US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

TECHNICAL MEMORANDUM
IMPACT OF DIOXIN REASSESSMENT

CENTREDALE MANOR RESTORATION
PROJECT SUPERFUND SITE
CONTRACT NO. W912WJ-11
DELIVERY ORDER NO. 0005

MAY 2012

SDMS DocID 509364

US EPA ARCHIVE DOCUMENT

31 May 2012

Ms. Anna Krasko
U.S. EPA Region I
5 Post Office Square, Suite 100
Boston, MA 02109

Subject: Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island
May 2012

Dear Ms. Krasko:

Please find enclosed two hardcopies and two electronic copies of the subject report prepared by AMEC Environment & Infrastructure, Inc. under contract to U.S. Army Corps of Engineers, New England District. One hardcopy and one electronic copy have also been transmitted to Lou Maccarone of the Rhode Island Department of Environmental Management. If you have any questions concerning this deliverable, please do not hesitate to contact us at (781) 245-6606.

Sincerely,
AMEC Environment & Infrastructure, Inc.

Michael J. Murphy
Project Manager

Allen J. Ikalainen
Program Manager

encl.

cc: Ms. Beverly Lawrence, U.S. Army Corps of Engineers, New England Division
Lou Maccarone, Rhode Island Department of Environmental Management
AMEC Project File

Correspondence:
107 Audubon Road, Building 2, Suite 301
Wakefield, Massachusetts 01880 USA
Tel: (781) 245-6606
Fax: (781) 246-5060 amec.com

US EPA ARCHIVE DOCUMENT

TECHNICAL MEMORANDUM – IMPACT OF DIOXIN REASSESSMENT

CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE

Prepared for:

U.S. EPA Region 1
5 Post Office Square, Suite 100
Boston, MA 02109

and

Department of the Army
U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, Massachusetts 01742

Contract No. W912WJ-11
Delivery Order No. 0005

Prepared by:

AMEC Environment & Infrastructure, Inc.
107 Audubon Road, Suite 301
Wakefield, Massachusetts 01880

MAY 2012

Prepared and Approved by:

Michael J. Murphy
Project Manager

Allen J. Ikalainen
Program Manager

US EPA ARCHIVE DOCUMENT

Table of Contents

1. INTRODUCTION 1-1

2. IMPACT ON HUMAN HEALTH RISK ASSESSMENTS 2-1
   2.1 Update to Previous Human Health Risk Assessments 2-1
   2.2 Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond 2-4
   2.3 Evaluation of Floodplain Soil at Lee Romano Field and Vicinity 2-7
   2.4 Baseline Human Health Risk Assessment for Source Area Soil 2-8

3. IMPACT ON HUMAN HEALTH PRELIMINARY REMEDIATION GOALS 3-1

4. IMPACT ON IDENTIFICATION OF TARGET CLEANUP LEVELS 4-1

5. IMPACT ON REMEDIAL FOOTPRINTS AND ASSOCIATED REMEDIAL COSTS 5-1
   5.1 Impacts on Remedial Footprints for CMRP Site Soil 5-1
   5.2 Impacts on Remedial Alternative Cost Estimates for CMRP Site Soil Alternatives 5-3

6. IMPACT ON RESIDUAL RISK CALCULATIONS 6-1

7. REFERENCES 7-1

Tables

Table 2-1 Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Table 2-2 Summary of Residential Soil Exposure Points and Risk Along Eastern Shore of Allendale and Lyman Mill Pond
Table 2-3 Summary Surface Soil Results on the East Bank of Lyman Mill Pond in the Vicinity of the Lee Romano Field
Table 2-4 Derivation of Ballfield Soil Risk Based Human health Screening Values – Direct Contact
Table 2-5 Risk Assessment Summary – Source Area

Table 3-1 PRGs for Fish Tissue, Sediment, Bank Soil, and Surface Soil
Table 3-2 Derivation of Surface Soil Based Human Health Preliminary Remediation Goals – Direct Contact
Table 4-1 Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soil
Table 5-1 Areas and Volumes of Soil Above the cleanup Goals at the CMRP Site
Table 6-1 Soil Residual Risks – Human Health
Table 6-29d Copy of Summary of Residual Risks for Ecological Health, Lyman mill Reach Stream Sediment and Floodplain Soil Action-Based Alternatives (Alternatives 3 and 5)

US EPA ARCHIVE DOCUMENT

Figures

Figure 2-1 Residential Soil Compared to Cleanup Goals – Allendale North
Figure 2-2 Residential Soil Compared to Cleanup Goals – Allendale South
Figure 2-3 Residential Soil Compared to Cleanup Goals – Lyman Mill North
Figure 2-4 Residential Soil Compared to Cleanup Goals – Lyman Mill South
Figure 2-5 Lee Romano Ballfield Soil Samples
Figure 2-6 Source Area Soil Samples
Figure 5-1 Dioxin in Surface Soil Relative to Proposed Cleanup Areas at the Source Area
Figure 5-2 Dioxin in Surface Soil Relative to Proposed Cleanup Areas at Allendale Reach
Figure 5-3 Dioxin in Surface Soil Relative to Proposed Cleanup Areas for Floodplain Soil at Lyman Mill Reach (including Oxbow)

Appendices

A Historical Risk Calculation Spreadsheets

B Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond and Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

B-1 Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond

Attachment A Risk Calculations for the Eastern Shore Residential Floodplain Soil Evaluations

B-2 Photographs Supporting the Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

C Source Area Baseline Human Health Risk Assessment

D Supporting Information for the Updates to the Human Health Risk-based PRGs

E Supporting Information for Evaluation of Impacts on Cleanup Goals

F Supporting Information for Evaluation of Impacts on Cost Estimates for Remedial Alternatives

US EPA ARCHIVE DOCUMENT

ACRONYMS AND ABBREVIATIONS

ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Restoration, Compensation, and Liability Act
CMRP	Centredale Manor Restoration Project
cy	cubic yards
EE/CA	Engineering Evaluation/Cost Analysis
EPC	Exposure Point Concentration
ft	feet
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
IRIS	Integrated Risk Information System
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
MRL	Minimal Risk Level
ng/kg	nanogram per kilogram
NAS	National Academy of Sciences
NCP	National Contingency Plan
NHPA	National Historic Preservation Act
NTCRA	Non-Time-Critical Removal Action
OSWER	Office of Solid Waste and Emergency Response
PCB	Polychlorinated Biphenyls
ppt	parts per trillion
pg/kg-day	picograms per kilogram-day
PRGs	Preliminary Remediation Goals
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose

RI	Remedial Investigation
RIDEM	Rhode Island Department of Environmental Management
RME	Reasonable Maximum Exposure
SVOCs	Semivolatile Organic Compounds
sq ft	square feet
TBC	To Be Considered
TCDD	Tetrachlorodibenzo-*p*-Dioxin
TEF	Toxicity Equivalence Factors
TEQ	Toxicity Equivalence
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

1. INTRODUCTION

This Technical Memorandum – Impact of Dioxin Reassessment updates the human health risk assessment supporting the Remedial Investigation (RI) Report (Battelle, 2005, MACTEC, 2004, MACTEC, 2005a, MACTEC, Inc. and Battelle, 2006), Preliminary Remediation Goals (PRG) Reports (MACTEC, 2005b, MACTEC and Battelle, 2011), Feasibility Study (FS) (Battelle, 2010), Addendum to the FS (Battelle, 2011), and the Proposed Plan (USEPA, 2011) for the Centredale Manor Restoration Project (CMRP) Superfund Site (hereafter referred to as "the Site") in North Providence, Rhode Island.

In February 2012, the United States Environmental Protection Agency (USEPA) released the first of two volumes entitled *Issues Related to Dioxin Toxicity and Response to NAS Comments Volumes 1 and 2 [Reanalysis Volumes 1 and 2]*). Taken together, the documents will respond to the recommendations and comments made for dose-response assessment of 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) exposures that were made in the 2006 National Academy of Sciences (NAS) report, *Health Risks from Dioxin and Related Compounds: Evaluation of the EPA Reassessment.*

Reanalysis Volume 1 (USEPA, 2012a) identified an oral Reference Dose (RfD) for non-cancer risk assessment of 2,3,7,8-TCDD (7×10^{-10} milligrams per kilogram per day [mg/kg/day]). Reanalysis Volume 2 will focus on dioxin cancer risk assessment and is currently under development.

An RfD for assessing non-cancer hazards was previously unavailable from USEPA. The RfD and other toxicity values are now published in the USEPA Integrated Risk Information System (IRIS) database (USEPA, 2012b). The Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-53, *Human Health Toxicity Values in Superfund Risk Assessments* (USEPA, 2003) identifies IRIS as a Tier I (preferred) source of toxicity values for Superfund sites that are regulated under the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA).

Consistent with the National Contingency Plan's (NCP's) preamble (see e.g., 55 Fed. Reg. 8666 at p. 8745 (March 8, 1990) and subsequent guidance (USEPA, 2003), the IRIS RfD is an appropriate toxicity value to use for establishing exposure levels that are protective of human health. Thus, this RfD is now the recommended value "to be considered" (TBC) for use in developing site-specific dioxin PRGs and cleanup levels under CERCLA and the NCP. PRGs are risk-based concentrations in media that are used as a starting point in developing cleanup levels. For example, the PRG calculated using the new RfD of 0.7 pg/kg-day (picograms per kilogram-day) and USEPA default residential exposure factors is 50 nanogram per kilogram (ng/kg) dioxin toxicity equivalence (TEQ) for residential soil and 664 ng/kg dioxin TEQ for soil in commercial/industrial settings. With the release of the Tier 1 IRIS RfD for TCDD, the Agency no longer relies on USEPA's 1998 *Approach for Addressing Dioxin in Soil at CERCLA and RCRA*

US EPA ARCHIVE DOCUMENT

Sites (USEPA 1998) or the proposed interim PRGs provided in the December 30, 2009 *Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites to establish PRGs*.

The RI, FS, and Proposed Plan have been prepared for the Site. Dioxins and furans (particularly 2,3,7,8-TCDD) and dioxin-like compounds (certain polychlorinated biphenyls (PCB) congeners) are significant contributors to elevated human health risks associated with various media evaluated for the Site. Prior to development of the RfD noted above, human health risk assessments did not evaluate non-cancer hazards associated with exposures to dioxins and furans and dioxin-like compounds. *Reanalysis Volume 1* recommends that the RfD for 2,3,7,8-TCDD be utilized in the calculation of non-cancer hazard quotients (HQs) associated with exposure to dioxin TEQ and dioxin-like PCB compounds TEQ (PCB TEQ).

Human health risks have previously been evaluated for human exposures to soils, sediments, surface water, and for the consumption of biota from the Woonasquatucket River. Therefore, prior to the release of *Reanalysis, Volume 1*, evaluations of the need for remedial action with respect to dioxins and furans and dioxin-like compounds for the Site have previously been conducted based only on the potential carcinogenic risks associated with those compounds. Consequently, PRGs, medium-specific cleanup goals, remedial alternatives, remedial footprints, and expected post-remedy residual risks for dioxin TEQ and PCB TEQ were also based only on the potential carcinogenic risks associated with those compounds (and not the non-cancer hazards).

Residential-use soils impacted by dioxins and furans have been addressed at the site by the application of the 1998 USEPA *Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites,* OSWER Directive 9200.4-26 (USEPA, 1998). That directive indicates that USEPA should generally use 1,000 ng/kg (dioxin TEQ) as a starting point for residential-use soil cleanup levels for CERCLA non-time critical removal sites (and time permitting, for emergency and time critical sites) and as a PRG for remedial sites. The 1998 Directive indicates the cancer risk associated with 1,000 ng/kg dioxin TEQ in residential-use soil is approximately 2.5×10^{-4}. Using the recently published oral RfD, the HQ associated with 1,000 ng/kg dioxin TEQ in residential-use soil is approximately 20. Human health risk calculations have not previously been conducted for residential properties associated with the Site as a component of the RI or FS, but residential-use soil risks were evaluated in the risk assessment included in the Engineering Evaluation/Cost Analysis (EE/CA). The 1998 Directive indicates that when the Dioxin Reassessment is completed, the dioxin soil cleanup levels will be revisited. In addition, the *Action Memorandum: Non-Time-Critical Removal Action* (USEPA, 2001a) states the following:

It is anticipated that following issuance of the final dioxin reassessment report, OSWER will issue guidance, informed by the reassessment effort that will provide a basis for the selection of dioxin cleanup levels. In accordance with the 1998 Guidance, USEPA intends to review the Action Memorandum promptly following the release and analysis of the reassessment report

and OSWER guidance, and if necessary, to make changes to the Action memorandum and cleanup actions, based on the information contained in the reassessment report and the OSWER guidance.

In December 2009, USEPA released the *Public Review Draft, Draft Recommended Interim Preliminary Remediation Goals For Dioxin In Soil At CERCLA AND RCRA Sites* (OSWER 9200.3-56). That review draft included proposed interim human health risk-based PRGs for residential and industrial land use scenarios, based on both cancer risk and non-cancer risk. The recommended residential soil PRG in that document was 72 ng/kg. This value was based on the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Level (MRL), which is based on non-cancer effects, at Tier III of the USEPA hierarchy of toxicity values (USEPA, 2003). The PRG of 72 ng/kg was considered in Appendix N of the 2010 FS as a possible PRG in anticipation of the release of *Reanalysis, Volume 1*. With the actual release of *Reanalysis, Volume 1*, there is a need to calculate a new PRG value, using the newly published Tier I RfD.

With the recent release of the *Reanalysis Volume 1* and the publication of the oral RfD for 2,3,7,8-TCDD in the USEPA IRIS database, it is appropriate to revisit the findings of the RI, FS, and Proposed Plan to confirm that human health risks associated with dioxins and furans and dioxin-like compounds are appropriately evaluated.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

2. IMPACT ON HUMAN HEALTH RISK ASSESSMENTS

This section of the Technical Memorandum evaluates the impact of the newly published oral RfD for 2,3,7,8-TCDD on human health risk considerations with respect to the RI, FS, and the Proposed Plan. This section discusses an update of previously conducted human health risk assessments, presents a human health risk assessment for residential floodplain soil on the eastern shore of Allendale Pond and Lyman Mill Pond, evaluates the human health risks for floodplain soil for the Lee Romano Field and vicinity (eastern shore of the northern portion of Lyman Mill Pond), and presents a baseline human health risk assessment (BHHRA) for the Source Area (potential future risk in the absence of capping).

2.1 Update to Previous Human Health Risk Assessments

The following is an update to the BHHRA (MACTEC, 2005a) and the Oxbow Area Addendum to the BHHRA (MACTEC and Battelle, 2006). In the following sections, the impact of the recently published oral RfD for 2,3,7,8-TCDD on the human health non-cancer risk estimates that were calculated in the previous risk assessments is evaluated. This has been accomplished by utilizing previously identified dioxin TEQ exposure point concentrations (EPCs) and associated daily intakes of dioxin TEQ and of PCB TEQ in conjunction with the newly published oral RfD for 2,3,7,8-TCDD to calculate non-cancer hazard (HQ) for dioxin TEQ and PCB TEQ. HQs have been calculated for (select) receptors and exposure points and all media (combined fish diet, sediment, surface water, bank soil, and floodplain soil).

The following equation is used to determine the HQ:

$$HQ_i = \frac{I_i}{RfD_i}$$

where:

HQi	=	hazard quotient of chemical i
Ii	=	intake of chemical i averaged over the exposure period (mg/kg-day)
RfDi	=	Reference Dose for chemical i corresponding to the same exposure duration as the intake (mg/kg-day)

HQ calculations for dioxin TEQ and PCB TEQ have been conducted for the following media and exposure scenarios that had been evaluated in previous human health risk assessments:

- Resident Living Along the River – Allendale Pond

US EPA ARCHIVE DOCUMENT

  - Sediments – ingestion and dermal contact
  - Surface water – ingestion and dermal contact
  - Combined fish diet
  - Bank Soil – western shore of Allendale Pond – ingestion and dermal contact – this is a component of the Allendale Floodplain Soil Cleanup Area identified in the Proposed Plan.
- Visiting Recreational Angler – Allendale Pond
  - Sediments – ingestion and dermal contact
  - Surface water – ingestion and dermal contact
  - Combined fish diet
- Resident Living Along the River – Lyman Mill Pond Reach
  - Sediments – ingestion and dermal contact
  - Surface water – ingestion and dermal contact
  - Combined fish diet
- Visiting Recreational Angler – Lyman Mill Pond Reach
  - Sediments – ingestion and dermal contact
  - Surface water – ingestion and dermal contact
  - Combined fish diet
- Worker at Fogarty Center (located east of Lyman Mill Pond Reach)
  - Surface soil – ingestion and dermal contact
- Passive Recreational Visitor – Oxbow Area (located west of Lyman Mill Pond Reach)
  - Surface soil – ingestion and dermal contact

Table 2-1 documents the calculation of HQs for dioxin TEQ and PCB TEQ for the exposure scenarios previously evaluated in the *Interim Final Baseline Human Health Risk Assessment* (MACTEC, 2005a) and the *Addendum to the Interim Final Baseline Risk Assessment: Oxbow Area, Part I – Human Health* (MACTEC AND Battelle, 2006). Appendix A contains copies of the original spreadsheets that are the source of the EPCs and daily intakes that are shown in Table 2-1. As can be seen in Table 2-1, HQ is calculated separately for dioxin TEQ and PCB TEQ for each medium, exposure point, receptor, and exposure route combination. The previously calculated cumulative hazard index (HI) (excluding dioxin TEQ and PCB TEQ) is also presented in the table to provide context.

The dioxin TEQ and PCB TEQ HQs are less than or equal to 1 for each receptor, medium, and age group at the background locations (Assapumpsett Pond and Greystone Mill Pond).

US EPA ARCHIVE DOCUMENT

For Allendale Pond, dioxin TEQ HQs for the combined fish diet for the Visiting Recreational Angler range from 83 (adult) to 129 (child) and the HQs for each of the other media are less than or equal to 1. For Allendale Pond, HQs for the combined fish diet for the Resident Living Along the River range from 83 (adult) to 129 (child) and the HQs for direct contact with sediments range from 1 to 16. The HQs for other media for Allendale Pond and the Resident Living Along the River are less than or equal to 1.

For Lyman Mill Pond, dioxin TEQ HQs for the combined fish diet for the Visiting Recreational Angler range from 101 (adult) to 159 (child) and the HQs for each of the other media are less than or equal to 1. For Lyman Mill Pond, HQs for the combined fish diet for the Resident Living Along the River range from 101 (adult) to 159 (child) and the HQs for direct contact with sediments range from 2 to 24. The HQs for other media (surface water) for Lyman Mill Pond and the Resident Living Along the River are less than or equal to 1.

For the Fogarty Center, located on the eastern shore of Lyman Mill Pond, the dioxin TEQ HQ for surface soil ingestion and dermal contact for the adult worker is 0.004. There are no PCB TEQ data for surface soil at the Fogarty Center. The reassessment of the human health risks does not indicate any additional need to consider the Fogarty Center surface soils with respect to future remediation.

As presented in previous reports, the worker cancer risk for surface soil at the Fogarty Center was calculated as 2×10^{-5} (within the Superfund risk range of 10^{-6} to 10^{-4}). Most of that risk is contributed by benzo(a)pyrene (maximum concentration of 5.1 milligrams per kilogram (mg/kg), with the other two detections quite low). The benzo(a)pyrene cancer risk was 1×10^{-5}. The maximum detected concentration was used as the EPC. Arsenic was the other chemical with cancer risk greater than 1×10^{-6}. The arsenic concentrations were 11.5 mg/kg, 9.98 mg/kg, and 9.77 mg/kg. These concentrations are slightly above the Rhode Island published background number of 7 mg/kg, but do not suggest site impacts.

The 2,3,7,8-TCDD concentrations reported for the surface soils at the Fogarty Center are very low (2.01 parts per trillion (ppt), 3.18 ppt, and 2.65 ppt). All of these concentrations are below the average background concentration of 2,3,7,8-TCDD in floodplain soil background samples (17 ppt). The dioxin TEQ concentrations in the three samples at the Fogarty Center were also very low (5.11 ppt, 4.97 ppt, and 6.64 ppt). These concentrations are suggestive of background conditions rather than site impacts.

For Manton Pond, dioxin TEQ HQs for the combined fish diet for the Visiting Recreational Angler range from 8 (adult) to 13 (child) and the HQs for each of the other media are less than or equal to 1. For Manton Pond, HQs for the combined fish diet for the Resident Living Along the River range from 8 (adult) to 13 (child) and the HQs for direct contact with sediments range from 0.2 (adult) to 3 (child). The HQs for other media (surface water) for Manton Pond and the Resident Living Along the River are less than or equal to 1.

US EPA ARCHIVE DOCUMENT

For Dyerville Pond, dioxin TEQ HQs for the combined fish diet for the Visiting Recreational Angler range from 21 (adult) to 32 (child) and the HQs for each of the other media are less than or equal to 1. For Dyerville Pond, HQs for the combined fish diet for the Resident Living Along the River range from 21 (adult) to 32 (child) and the HQs for other media (sediment and surface water) for Dyerville Pond and the Resident Living Along the River are less than or equal to 1.

For PCB TEQ, HQ ranged from 9 to 14 for the Visiting Recreational Angler and Resident Living Along the River combined fish diet at Allendale Pond, and were less than 1 for direct contact with sediments. For PCB TEQ, HQ ranged from 11 to 17 for the Visiting Recreational Angler and Resident Living Along the River combined fish diet at Lyman Mill Pond, and were less than 1 for direct contact with sediments. No dioxin-like PCB Congener data were available for media at Manton Pond, so HQs could not be calculated. For Dyerville Pond, dioxin-like PCB Congener data were available for only sediment. The HQs for PCB TEQ were well below 1 for the Visiting Recreational Angler and Resident Living Along the River direct contact sediment exposure.

For the Oxbow Area (Human Health Concern Area), the HQs for dioxin TEQ for the Passive Recreational Visitor direct soil contact were well below 1. No PCB TEQ data were available for soil in the Oxbow Human Health Concern Area. For the Oxbow Area (Oxbow General Area), the HQs for dioxin TEQ for the Passive Recreational Visitor direct soil contact were below 1 for the adolescent and adult, but the HQ was 4 for the child. No PCB TEQ data were available for soil in the Oxbow General Area.

2.2 Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond

As discussed in Section 1.0, the publication of the non-cancer RfD for dioxin in the Final Non-Cancer Dioxin Reanalysis triggers the re-evaluation of dioxin-related non-cancer hazards and the associated PRGs and cleanup goals. The following section summarizes that re-evaluation of human health risks for residential-use floodplain soils along the eastern shore of Allendale Pond and Lyman Mill Pond. The following section employs, in a streamlined risk assessment approach, risk-based PRGs for residential soils that are documented and discussed in Section 3.0 of this technical memorandum.

Cancer risks and non-cancer hazards have been characterized for residential land use of the properties identified by Plat and Lot numbers identified in Table 2-2. The following risk calculations were conducted for dioxin TEQ, benzo(a)pyrene, dibenz(a,h)anthracene, arsenic, and PCB TEQ (at one exposure point only). These analytical parameters had previously been identified as contaminants associated with elevated risks for direct contact exposures for sediments at Allendale Pond and Lyman Mill Pond. These parameters were the focus of this evaluation of floodplain soils, since the conceptual site model suggests that these parameters would likely be transported from the ponds to the floodplain during storm and flood events.

US EPA ARCHIVE DOCUMENT

Table 2-2 identifies the cumulative cancer risk for each exposure area and also identifies the HQ for each of the analytical parameters detected and evaluated at each exposure area. These risk estimates have been compared to the remedial action objective (RAO) corresponding to 10^{-5}cancer risk and the HQ threshold of 1. This information supported identifying areas warranting further consideration of remedial alternatives and additional pre-design sampling requirements.

In Table 2-2, cancer risks greater than $10^{-5}$and HQs greater than 1 are flagged with yellow shading. As shown in that table, a large number of exposure areas are associated with calculated cancer risks greater than 10^{-5} and a similar number of exposure areas are associated with calculated HQs greater than 1. Figures 2-1 through 2-4 summarize the health risk in the context of risk-based RAOs and identify which sample locations are associated with analytical parameter concentrations greater than target cleanup goals (for dioxin TEQ, PAHs, and arsenic). These figures also identify the dioxin TEQ concentration at each of the locations included in this evaluation.

The evaluation of the residential-use floodplain soils along the eastern shore of Allendale Pond and Lyman Mill Pond is described below and further documented in the tables of Appendix B-1. The risk calculations are detailed in the tables included in Attachment A to Appendix B-1, including the risk calculation tables for each of the exposure areas. Those tables are presented in the same order listed in Table 2-2. Allendale Pond surface soil tables include Tables APB-SS-1 through APB-SS-28, Allendale Pond subsurface soil tables include Tables APB-SUB-1 through APB-SUB-17, and Lyman Mill Pond surface soil tables include Tables LPX-SS-1 through LPX-SS-20. These tables identify the calculated cancer risk and non-cancer hazard for each of the analytical parameters evaluated. Note that although dioxin TEQ is often the largest risk contributor, that is not always the case.

The following text summarizes the selection of analytical data for this evaluation as well as the procedure utilized for the risk calculations.

The initial step in the process was to update the dioxin TEQ concentrations of all soil samples by consistently applying Toxicity Equivalence Factors (TEFs) from USEPA 2010 guidance to dioxin/furan congener data associated with samples from all of the different sampling events. A list of potential candidate soil samples for the eastern shore floodplain soil evaluation was compiled (Table B-1-1 in Appendix B-1).

From the list of candidate soil samples, soil samples were selected for the eastern shore of Allendale Pond, excluding Source Area samples. Samples also were selected for the eastern shore of Lyman Mill Pond, excluding the Fogarty Center and samples collected in the area of Lee Romano Field that were used to evaluate potential exposures for visitors to that field. For the purposes of this evaluation, soil samples were selected 1) if they were collected within the 100-year floodplain (using the floodplain boundary utilized in the FS or 2) they were collected outside the 100-year floodplain but the dioxin/furan signature appears to be site-related. The

US EPA ARCHIVE DOCUMENT

samples were determined to be site-related when the 2,3,7,8-TCDD concentration accounts for at least 80% of the dioxin TEQ concentration and the 2,3,7,8-TCDD concentration is greater than the maximum detected concentration of 2,3,7,8-TCDD among the Greystone Mill Pond "background" floodplain soil samples. Table B-1-1 documents the selection of samples retained for this screening and identifies samples selected for the eastern shore of Allendale Pond, and separately, for the eastern shore of Lyman Mill Pond.

Figures 2-1 through 2-4 identify the locations of the surface soil samples selected for this screening evaluation.

The soil samples and the associated analytical data were then separated into three sample groupings:

- Allendale Pond eastern shore surface soil samples collected in the 0-1 feet below ground surface (ft bgs) interval (Table B-1-2 identifies those samples and the chemical analyses that were conducted for each sample). The number shown in a given column (e.g., VOCs) indicates the number of results and therefore the number of analytes reported for that parameter group for that sample).
- Allendale Pond eastern shore subsurface soil samples (collected within the 1-10 ft bgs interval) as shown in Table B-1-3. Most samples were collected shallower than 10 ft because the water table is shallow.
- Lyman Mill Pond surface soil samples as shown in Table B-1-4.

Analytical data summaries were prepared for each of the three soil sample groupings (Tables B-1-5, B-1-6, and B-1-7). In addition, to provide perspective in the context of the risk-based RAOs, Table B-1-8 was prepared to identify all soil samples with a dioxin TEQ concentration greater than 35 ng/kg that is associated with a cancer risk of 10^{-5} for residential-use soil, as derived in Section 3 of this Technical Memorandum. The same table indicates if each concentration is greater than the associated human health non-cancer risk-based PRG (HQ=1 for a child) for residential soil (50 ppt).

A streamlined approach was employed to provide an estimate of cancer risk and non-cancer hazards associated with the analytical data associated with each exposure area identified in Table 2-2. Table APB-SS-1 in Attachment A of Appendix B-1 is an example of a risk calculation spreadsheet. The estimated risks were calculated, for each property separately, by first identifying the maximum concentration of each of the previously identified sediment contaminants associated with elevated risks. The cancer risk and non-cancer HQ were then calculated using the ratio of the maximum concentration to its respective cancer risk-based residential soil PRG (cancer risk of 10^{-6}) and separately, non-cancer risk-based PRG (HQ=1). The ratio using the cancer risk-based PRG was multiplied by 10^{-6} to estimate a cancer risk and the ratio based on the non-cancer PRG was identified as the HQ. The PRGs for residential

US EPA ARCHIVE DOCUMENT

cancer risk and the non-cancer hazard are identified in each of the risk calculation tables in Attachment A of Appendix B-1. The derivation of those PRGs is documented in Section 3.0 of this Technical Memorandum.

There are, as in any risk assessment, uncertainties associated with this risk assessment exercise for the residential land use eastern shore floodplain soil. This risk assessment utilizes the available information, and the number of soil samples available for each exposure area is limited. Therefore, the Pro-UCL software was not used to calculate 95% upper confidence limit (UCLs). In addition, the analytical data associated with the small number of samples for each exposure area may not be fully representative of potential exposures; more sampling may be appropriate to characterize potential exposure/risk. In most cases there are fewer than 4 samples with dioxin data and only one sample with metals, semivolatile organic compounds (SVOCs), and pesticides data.

2.3 Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

This section evaluates the dioxin soil information at and in the vicinity of the Lee Romano Field (143 Waterman Avenue), located on the eastern shore of the northern end of Lyman Mill Pond. The evaluation has been conducted to determine if the ball field is impacted by the Site and if it should be included as an action area. The ball field is a well-maintained, fenced ball field. The stands are located in paved areas outside the fence of the actual ball field, and younger children or adults who are spectators at the ball field would have little opportunity to contact soils at the ball field. It appears that athletes would have potential for exposure primarily through participation in formal baseball or softball league play. There were samples collected in the vicinity of the ball field and adjacent to the Tri-Town Community Center located on Maple Street and adjacent to the ball field. Much of the perimeter of the Community Center building is paved, with little or no opportunity for visitors or employees to contact soils at that location. Appendix B-2 contains recent photographs of the ball field area.

Table 2-3 includes a summary of the available analytical data associated with soil samples collected at and in the vicinity of the Lee Romano Field. Sample locations are shown in Figure 2-5. As shown in Table 2-3, 10 samples were analyzed for only 2,3,7,8-TCDD and 2,3,7,8-TCDD was not detected in any of those samples (reporting limits range from 332 ng/kg to 493 ng/kg). Five other samples were analyzed for 2,3,7,8-TCDD and other dioxin/furan congeners. The dioxin TEQ concentrations ranged from 0.67 ng/kg to 4.7 ng/kg.

Table 2-4 identifies a 2,3,7,8-TCDD (and dioxin TEQ) health risk-based screening level for a 7 to 18 year old athlete who may play baseball or softball at the field. The screening level is based on a recreational exposure scenario, with potential soil exposure 180 days per year. The non-cancer screening level (HQ = 1) is 496 ng/kg and the cancer risk screening level (cancer risk of 10^{-5}) is 280 ng/kg. A comparison of the analytical results to the screening level indicates

US EPA ARCHIVE DOCUMENT

that the detected concentrations of 2,3,7,8-TCDD and the associated calculated dioxin TEQ concentrations are well below the human health screening levels and soils at and in the vicinity of the Lee Romano Field are not impacted by the site and need not be considered further.

2.4 Baseline Human Health Risk Assessment for Source Area Soil

The BHHRA for Source Area soil has been conducted in accordance with USEPA CERCLA requirements and guidance and USEPA Region 1 guidance. The risk assessment evaluates a potential future residential land use scenario under the assumption that the current caps and pavement are not present (or are not effective in preventing direct contact exposure) and the soils could be accessible to residential receptors (child, older child, and adult) of all ages. The entire BHHRA for the Source Area is included in Appendix C.

Soil ingestion and dermal contact and potential inhalation of soil-derived dust have been evaluated for the potential future residential receptors. In addition, an adult construction worker exposure scenario for soil contact (ingestion and dermal contact) and inhalation of soil-derived dust has been evaluated in the risk assessment. The potential future residential exposure scenario and risk assessment provide a conservative estimate of exposures and risks for land uses, and therefore, other land uses (industrial, commercial, recreational) for the Source Area have not been explicitly evaluated in the baseline risk assessment.

Surface soil samples (collected within the top 12 inches of the soil) and soils collected from the 1 to 5 ft bgs interval (average depth to water table) were evaluated separately for the residential receptors. Soils within the top 5 feet of the soil column have been evaluated for the potential future construction worker.

The baseline risk assessment included data associated with soil samples collected from within the proposed remedial footprint shown on Figure 3-5 of the FS plus the area of the Brook Village property that is north of the proposed remedial footprint and south of Route 44 (collectively, the expanded remedial footprint). Figure 2-6 identifies the area evaluated in this Source Area soil risk assessment and it also identifies the locations of soil samples within that area that were utilized in the risk assessment. The baseline risk assessment considered the available validated analytical data for soil samples collected from within the source area. Soil samples from within the area excavated as part of the 2010 groundwater removal action under the Brook Village parking lot and along the Woonasquatucket River bank were excluded from the evaluation, since they are no longer representative of site soils.

The baseline risk assessment utilized USEPA published toxicity values as well as toxicity values obtained from sources that are recommended by USEPA (USEPA, 2003) for all contaminants evaluated. The risk assessment included the Reasonable Maximum Exposure (RME) scenario. The risk assessment information has been documented in tabular form using tables consistent with USEPA Risk Assessment Guidance for Superfund (RAGS) Part D requirements (USEPA,

US EPA ARCHIVE DOCUMENT

2001b). The entire Source Area footprint has been considered as one exposure point (or area). The EPCs have been calculated consistent with USEPA guidance using the USEPA Pro-UCL Software (Version 4.1). The EPCs are the lower of the maximum detected concentration and the 95% UCL on the mean concentration.

The assumptions, procedures, and techniques employed in the risk assessment as well as the results and conclusions are documented in the complete BHHRA report included in Appendix C.

The results and conclusions of the BHHRA for the Source Area soils are as follows.

The human health risks for the Source Area soils are summarized in Table 2-5. Three scenarios were evaluated: potential future residential exposure to surface soil (assuming the existing caps are no longer present or no longer effectively prevent direct contact exposure); potential future residential exposure to subsurface soil (assuming the subsurface soil could be brought to the surface and existing caps are no longer present or no longer effectively minimize direct contact exposure); and a potential future construction scenario with a construction worker potentially exposed to soils within five feet of the land surface (the approximate depth of the water table).

For the potential future residential exposure to surface soil, the total (summed across age groups) surface soil cancer risk for the future resident in the Source Area is 4×10^{-3}, which is above the upper end of the Superfund cancer risk range and the 10^{-5} RAO. The highest non-cancer HI among the age groups in Source Area is 305, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to this HI is Aroclor-1232. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

For the potential future residential exposure to subsurface soil, the total (summed across age groups) subsurface soil cancer risk for the future resident in the Source Area is 2×10^{-3}, which is above the upper end of the Superfund cancer risk range and the 10^{-5} RAO. The highest non-cancer HI among the age groups in the Source Area is 109, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to the HI is Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

For the potential future construction scenario with a construction worker potentially exposed to soils within five feet of the land surface in the Source Area, the total soil cancer risk is 5×10^{-5}, which is within the Superfund cancer risk range, but above 10^{-5}. The non-cancer HI for the construction worker in the Source Area is 15. This HI is associated with the Immune System. The largest chemical contributor to this HI is ingestion of Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

US EPA ARCHIVE DOCUMENT

3. IMPACT ON HUMAN HEALTH PRELIMINARY REMEDIATION GOALS

The human health PRG tables in the *Interim Final Preliminary Remediation Goals Report, Part I – Human Health* (Battelle, 2005b) and the *Addendum to the Interim Final Preliminary Remediation Goals Report: Oxbow Area, Part I, Human Health* (MACTEC, 2011) have been updated using the recently published oral RfD for 2,3,7,8-TCDD. Only the non-cancer hazard-based PRGs for dioxin TEQ and PCB TEQ have been revised and those revisions are shown in Table 3-1. Table 3-1 presents the PRGs for combined fish tissue (fish diet), sediment direct contact, sediment (fish bioaccumulation), bank soil (west bank of Allendale Pond), and floodplain soil (Oxbow Area) for the receptors previously evaluated. This is primarily the Resident Living Along the River (this receptor does not involve any exposures at a person's residence), Visiting Recreational Angler, and the Passive Recreational Visitor. Table 3-1 also includes an updated Table 5-2 from the Interim Final PRG Report (MACTEC, 2005b).

Table 3-1 indicates that for all media evaluated and for receptors involving a child age group, the non-cancer hazard-based PRG (at HQ = 1) for dioxin TEQ or PCB TEQ is more stringent (i.e., lower concentration) than the corresponding cancer risk-based PRG if the target cancer risk is greater than approximately 10^{-5}.

In addition, human health PRGs for cancer and non-cancer risk for residential soils have been calculated to assist in the risk evaluation for the Allendale Pond and Lyman Mill Pond eastern shore floodplain soil evaluation presented in Section 2.2 above. The previous PRG reports (MACTEC, 2005b and MACTEC and Battelle, 2011) had not included residential-use soil PRGs, since residential-use soils had not been included in the BHHRA or Oxbow addendum. The residential-use soils had previously been addressed by the 1,000 ng/kg Non-Time-Critical Removal Action (NTCRA) remedial goal identified in the USEPA Directive 9200.4-26 (USEPA, 1998). The residential-use soil PRGs and the equations utilized in deriving those PRGs are included in Table 3-2. The assumed exposure parameters for the child, adolescent, and adult resident that were used in the PRG derivation are also shown in Table 3-2. The cancer risk-based (10^{-5} cancer risk) residential soil PRG was identified as 35 ppt and the non-cancer residential soil PRG (HQ = 1) was identified as 50 ppt.

Supporting information for the updates to the human health risk-based PRGs is contained in Appendix D.

US EPA ARCHIVE DOCUMENT

4. IMPACT ON IDENTIFICATION OF TARGET CLEANUP LEVELS

This section describes the impacts on cleanup goals developed in the FS (Battelle, 2010 and 2011) from the release of the *Reanalysis Volume 1* and the publication of the oral RfD for 2,3,7,8-TCDD in the USEPA IRIS database (USEPA, 2012b), which resulted in revisions to risk-based PRGs for contaminated media at the Site as described in Section 3.0.

The general approach and rationale used to develop cleanup goals for contaminated media at the Site is presented in Section 3.4 and Appendix F of the FS (Battelle, 2010 and 2011). Overall, the cleanup goals are used to delineate the proposed cleanup areas and are based on an evaluation of potential applicable or relevant and appropriate requirements (ARARs) and TBC criteria, risk-based PRGs and site background data. Cleanup goals for site sediment and soil are updated in this Technical Memorandum to consider changes to the risk-based PRGs resulting from the release of the *Reanalysis Volume 1* and the publication of the oral RfD for 2,3,7,8-TCDD in the USEPA IRIS (USEPA, 2012b), which resulted in updates to human health risk-based PRGs for site sediment and recreational-use soil, as well as newly calculated human health risk-based PRGs for residential-use soil.

Allendale and Lyman Mill Sediment. Cleanup goals for site sediment are based on the PRG or background, whichever is higher (see Appendix E, Table E-1) for comparison of PRGs to site data). PRGs include cancer and non-cancer risk-based concentrations and are based on the most sensitive receptor for the respective exposure pathway. For carcinogenic effects, the PRG associated with 10^{-6} risk was used. For non-carcinogenic effects and ecologically-protective PRGs, the PRG associated with target (HQ of 1), was used.

The cleanup goal evaluation performed in the FS (Battelle, 2010) has been updated in this Technical Memorandum to consider the non-cancer PRGs for 2,3,7,8-TCDD and PCB TEQ (Section 3.0, Table 3-1), which have been calculated based on USEPA's *Dioxin Reanalysis Volume I* (USEPA, 2012a).

Overall, cleanup goals developed in the FS (Battelle, 2010) for 2,3,7,8-TCDD and PCB TEQ in site sediment are not impacted by USEPA's *Dioxin Reanalysis Volume I* because the PRGs for these contaminants are below background[1], and, as a result, the cleanup goals continue to be based on background conditions. Nor are fish tissue target concentrations (i.e., biota tissue targets) developed in the FS (Battelle, 2010) for Allendale and Lyman Mill Ponds impacted by USEPA's *Dioxin Reanalysis Volume I* because these concentrations were derived using sediment cleanup goals, which have not changed and, in the majority of cases, are based on

[1] Combined fish diet PRGs for 2,3,7,8-TCDD and coplanar PCB TEQ are less than or similar to background (see Table E-1 in Appendix E for complete data):

- 2,3,7,8-TCDD: 10^{-6} cancer risk PRG = 0.5 ng/kg and non-cancer HQ of 1 PRG = 16 ng/kg compared to background 15 ng/kg.
- Coplanar PCB TEQ: 10^{-6} cancer risk PRG = 0.0058 ng/kg and non-cancer HQ of 1 PRG = 0.19 ng/kg compared to background 25 ng/kg.

background conditions. These concentrations will be an important tool in evaluating monitoring data and assessing compliance with RAOs.

Allendale and Lyman Mill Reach Soil (including the Oxbow). Cleanup goals for site soil are based on an evaluation of potential ARARs, TBCs, PRGs and site background data, such that the proposed cleanup goal is based on the PRG or ARAR/TBC whichever is lower, or background if it is higher. Potential ARARs include Rhode Island Department of Environmental Management (RIDEM's) residential direct exposure and GB leachability criteria (RIDEM, 2011). TBCs include USEPA's recommended residential level for PCB in soil (USEPA, 1990). PRGs include cancer and non-cancer risk-based concentrations and are based on the most sensitive receptor with respective exposure pathway. As described above for site sediment, the lowest risk level value (PRG associated with 10^{-6} risk) was used for carcinogenic effects and the PRG associated with target HQ of 1 was used for non-carcinogenic effects and ecologically-protective PRGs.

The cleanup goal evaluations performed in the FS (Battelle, 2010 and 2011) have been updated in this Technical Memorandum to consider PRGs for recreational-use soil on the western bank of Allendale Pond (Section 3.0, Table 3-1), newly calculated PRGs for residential-use soil at the eastern shore of Allendale and Lyman Mill Ponds (Section 3.0, Table 3-2), and non-cancer PRGs for recreational-use soil at the Oxbow (Section 3.0, Table 3-1). Proposed cleanup goals are summarized in Table 4-1; detailed evaluations are presented in Appendix E, Table E-2.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

5. IMPACT ON REMEDIAL FOOTPRINTS AND ASSOCIATED REMEDIAL COSTS

This section describes the impacts on the remedial footprints (or cleanup areas) and alternative cost estimates developed in the FS (Battelle, 2010 and 2011) from USEPA's *Dioxin Reanalysis Volume I* (USEPA, 2012), which resulted in revisions to cleanup goals for recreational-use and residential-use soil at the Site (see Section 4.0). Cleanup areas and alternative cost estimates for the Site sediment are not impacted because USEPA's *Dioxin Reanalysis Volume I* did not impact cleanup goals for this medium (Section 4.0).

5.1 Impacts on Remedial Footprints for CMRP Site Soil

The approach used to delineate proposed areas and volumes of contaminated soil for cleanup at the Site is presented in Section 3.5 and Appendix G of the FS (Battelle, 2010 and 2011). Overall, the proposed cleanup areas encompass all sampling locations with contaminant concentrations above the cleanup goals. The estimated volumes are based on the removal depth needed to reach the cleanup goals, but do not include any allowance for over-excavation or over-dredging that may be needed to perform the remediation. Allowances for over-excavation are included in the remedial alternatives evaluated in detail in the FS. Cleanup areas as conveyed in the FS and this Technical Memorandum are conceptual; more precise cleanup areas will be developed during the remedial design as described in the FS (Battelle, 2010).

Proposed cleanup areas for soil at the Source Area and Allendale and Lyman Mill Reach action areas are updated in this Technical Memorandum based on a comparison of site soil data to the revised cleanup goals presented in Table 4-1 and Section 4.0. Areas and estimated volumes for cleanup of Site soil are summarized in Table 5-1.

Source Area Soil. The proposed cleanup areas for Source Area soil are shown in Figure 5-1. The spatial extent of the proposed cleanup areas encompass nearly the entire Source Area except the Brook Village and Centredale Manor apartment buildings and some small paved and landscaped areas east of Brook Village and north of Cap Area 3 (Figure 5-1). All locations with concentrations of 2,3,7,8-TCDD above the cleanup goal for residential-use (17 ng/kg) soil are encompassed within the proposed cleanup areas (Figure 5-1). Areas with concentrations of other contaminants (e.g., PCB) at levels above the cleanup goals[2] generally represent a smaller area within the 2,3,7,8-TCDD footprint, indicating that cleanup for 2,3,7,8-TCDD will address the other contaminants as well.

[2] Source Area soil cleanup goals are based on potential ARARs (see Table 3-6 in the FS [Battelle, 2011]).

US EPA ARCHIVE DOCUMENT

The 7.8 acre cleanup area proposed in the FS (Battelle, 2010) is expanded in this Technical Memorandum to include landscape areas north of the Brook Village apartment building, where concentrations of 2,3,7,8-TCDD in surface soil are above the cleanup goal for residential-use soil (17 ng/kg). This expanded cleanup area is approximately 11,500 square feet (sq ft), with a removal volume of 430 cubic yards (cy). The vertical extent is assumed to be 1 foot based on limited sub-surface data, but will be confirmed during remedial design.

Allendale Reach Floodplain Soil. The proposed cleanup areas for Allendale Reach floodplain soil are shown in Figure 5-2. The spatial extent of the proposed cleanup areas encompass contaminated floodplain soil along the west bank of the Woonasquatucket River, floodplain areas east of Cap Area 3 and floodplain areas abutting Allendale Pond. All locations with concentrations of 2,3,7,8-TCDD above the cleanup goals (Table 4-1) are encompassed within the proposed cleanup areas (Figure 5-2).

The 1.5 acre cleanup area proposed in the FS (Battelle, 2010) is expanded in this Technical Memorandum to include floodplain areas where dioxin concentrations are above the cleanup goal for recreational- and/or residential-use soil (Table 4-1). Concentrations of other contaminants (e.g., arsenic) in floodplain soil at Allendale Reach are below the cleanup goals, which are based on background conditions (Table 4-1). This expanded cleanup area is approximately 72,300 sq ft, with a removal volume of 4,200 cy. The vertical extent is assumed to be 1 foot based on limited sub-surface data, but will be confirmed during remedial design.

Lyman Mill Reach Floodplain Soil (including Oxbow). The proposed cleanup areas for Lyman Mill Reach floodplain soil are shown in Figure 5-3. The spatial extent of the proposed cleanup areas encompass contaminated floodplain soil[3] within the old mill raceway connecting Allendale and Lyman Mill Ponds, the Oxbow area, and floodplain areas abutting Lyman Mill Pond. All locations with concentrations of 2,3,7,8-TCDD above the cleanup goals (Table 4-1) are encompassed within the proposed cleanup areas (Figure 5-3).

The 28.7 acre cleanup area proposed in the FS (Battelle, 2011) to protect human health (Oxbow area) and wildlife is expanded in this Technical Memorandum to include the entire eastern shore of Lyman Mill Pond where dioxin and other contaminant concentrations are above the cleanup goals for residential-use soil (Table 4-1). This expanded cleanup area is approximately 150,000 sq ft, with a removal volume of 5,600 cy. The vertical extent is assumed to be 1 foot based on limited sub-surface data, but will be confirmed during remedial design.

[3] The Lyman Mill Reach stream sediment and floodplain soil action area also includes contaminated sediment within the stream channel connecting Allendale and Lyman Mill Ponds, the abandoned channel that bisects the Oxbow area, and the scrub-shrub and emergent marsh habitat at the southern end of the Oxbow. Cleanup areas for sediment are not impacted by EPA's Dioxin Reanalysis Volume I (see Section 4.0).

US EPA ARCHIVE DOCUMENT

5.2 Impacts on Remedial Alternative Cost Estimates for CMRP Site Soil Alternatives

The approach used to prepare cost estimates for remedial alternatives evaluated in detail at the Site is presented in Appendix J of the FS (Battelle, 2010 and 2011). The estimated costs are updated in this Technical Memorandum to include costs to remediate contaminated soil at the expanded cleanup areas described in Section 5.1. The updated cost estimates assume that soil from the expanded cleanup areas would be remediated using excavation[4], and that the excavated soil would be disposed using one of the four defined disposal options described for the active alternatives (i.e., on-site containment in an upland confined disposal facility [CDF], on-site containment in a nearshore CDF, on-site thermal treatment, or off-site disposal and/or treatment).

The cost estimates are intended to reflect the actual cost of the remedial alternative to within an accuracy of +50% to -30%. The estimated costs presented in this Technical Memorandum are prepared for alternative comparison and selection of the recommended remedial action. The costs are based on the information available at the time of the estimate; cost estimates include the acquisition of property associated with remedy implementation. The actual costs of remediation depend on many variables, including quantity of contaminated sediments, disposal fees, health and safety regulations, ARAR requirements, labor and equipment costs, and the final project scope. As a result, the final project costs will vary from the estimates presented herein. Costs are expected to be within the range of accuracy typical for FS or conceptual engineering cost estimates (+50% to -30%).

Source Area Soil. The detailed cost evaluation for the remedial alternatives is presented in Appendix F-1. The capital, operation and monitoring, and present worth costs are summarized below.

Alternative	Cost		
	Capital Cost and Baseline Monitoring	Annual Cost for Years 1 to 30	Present Worth Costs
Alternative 1 – No Action	$0	$14,000	$170,000
Alternative 3e – Targeted Excavation, Upgrade and Maintain Existing Surfaces and Disposal and/or Treatment	$24,300,000	$37,000	$24,800,000
Alternative 4e – Targeted Excavation, Convert to RCRA Caps and Maintain and Disposal and/or Treatment	$21,200,000	$38,000	$21,700,000

[4] Construction of a Resource Conservation and Recovery Act (RCRA) cap at the Source Area soil *expanded cleanup area* would probably cost less than remediating this expanded cleanup area using excavation and off-site disposal. Regardless, the remedial cost estimates based on a RCRA cap are expected to be within an accuracy of +50% to -30% of the cost estimates presented in this Technical Memorandum.

The present worth costs (above) for Alternatives 3e and 4e could increase by approximately $120,000 to $135,000 (or more) if a Stage IB cultural resource survey (archaeological survey testing and excavation) and additional mitigation measures are required to comply with the National Historic Preservation Act (NHPA) (USACE, 2011) (Battelle, 2011).

Allendale Reach Floodplain Soil. The detailed cost evaluation for the remedial alternatives is presented in Appendix F-2. The capital, operation and monitoring, and present worth costs are summarized below.

Alternative	Disposal Option	Cost		
		Capital Cost and Baseline Monitoring	**Annual Cost for Years 1 to 30**	**Present Worth Costs**
Alternative 1 – No Action	N/A	$0	$0	**$0**
Alternative 5 – Excavation	*Option 5a: On-site Containment in an Upland CDF*	$2,000,000	$9,100	**$2,100,000**
	Option 5b: On-site Containment in a Nearshore CDF	$2,000,000	$9,100	**$2,100,000**
	Option 5d: On-site Thermal Treatment	$7,900,000	$9,100	**$8,000,000**
	Option 5e: Off-site Disposal and/or Treatment	$5,600,000	$9,100	**$5,700,000**

The present worth costs (above) for Alternatives 5 could increase by approximately $240,000 to $275,000 (or more) if a Stage IB cultural resource survey (archaeological survey testing and excavation) and additional mitigation measures are required to comply with the NHPA (USACE, 2011) (Battelle, 2011).

US EPA ARCHIVE DOCUMENT

Lyman Mill Reach Stream Sediment and Floodplain Soil (including Oxbow). The detailed cost evaluation for the remedial alternatives is presented in Appendix F-3. The capital, operation and monitoring, and present worth costs are summarized below.

Alternative	Disposal Option	Cost		
		Capital Cost and Baseline Monitoring	**Annual Cost for Years 1 to 30**	**Present Worth Costs**
Alternative 1 – No Action	N/A	$0	$20,400	**$254,000**
Alternative 3 – Targeted Excavation, Enhanced Natural Recovery and	*Option 3a: On-site Containment in an Upland CDF*	$16,500,000	$230,000	**$19,400,000**
	Option 3b: On-site Containment in a Nearshore CDF	$13,200,000	$230,000	**$16,100,000**
	Option 3d: On-site Thermal Treatment	$38,600,000	$207,000	**$41,200,000**
	Option 3e: Off-site Disposal and/or Treatment	$29,400,000	$207,000	**$32,000,000**
Alternative 5 – Partial Excavation, Enhanced Natural Recovery and	*Option 5a: On-site Containment in an Upland CDF*	$31,500,000	$230,000	**$34,400,000**
	Option 5b: On-site Containment in a Nearshore CDF	$23,700,000	$230,000	**$26,600,000**
	Option 5d: On-site Thermal Treatment	$78,600,000	$207,000	**$81,200,000**
	Option 5e: Off-site Disposal and/or Treatment	$58,600,000	$207,000	**$61,200,000**

The present worth costs (above) for Alternatives 3 and 5 could increase by approximately $290,000 to $350,000 (or more) if a Stage IB cultural resource survey (archaeological survey testing and excavation) and additional mitigation measures are required to comply with the NHPA (USACE, 2011) (Battelle, 2011).

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

6. IMPACT ON RESIDUAL RISK CALCULATIONS

The human health residual risks have been updated to reflect the newly published oral RfD for 2,3,7,8-TCDD (and dioxin TEQ). The residual risks represent the anticipated receptor risk after remedy implementation and achievement of the cleanup goals. Table 6-1 presents the calculated human health residual risks based on the information previously presented in this Technical Memorandum in a format consistent with tables associated with Section 6.0 of the FS (Battelle, 2010).

The calculated residual risks (i.e., the risk based on anticipated contaminant exposures following attainment of the RAOs) to ecological receptors for Allendale Reach floodplain soil and Lyman Mill Reach stream sediment and floodplain soil are the same as presented in the FS (Battelle, 2010 and 2011 FS). Table 6-29d in the FS (Battelle, 2011), however, is revised and reproduced in this Technical Memorandum to clarify that residual risks to ecological receptors would be slightly lower for the eastern shore of Lyman Mill Pond where the lower cleanup goal for 2,3,7,8-TCDD (17 ng/kg compared to 35 ng/kg at the Oxbow) is used for cleanup.

US EPA ARCHIVE DOCUMENT

7. REFERENCES

Battelle, 2005. *Interim Final Remedial Investigation*, *Centredale Manor Restoration Project Superfund Site*. Prepared for U.S. Army Corps of Engineers, New England District. June.

Battelle, 2010. *Interim Final Feasibility Study Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island*, Prepared for U.S. Army Corps of Engineers New England District. April.

Battelle, 2011. *Addendum to the Interim Final Feasibility Study*, *Centredale Manor Restoration Project Superfund Site*. Prepared for U.S. Army Corps of Engineers New England District. September.

Battelle and MACTEC, Inc., 2011. *Addendum to the Interim Final Preliminary Remediation Goals Report: Oxbow Area, Part I, Human Health, Centredale Manor Restoration Project Superfund Site*. Prepared for USACE New England District. September.

Loureiro Engineering Associates, Inc., 2005. Draft Completion of Work Report, Second Unilateral Administrative Order for Removal Action, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island. April.

MACTEC, 2004. *Interim Final Baseline Ecological Risk Assessment, Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island*, Prepared for U.S. Army Corps of Engineers New England District. September.

MACTEC, 2005a. *Interim Final Baseline Human Health Risk Assessment, Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island*, Prepared for U.S. Army Corps of Engineers New England District. November.

MACTEC, 2005b. *Interim Final Preliminary Remediation Goals Report, Part I – Human Health, Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island*, Prepared for U.S. Army Corps of Engineers New England District. July.

MACTEC, Inc. and Battelle, 2006. *Addendum to the Interim Final Baseline Risk Assessment: Oxbow Area, Part I – Human Health and Part II – Ecological, Centredale Manor Restoration Project Superfund Site*. Prepared for USACE New England District. August.

MACTEC, Inc. and Battelle, 2011. *Addendum to the Interim Final Preliminary Remediation Goals Report: Oxbow Area, Part I, Human Health, Centredale Manor Restoration Project Superfund Site*. Prepared for USACE New England District. September.

US EPA ARCHIVE DOCUMENT

Rhode Island Department of Environmental Management (RIDEM), 2011. *Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations)*. DEM-DSR-01-93. Amended November.

TetraTech NUS, Inc. (TTNUS), 2000a. *Final Engineering Evaluation/Cost Analysis, Centredale Manor Restoration Project Site, North Providence, Rhode Island*. Prepared for the U.S. Environmental Protection Agency. September.

U.S. Army Corps of Engineers (USACE), 2011. *Review and Evaluation of Cleanup Alternatives for Impacts Upon Historic Properties, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. New England District, Concord, MA. June.

United States Environmental Protection Agency (USEPA), 1991. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim,* EPA/540/R-92/003, Publication 9285.7-01B. December.

USEPA, 1997. Health Effects Assessment Summary Tables (HEAST), FY-1997 Update, EPA 540/R-97-036. July.

USEPA, 1998. *Approach for Addressing Dioxins in Soil at CERCLA and RCRA Sites.* USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-26. April 13.

USEPA, 2001a. Request for Removal Action Centredale Manor Restoration Project, North Providence, Rhode Island-Action Memorandum: *Non-Time-Critical Removal Action* (NTCRA). January 18.

USEPA, 2001b. *Risk Assessment Guidance for Superfund (RAGS): Volume I - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final*. December.

USEPA, 2003. *OSWER Directive 9285.7-53, Human Health Toxicity Values in Superfund Risk Assessments.* December.

USEPA, 2010a. *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds, EPA/100/R/ 10/005.* December.

USEPA, 2011. *Proposed Plan, Centredale Manor Restoration Project, North Providence, Rhode Island*, Hazardous Waste Program at EPA New England. October.

USEPA, 2012a. *EPA's Reanalysis of Key Issues Related to Dioxin Toxicity and Response to NAS Comments, Volume 1***,** *(CAS No. 1746-01-6), In Support of Summary Information on the Integrated Risk Information System (IRIS)*, EPA/600/R-10/038F. February.

USEPA, 2012b. IRIS. May.

Van den Berg M., L.S. Bimbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, H. Hakansson, A. Hanberg, L. Haws, M. Rose, S. Safe, D. Schrenk, C. Tohyama, A. Tritscher, J. Tuomisto, M. Tysklind, N. Walker, and R.E. Peterson, 2006. *The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds*.
Available at http://toxsci.oxfordjournals.org/cgi/reprint/kfl055v1 (August 11, 2006) or http://toxsci.oxfordjournals.org/cgi/content/abstract/kfl055v1 (August 11, 2006).

Van den Berg, M., L. Birnbaum, A.T.C. Bosveld, B. Brunström, P. Cook, M. Feeley, J.P. Giesy, A. Hanberg, R. Hasegawa, S.W. Kennedy, T. Kubiak, J.C. Larsen, F.X. R. van Leeuwen, A.K. Djien Liem, C. Nolt, R.E. Peterson, L. Poellinger, S. Safe, D. Schrenk, D.Tillitt, M. Tysklind, M. Younes, F. Wærn, and T. Zacharewski, 1998. "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife." *Environ. Health Persp. 106*(12): 775-792.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

TABLES

TECHNICAL MEMORANDUM – IMPACT OF DIOXIN REASSESSMENT

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Assapumpset Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	2	2.38E-06	7.15E-10	1	NA	NA	NA
			Total Risk:	**2**		**Total Risk:**	**1**		**Total Risk:**	**NE/NA**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Sediment	Incidental ingestion	0.003	7.73E-06	3.06E-13	0.0004	NA	NA	NA
			Dermal contact	0.0007	7.73E-06	1.31E-13	0.0002	NA	NA	NA
		Surface water	Incidental ingestion	0.00003	5.34E-09	2.11E-14	0.00003	NA	NA	NA
			Dermal contact	0.0009	5.34E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	1	2.38E-06	4.72E-10	0.7	NA	NA	NA
			Total Risk:	**1**		**Total Risk:**	**0.7**		**Total Risk:**	**NA**
Visiting Recreational Angler	Adult (ages 19 and above)	Sediment	Incidental ingestion	0.002	7.73E-06	1.97E-13	0.0003	NA	NA	NA
			Dermal contact	0.0002	7.73E-06	4.01E-14	0.00006	NA	NA	NA
		Surface water	Incidental ingestion	0.00002	5.34E-09	1.36E-14	0.00002	NA	NA	NA
			Dermal contact	0.0008	5.34E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	1	2.38E-06	4.56E-10	0.7	NA	NA	NA
			Total Risk:	**1**		**Total Risk:**	**0.7**		**Total Risk:**	**NA**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Assapumpset Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)									
		Sediment	Incidental ingestion	0.2	7.73E-06	1.47E-11	0.02	NA	NA	NA
			Dermal contact	0.007	7.73E-06	1.23E-12	0.002	NA	NA	NA
		Surface water	Incidental ingestion	0.004	5.34E-09	2.54E-12	0.004	NA	NA	NA
			Dermal contact	0.004	5.34E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	2	2.38E-06	7.15E-10	1	NA	NA	NA
			Total Risk:	**2**		**Total Risk:**	**1**		**Total Risk:**	**NA**
Resident Living Along the River	Older Child (ages 7 through 18)									
		Sediment	Incidental ingestion	0.02	7.73E-06	1.84E-12	0.003	NA	NA	NA
			Dermal contact	0.002	7.73E-06	3.94E-13	0.0006	NA	NA	NA
		Surface water	Incidental ingestion	0.001	5.34E-09	8.45E-13	0.001	NA	NA	NA
			Dermal contact	0.003	5.34E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	1	2.38E-06	4.72E-10	0.7	NA	NA	NA
			Total Risk:	**1**		**Total Risk:**	**0.7**		**Total Risk:**	**NA**
Resident Living Along the River	Adult (ages 19 and above)									
		Sediment	Incidental ingestion	0.01	7.73E-06	1.18E-12	0.002	NA	NA	NA
			Dermal contact	0.0007	7.73E-06	1.20E-13	0.0002	NA	NA	NA
		Surface water	Incidental ingestion	0.0009	5.34E-09	5.43E-13	0.0008	NA	NA	NA
			Dermal contact	0.003	5.34E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	1	2.38E-06	4.56E-10	0.7	NA	NA	NA
			Total Risk:	**1**		**Total Risk:**	**0.7**		**Total Risk:**	**NA**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Greystone Mill Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Bank Soil	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	5	1.36E-06	4.09E-10	0.6	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**0.6**		**Total Risk:**	**NE/NA**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Bank Soil	Incidental ingestion	0.01	1.09E-04	4.31E-12	0.006	NA	NA	NA
			Dermal contact	0.006	1.09E-04	2.48E-12	0.004	NA	NA	NA
		Sediment	Incidental ingestion	0.009	1.20E-04	4.75E-12	0.007	2.49E-05	9.85E-13	0.001
			Dermal contact	0.003	1.20E-04	2.04E-12	0.003	2.49E-05	4.23E-13	0.0006
		Surface water	Incidental ingestion	0.00004	5.64E-09	2.23E-14	0.00003	NA	NA	NA
			Dermal contact	0.0008	5.64E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	4	1.36E-06	2.70E-10	0.4	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**0.4**		**Total Risk:**	**0.002**
Visiting Recreational Angler	Adult (ages 19 and above)	Bank Soil	Incidental ingestion	0.009	1.09E-04	2.77E-12	0.004	NA	NA	NA
			Dermal contact	0.002	1.09E-04	6.64E-13	0.0009	NA	NA	NA
		Sediment	Incidental ingestion	0.006	1.20E-04	3.05E-12	0.004	2.49E-05	6.33E-13	0.0009
			Dermal contact	0.001	1.20E-04	6.23E-13	0.0009	2.49E-05	1.29E-13	0.0002
		Surface water	Incidental ingestion	0.00002	5.64E-09	1.43E-14	0.00002	NA	NA	NA
			Dermal contact	0.0007	5.64E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	3	1.36E-06	2.61E-10	0.4	NA	NA	NA
			Total Risk:	**3**		**Total Risk:**	**0.4**		**Total Risk:**	**0.001**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Greystone Mill Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)	Bank Soil	Incidental ingestion	1	1.09E-04	3.11E-10	0.4	NA	NA	NA
			Dermal contact	0.07	1.09E-04	2.61E-11	0.04	NA	NA	NA
		Sediment	Incidental ingestion	0.4	1.20E-04	2.28E-10	0.3	2.49E-05	4.73E-11	0.07
			Dermal contact	0.03	1.20E-04	1.91E-11	0.03	2.49E-05	3.97E-12	0.006
		Surface water	Incidental ingestion	0.004	5.64E-09	2.68E-12	0.004	NA	NA	NA
			Dermal contact	0.004	5.64E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	1.36E-06	4.09E-10	0.6	NA	NA	NA
			Total Risk:	**7**		**Total Risk:**	**1**		**Total Risk:**	**0.07**
Resident Living Along the River	Older Child (ages 7 through 18)	Bank Soil	Incidental ingestion	0.2	1.09E-04	5.18E-11	0.07	NA	NA	NA
			Dermal contact	0.04	1.09E-04	1.49E-11	0.02	NA	NA	NA
		Sediment	Incidental ingestion	0.06	1.20E-04	2.85E-11	0.04	2.49E-05	5.91E-12	0.008
			Dermal contact	0.01	1.20E-04	6.11E-12	0.009	2.49E-05	1.27E-12	0.002
		Surface water	Incidental ingestion	0.001	5.64E-09	8.93E-13	0.001	NA	NA	NA
			Dermal contact	0.003	5.64E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	4	1.36E-06	2.70E-10	0.4	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**0.5**		**Total Risk:**	**0.01**
Resident Living Along the River	Adult (ages 19 and above)	Bank Soil	Incidental ingestion	0.1	1.09E-04	3.33E-11	0.05	NA	NA	NA
			Dermal contact	0.01	1.09E-04	3.98E-12	0.006	NA	NA	NA
		Sediment	Incidental ingestion	0.04	1.20E-04	1.83E-11	0.03	2.49E-05	3.80E-12	0.005
			Dermal contact	0.003	1.20E-04	1.87E-12	0.003	2.49E-05	3.88E-13	0.0006
		Surface water	Incidental ingestion	0.0009	5.64E-09	5.74E-13	0.0008	NA	NA	NA
			Dermal contact	0.003	5.64E-09	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	3	1.36E-06	2.61E-10	0.4	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**0.5**		**Total Risk:**	**0.006**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Allendale Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Bank Soil	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	30	3.01E-04	9.04E-08	129	3.20E-05	9.61E-09	14
			Total Risk:	**30**		**Total Risk:**	**129**		**Total Risk:**	**14**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Bank Soil	Incidental ingestion	NA	2.70E-04	1.07E-11	0.02	NA	NA	NA
			Dermal contact	NA	2.70E-04	6.15E-12	0.009	NA	NA	NA
		Sediment	Incidental ingestion	0.01	5.70E-03	2.26E-10	0.3	1.12E-07	4.43E-15	0.000006
			Dermal contact	0.01	5.70E-03	9.67E-11	0.1	1.12E-07	1.90E-15	0.000003
		Surface water	Incidental ingestion	0.0009	3.85E-07	1.52E-12	0.002	NA	NA	NA
			Dermal contact	0.007	3.85E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	20	3.01E-04	5.97E-08	85	3.20E-05	6.34E-09	9
			Total Risk:	**20**		**Total Risk:**	**86**		**Total Risk:**	**9**
Visiting Recreational Angler	Adult (ages 19 and above)	Bank Soil	Incidental ingestion	NA	2.70E-04	6.87E-12	0.01	NA	NA	NA
			Dermal contact	NA	2.70E-04	1.64E-12	0.002	NA	NA	NA
		Sediment	Incidental ingestion	0.009	5.70E-03	1.45E-10	0.2	1.12E-07	2.85E-15	0.000004
			Dermal contact	0.003	5.70E-03	2.96E-11	0.04	1.12E-07	5.82E-16	0.0000008
		Surface water	Incidental ingestion	0.0006	3.85E-07	9.79E-13	0.001	NA	NA	NA
			Dermal contact	0.006	3.85E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	19	3.01E-04	5.77E-08	82	3.20E-05	6.14E-09	9
			Total Risk:	**19**		**Total Risk:**	**83**		**Total Risk:**	**9**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Allendale Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)									
		Bank Soil	Incidental ingestion	NA	2.70E-04	7.69E-10	1	NA	NA	NA
			Dermal contact	NA	2.70E-04	6.46E-11	0.09	NA	NA	NA
		Sediment	Incidental ingestion	0.7	5.70E-03	1.08E-08	15	1.12E-07	2.13E-13	0.0003
			Dermal contact	0.1	5.70E-03	9.10E-10	1	1.12E-07	1.79E-14	0.00003
		Surface water	Incidental ingestion	0.1	3.85E-07	1.83E-10	0.3	NA	NA	NA
			Dermal contact	0.04	3.85E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	30	3.01E-04	9.04E-08	129	3.20E-05	9.61E-09	14
			Total Risk:	**31**		**Total Risk:**	**147**		**Total Risk:**	**14**
Resident Living Along the River	Older Child (ages 7 through 18)									
		Bank Soil	Incidental ingestion	NA	2.70E-04	1.28E-10	0.2	NA	NA	NA
			Dermal contact	NA	2.70E-04	3.69E-11	0.05	NA	NA	NA
		Sediment	Incidental ingestion	0.08	5.70E-03	1.35E-09	2	1.12E-07	2.66E-14	0.00004
			Dermal contact	0.03	5.70E-03	2.90E-10	0.4	1.12E-07	5.70E-15	0.000008
		Surface water	Incidental ingestion	0.04	3.85E-07	6.09E-11	0.09	NA	NA	NA
			Dermal contact	0.03	3.85E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	20	3.01E-04	5.97E-08	85	3.20E-05	6.34E-09	9
			Total Risk:	**20**		**Total Risk:**	**88**		**Total Risk:**	**9**
Resident Living Along the River	Adult (ages 19 and above)									
		Bank Soil	Incidental ingestion	NA	2.70E-04	8.24E-11	0.1	NA	NA	NA
			Dermal contact	NA	2.70E-04	9.87E-12	0.01	NA	NA	NA
		Sediment	Incidental ingestion	0.05	5.70E-03	8.70E-10	1	1.12E-07	1.71E-14	0.00002
			Dermal contact	0.01	5.70E-03	8.88E-11	0.1	1.12E-07	1.74E-15	0.000002
		Surface water	Incidental ingestion	0.02	3.85E-07	3.92E-11	0.06	NA	NA	NA
			Dermal contact	0.02	3.85E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	19	3.01E-04	5.77E-08	82	3.20E-05	6.14E-09	9
			Total Risk:	**19**		**Total Risk:**	**84**		**Total Risk:**	**9**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Lyman Mill Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	34	3.70E-04	1.11E-07	159	4.05E-05	1.22E-08	17
			Total Risk:	**34**		**Total Risk:**	**159**		**Total Risk:**	**17**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Sediment	Incidental ingestion	0.007	8.03E-03	3.18E-10	0.5	6.49E-05	2.57E-12	0.004
			Dermal contact	0.004	8.03E-03	1.36E-10	0.2	6.49E-05	1.10E-12	0.002
		Surface water	Incidental ingestion	0.0002	8.61E-07	3.41E-12	0.005	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	22	3.70E-04	7.33E-08	105	4.05E-05	8.03E-09	11
			Total Risk:	**22**		**Total Risk:**	**105**		**Total Risk:**	**11**
Visiting Recreational Angler	Adult (ages 19 and above)	Sediment	Incidental ingestion	0.004	8.03E-03	2.04E-10	0.3	6.49E-05	1.65E-12	0.002
			Dermal contact	0.001	8.03E-03	4.17E-11	0.06	6.49E-05	3.37E-13	0.0005
		Surface water	Incidental ingestion	0.0001	8.61E-07	2.19E-12	0.003	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	21	3.70E-04	7.10E-08	101	4.05E-05	7.77E-09	11
			Total Risk:	**22**		**Total Risk:**	**102**		**Total Risk:**	**11**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Lyman Mill Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)									
		Sediment	Incidental ingestion	0.3	8.03E-03	1.53E-08	22	6.49E-05	1.23E-10	0.2
			Dermal contact	0.04	8.03E-03	1.28E-09	2	6.49E-05	1.04E-11	0.01
		Surface water	Incidental ingestion	0.02	8.61E-07	4.09E-10	0.6	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	34	3.70E-04	1.11E-07	159	4.05E-05	1.22E-08	17
			Total Risk:	**34**		**Total Risk:**	**183**		**Total Risk:**	**18**
Resident Living Along the River	Older Child (ages 7 through 18)									
		Sediment	Incidental ingestion	0.04	8.03E-03	1.91E-09	3	6.49E-05	1.54E-11	0.02
			Dermal contact	0.01	8.03E-03	4.09E-10	0.6	6.49E-05	3.30E-12	0.005
		Surface water	Incidental ingestion	0.008	8.61E-07	1.36E-10	0.2	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	22	3.70E-04	7.33E-08	105	4.05E-05	8.03E-09	11
			Total Risk:	**22**		**Total Risk:**	**108**		**Total Risk:**	**11**
Resident Living Along the River	Adult (ages 19 and above)									
		Sediment	Incidental ingestion	0.03	8.03E-03	1.23E-09	2	6.49E-05	9.91E-12	0.01
			Dermal contact	0.004	8.03E-03	1.25E-10	0.2	6.49E-05	1.01E-12	0.001
		Surface water	Incidental ingestion	0.005	8.61E-07	8.76E-11	0.1	NA	NA	NA
			Dermal contact	0.008	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	21	3.70E-04	7.10E-08	101	4.05E-05	7.77E-09	11
			Total Risk:	**22**		**Total Risk:**	**103**		**Total Risk:**	**11**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Manton Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	5	3.10E-05	9.31E-09	13	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**13**		**Total Risk:**	**NE/NA**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Sediment	Incidental ingestion	0.0006	9.99E-04	3.95E-11	0.06	NA	NA	NA
			Dermal contact	0.00008	9.99E-04	1.70E-11	0.02	NA	NA	NA
		Surface water	Incidental ingestion	0.0002	8.61E-07	3.41E-12	0.005	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	4	3.10E-05	6.14E-09	9	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**9**		**Total Risk:**	**NA**
Visiting Recreational Angler	Adult (ages 19 and above)	Sediment	Incidental ingestion	0.0004	9.99E-04	2.54E-11	0.04	NA	NA	NA
			Dermal contact	0.00003	9.99E-04	5.19E-12	0.007	NA	NA	NA
		Surface water	Incidental ingestion	0.0001	8.61E-07	2.19E-12	0.003	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	3	3.10E-05	5.95E-09	8	NA	NA	NA
			Total Risk:	**3**		**Total Risk:**	**9**		**Total Risk:**	**NA**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Manton Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)	Sediment	Incidental ingestion	0.03	9.99E-04	1.90E-09	3	NA	NA	NA
			Dermal contact	0.0008	9.99E-04	1.59E-10	0.2	NA	NA	NA
		Surface water	Incidental ingestion	0.02	8.61E-07	4.09E-10	0.6	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	3.10E-05	9.31E-09	13	NA	NA	NA
			Total Risk:	**6**		**Total Risk:**	**17**		**Total Risk:**	**NA**
Resident Living Along the River	Older Child (ages 7 through 18)	Sediment	Incidental ingestion	0.003	9.99E-04	2.37E-10	0.3	NA	NA	NA
			Dermal contact	0.0003	9.99E-04	5.09E-11	0.07	NA	NA	NA
		Surface water	Incidental ingestion	0.008	8.61E-07	1.36E-10	0.2	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	4	3.10E-05	6.14E-09	9	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**9**		**Total Risk:**	**NA**
Resident Living Along the River	Adult (ages 19 and above)	Sediment	Incidental ingestion	0.002	9.99E-04	1.52E-10	0.2	NA	NA	NA
			Dermal contact	0.00008	9.99E-04	1.56E-11	0.02	NA	NA	NA
		Surface water	Incidental ingestion	0.005	8.61E-07	8.76E-11	0.1	NA	NA	NA
			Dermal contact	0.008	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	3	3.10E-05	5.95E-09	8	NA	NA	NA
			Total Risk:	**4**		**Total Risk:**	**9**		**Total Risk:**	**NA**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Dyerville Pond										
Visiting Recreational Angler	Child (ages 1 through 6)	Sediment	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Surface water	Incidental ingestion	NE	NE	NE	NE	NE	NE	NE
			Dermal contact	NE	NE	NE	NE	NE	NE	NE
		Combined Fish Diet	Ingestion	8	7.57E-05	2.27E-08	32	NA	NA	NA
			Total Risk:	**8**		**Total Risk:**	**32**		**Total Risk:**	**NE/NA**
Visiting Recreational Angler	Older Child (ages 7 through 18)	Sediment	Incidental ingestion	0.009	1.52E-04	6.02E-12	0.009	2.53E-08	1.00E-15	0.000001
			Dermal contact	0.005	1.52E-04	2.58E-12	0.004	2.53E-08	4.29E-16	0.0000006
		Surface water	Incidental ingestion	0.0002	8.61E-07	3.41E-12	0.005	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	7.57E-05	1.50E-08	21	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**21**		**Total Risk:**	**0.000002**
Visiting Recreational Angler	Adult (ages 19 and above)	Sediment	Incidental ingestion	0.006	1.52E-04	3.87E-12	0.006	2.53E-08	6.44E-16	0.0000009
			Dermal contact	0.002	1.52E-04	7.89E-13	0.001	2.53E-08	1.31E-16	0.0000002
		Surface water	Incidental ingestion	0.0001	8.61E-07	2.19E-12	0.003	NA	NA	NA
			Dermal contact	0.002	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	7.57E-05	1.45E-08	21	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**21**		**Total Risk:**	**0.000001**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Dyerville Pond (cont)										
Resident Living Along the River	Child (ages 1 through 6)									
		Sediment	Incidental ingestion	0.4	1.52E-04	2.89E-10	0.4	2.53E-08	4.81E-14	0.00007
			Dermal contact	0.05	1.52E-04	2.43E-11	0.03	2.53E-08	4.04E-15	0.000006
		Surface water	Incidental ingestion	0.02	8.61E-07	4.09E-10	0.6	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	8	7.57E-05	2.27E-08	32	NA	NA	NA
			Total Risk:	**8**		**Total Risk:**	**34**		**Total Risk:**	**0.00007**
Resident Living Along the River	Older Child (ages 7 through 18)									
		Sediment	Incidental ingestion	0.05	1.52E-04	3.61E-11	0.05	2.53E-08	6.01E-15	0.000009
			Dermal contact	0.02	1.52E-04	7.74E-12	0.01	2.53E-08	1.29E-15	0.000002
		Surface water	Incidental ingestion	0.008	8.61E-07	1.36E-10	0.2	NA	NA	NA
			Dermal contact	0.01	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	7.57E-05	1.50E-08	21	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**22**		**Total Risk:**	**0.00001**
Resident Living Along the River	Adult (ages 19 and above)									
		Sediment	Incidental ingestion	0.03	1.52E-04	2.32E-11	0.03	2.53E-08	3.86E-15	0.000006
			Dermal contact	0.005	1.52E-04	2.37E-12	0.003	2.53E-08	3.94E-16	0.0000006
		Surface water	Incidental ingestion	0.005	8.61E-07	8.76E-11	0.1	NA	NA	NA
			Dermal contact	0.008	8.61E-07	NC	NC	NA	NA	NA
		Combined Fish Diet	Ingestion	5	7.57E-05	1.45E-08	21	NA	NA	NA
			Total Risk:	**5**		**Total Risk:**	**21**		**Total Risk:**	**0.000006**
Current/Future - Fogarty Center										
Worker	Adult (ages 19 and above)	Surface Soil	Incidental ingestion	0.04	6.64E-06	1.95E-12	0.003	NA	NA	NA
			Dermal contact	0.03	6.64E-06	7.72E-13	0.001	NA	NA	NA
			Total Risk:	**0.07**		**Total Risk:**	**0.004**		**Total Risk:**	**NA**

US EPA ARCHIVE DOCUMENT

Table 2-1.
Non Cancer RME Risks Updated for 2,3,7,8-TCDD RfD
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Baseline Hazard Index (1)	TEQ (Dioxins/Furans) EPC (mg/kg) (2)	TEQ (Dioxins/Furans) Intake (mg/kg-day) (2)	TEQ (Dioxins/Furans) HQ (3) (4)	TEQ (PCB Congeners) EPC (mg/kg) (2)	TEQ (PCB Congeners) Intake (mg/kg-day) (2)	TEQ (PCB Congeners) HQ (3) (4)
Current/Future - Oxbow Human Health Concern Area										
Passive Recreational Visitor	Child (ages 1 through 6)	Soil	Incidental ingestion	0.1	5.10E-06	1.45E-11	0.02	NA	NA	NA
			Dermal contact	0.004	5.10E-06	1.22E-12	0.002	NA	NA	NA
			Total Risk:	**0.1**		**Total Risk:**	**0.02**		**Total Risk:**	**NA**
	Adolescent (ages 7 through 18)	Soil	Incidental ingestion	0.02	5.10E-06	2.42E-12	0.003	NA	NA	NA
			Dermal contact	0.002	5.10E-06	6.98E-13	0.001	NA	NA	NA
			Total Risk:	**0.02**		**Total Risk:**	**0.004**		**Total Risk:**	**NA**
	Adult (ages 19 and above)	Soil	Incidental ingestion	0.01	5.10E-06	1.56E-12	0.002	NA	NA	NA
			Dermal contact	0.0005	5.10E-06	1.86E-13	0.0003	NA	NA	NA
			Total Risk:	**0.01**		**Total Risk:**	**0.002**		**Total Risk:**	**NA**
Current/Future - Oxbow General Area										
Passive Recreational Visitor	Child (ages 1 through 6)	Soil	Incidental ingestion	0.1	2.80E-03	2.66E-09	4	NA	NA	NA
			Dermal contact	0.006	2.80E-03	2.23E-10	0.3	NA	NA	NA
			Total Risk:	**0.2**		**Total Risk:**	**4**		**Total Risk:**	**NA**
	Adolescent (ages 7 through 18)	Soil	Incidental ingestion	0.02	2.80E-03	4.43E-10	0.6	NA	NA	NA
			Dermal contact	0.003	2.80E-03	1.28E-10	0.2	NA	NA	NA
			Total Risk:	**0.03**		**Total Risk:**	**0.8**		**Total Risk:**	**NA**
	Adult (ages 19 and above)	Soil	Incidental ingestion	0.02	2.80E-03	2.85E-10	0.4	NA	NA	NA
			Dermal contact	0.0009	2.80E-03	3.41E-11	0.05	NA	NA	NA
			Total Risk:	**0.02**		**Total Risk:**	**0.5**		**Total Risk:**	**NA**

Notes:
1 - Hazard quotients and screening hazard index reported in Table 11.RME of the 2005 Interim-Final Baseline Human Health Risk Assessment or Table 11.1 of the June 2011 Interim Final Supplemental Baseline Human Health and Ecological Risk Assessment: Oxbow Area Floodplain Soil and Sediment, Part I.
2 -TEQ (Dioxins/Furans) EPC and Intake and TEQ (PCB Congeners) EPC and Intake reported in Tables 7.1 RME through 7.36 RME of the 2005 Interim-Final Baseline Human Health Risk Assessment and Tables 7.1 through 7.6 of the June 2011 Interim Final Supplemental Baseline Human Health and Ecological Risk Assessment: Oxbow Area Floodplain Soil and Sediment, Part I.
3 - TEQ (Dioxins/Furans) HQ = TEQ (Dioxins/Furans) Intake / Dioxin RfD or TEQ (PCB Congeners) HQ = TEQ (PCB Congeners) HQ Intake / 2,3,7,8-TCDD RfD.
4 - HQs are not summed with the original BHHRA HQ due to TEQ (Dioxins/Furans) HQs association with reproductive effects and therefore presented separately.
EPC - Exposure point concentration
TEQ - Toxicity Equivalency
HQ - Hazard quotient
RME - Reasonable maximum exposure
RfD - Reference dose
mg/kg-day - milligram per kilogram per day
2,3,7,8-TCDD RfD = 7E-10 mg/kg-day (IRIS, 2012)
NA - TEQ (Dioxins/Furans) or TEQ (PCB Congeners) Data not available for this medium and exposure route.
NE - Not evaluated. The "Visiting Recreational Angler Child" is not expected to visit the Site and therefore is not exposed to surface water, sediment, or bank soil at the Site. It is presumed that the Child is exposed only by consuming fish caught by older family members.
NC - Not calculated

Prepared by: BJR 3/27/12
Checked by: EYM 3/28/12
Revised by: EYM 4/10/12
Checked by: BJR 4/12/12

Table 2-2.
Residential Soil Exposure Points and Risks - Eastern Shore of Allendale and Lyman Mill Pond
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Area	Plat-Lot	ELCR	HQ				
			BAP	DAHA	As	Dioxin TEQ	PCBC TEQ
East Bank Allendale Pond Surface Soil	14-271	3E-05	--	--	--	2	--
	14-272	5E-05	--	--	--	3	--
	14-302	3E-05	--	--	--	2	--
	14-303	4E-05	--	--	--	3	--
	14-333	3E-05	--	--	--	2	--
	14-365	1E-04	--	--	--	10	--
	14-366	3E-05	--	--	--	2	--
	14-398	9E-05	--	--	--	6	--
	14-399	3E-05	--	--	--	2	--
	14-418	2E-04	--	--	--	12	--
	14-419	2E-04	0.0009	--	0.07	5	--
	14-420	6E-07	--	--	--	0.04	--
	14-421	3E-05	--	--	--	2	--
	14-422	7E-06	--	--	--	0.5	--
	14-424	7E-06	--	--	--	0.5	--
	14-425						
	14-430	7E-06	--	--	--	0.5	--
	14-448	3E-05	--	--	--	2	--
	14-449	4E-05	--	--	--	3	--
	14-450	7E-05	--	--	--	5	--
	14-210	4E-06	--	--	--	0.3	--
	12-239	3E-05	--	--	--	2	--
	12-240	9E-07	--	--	--	0.06	--
	12-550	2E-04	--	--	--	17	--
	12-551	8E-05	--	--	--	6	--
	12-552	7E-07	--	--	--	0.05	--
	12-553	1E-05	--	--	--	0.8	--
	12-554	1E-04	--	--	--	8	--
	12-555	2E-05	--	--	--	1	--
East Bank Allendale Pond Subsurface Soil	14-271	5E-05	0.0001	--	0.2	2	--
	14-272	1E-06	--	--	--	0.07	--
	14-303	2E-05	--	--	--	2	--
	14-365	5E-06	--	--	--	0.3	--
	14-419	1E-04	0.0004	0.00008	0.06	4	--
	14-421	2E-06	--	--	--	0.2	--
	14-424	5E-06	--	--	--	0.4	--
	14-425						
	14-430	2E-06	--	--	--	0.1	--
	14-448	1E-05	--	--	--	1	--
	14-449	9E-07	--	--	--	0.07	--
	14-450	1E-04	--	--	--	9	--
	12-239	9E-07	--	--	--	0.07	--
	12-240	2E-07	--	--	--	0.02	--
	12-551	2E-04	--	--	--	16	--
	12-552	9E-07	--	--	--	0.07	--
	12-553	1E-06	--	--	--	0.08	--
	12-555	8E-05	--	--	--	6	--
East Bank Lyman Mill Pond Surface Soil	11-011	1E-04	0.001	0.0001	0.4	0.3	--
	11-012						
	11-419	2E-04	0.0003	--	0.2	12	--
	11-420	6E-05	0.00008	--	0.3	2	--
	11-422	4E-05	0.00007	--	0.3	0.8	--
	11-423	9E-03	0.06	0.02	0.1	0.8	--
	11-424						
	11-425	3E-05	0.00007	--	0.1	1	--
	11-426						
	11-427	6E-05	0.0002	--	0.4	0.3	--
	11-428						
	11-429						
	11-430	1E-05	--	--	0.08	0.7	--
	11-431						
	11-432	4E-04	0.0003	0.00008	0.4	20	--
	11-433						

Table 2-2.
Residential Soil Exposure Points and Risks - Eastern Shore of Allendale and Lyman Mill Pond
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Area	Plat-Lot	ELCR	HQ				
			BAP	DAHA	As	Dioxin TEQ	PCBC TEQ
	11-486	9E-05	0.0005	--	0.3	1	--
East Bank Lyman Mill Pond Surface Soil Cont'd	11-328	2E-04	0.0004	0.00003	0.3	8	--
	11-497	1E-05	--	--	0.1	0.2	--
	11-396	9E-05	--	--	--	7	--
	11-577	1E-04	--	--	0.2	8	--
	10-004	7E-05	0.00006	--	0.4	2	--
	10-005	7E-05	--	--	0.4	3	--
	10-042	5E-04	0.001	0.0003	3	11	0.1
	10-044						
	10-604						
	10-068	3E-05	0.00006	--	0.1	1	--
	10-074	2E-04	0.001	--	0.4	2	--
	10-075	2E-03	0.01	0.003	1	2	--
	10-076						

Notes:
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
BAP = benzo(a)pyrene
DAHA = dibenzo(a,h)anthracene
As = arsenic
Dioxin TEQ = dioxin toxicity equivalence concentration
PCBC TEQ = PCB Dioxin-like Congener toxicity equivalence concentration

Prepared by: KJC 5/8/12
Checked by: EYM 5/8/12
Revised by MJM 5/15/12
Checked by: KJC 5/23/12

US EPA ARCHIVE DOCUMENT

Table 2-3
Summary Surface Soil Results in the Vicinity of the Lee Romano Ballfield
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil RSL	SS-99-07 1/15/1999	SS-99-08 1/15/1999	SS-99-09 1/15/1999
Dioxins/Furans (ng/Kg)								
2,3,7,8-TCDD	5 / 15	332 : 493	0.0948 - 1.18	137.9003	4.5	478 U	414 U	405 U
DIOXIN TEQ (USEPA, 2010 Mammal)	15 / 15		0.67 - 250	139.578	4.5	NC	NC	NC

Notes:
ng/Kg = nanograms per kilogram
TEQ = Toxic Equivalence
RSL = Regional Screening Level (USEPA, May 2012)
U = not detected, value is the reporting limit
EMPC = estimated maximum possible concentration
NC = not calculated

US EPA ARCHIVE DOCUMENT

Table 2-3
Summary Surface Soil Results in the Vicinity of the Lee Romano Ballfield
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	SS-99-10 1/15/1999	SS-99-11 1/15/1999	SS-99-12 1/15/1999	SS-99-13 1/15/1999	SS-99-14 1/15/1999	SS-99-15 1/15/1999	SS-99-16 1/15/1999	SS-99-21 1/27/1999	SS-99-22 1/27/1999
Dioxins/Furans (ng/Kg)									
2,3,7,8-TCDD	332 U	395 U	375 U	405 U	397 U	493 U	437 U	0.231 EMPC	0.0948 EMPC
DIOXIN TEQ (USEPA, 2010 Mammal)	NC	NC	NC	NC	NC	NC	NC	0.67	1.5

Notes:
ng/Kg = nanograms per kilogram
TEQ = Toxic Equivalence
RSL = Regional Screening Level (USEPA, May 2012)
U = not detected, value is the reporting limit
EMPC = estimated maximum possible concentration
NC = not calculated

US EPA ARCHIVE DOCUMENT

Table 2-3
Summary Surface Soil Results in the Vicinity of the Lee Romano Ballfield
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	SS-99-23 1/27/1999	SS-99-24 1/27/1999	SS-99-25 1/27/1999
Dioxins/Furans (ng/Kg)			
2,3,7,8-TCDD	0.388 EMPC	1.18 EMPC	1.11 EMPC
DIOXIN TEQ (USEPA, 2010 Mammal)	3.4	3.4	4.7

Notes:
ng/Kg = nanograms per kilogram
TEQ = Toxic Equivalence
RSL = Regional Screening Level (USEPA, May 2012)
U = not detected, value is the reporting limit
EMPC = estimated maximum possible concentration
NC = not calculated

Prepared By: KJC 05/09/12
Checked By: MJM 5/10/12

US EPA ARCHIVE DOCUMENT

Table 2-4.
Derivation of Ballfield Surface Soil Risk Based Human Health Screening Values - Direct Contact
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SURFACE SOIL

EXPOSURE ROUTE	RECEPTOR POPULATION	RECEPTOR AGE	EXPOSURE POINT	PARAMETER CODE	PARAMETER DEFINITION	VALUE	UNITS	RATIONALE/ REFERENCE
INGESTION	RECREATIONAL	ADOLESCENT (ages 7 - 18)	BALLFIELD	IR-S	INGESTION RATE OF SOIL	100	mg/day	USEPA, 1994
				FI	FRACTION INGESTED	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	180	day/yr	Professional Judgement
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994
				BW	BODY WEIGHT	45	kg	USEPA, 1997[1]
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				CF	CONVERSION FACTOR	0.000001	kg/mg	
DERMAL	RECREATIONAL	ADOLESCENT (ages 7 - 18)	BALLFIELD	AF	ADHERENCE FACTOR	0.2	mg/cm2	USEPA, 2004
				AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2004
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	4800	cm2/day	USEPA, 1997[2]
				EV	EVENT DAY	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	180	day/yr	Professional Judgement
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994
				BW	BODY WEIGHT	45	kg	USEPA, 1997[1]
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				CF	CONVERSION FACTOR	0.000001	kg/mg	

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.
USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No. 2.
USEPA, 1997. "Exposure Factors Handbook, Volume 1"; Office of Research and Development; EPA-600/P-95/002Fa; Washington, D.C.; August.
USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005.
1 - Values are the average of 50th percentile body weights for males and females ages 7 through 18.
2 - Values are the average of 50th percentile body surface areas (sum of areas for face, hands, forearms, lower legs, and feet) for males in the various age groups indicated.
mg - milligrams
cm2 - square centimeters
kg - kilograms

Based on cancer risk,

$$RBC_{soil,c} = \frac{TR_{soil}}{\left[\left(\frac{CSF_o \times ADAF \times IR_{olderchild} \times FI \times EF_{olderchild} \times ED_{olderchild} \times CF}{BW_{olderchild} \times AT}\right)\right] + \left[\left(\frac{CSF_d \times ADAF \times AF \times AbF \times CF \times EV_{olderchild} \times ED_{olderchild} \times EF_{olderchild} \times SA_{olderchild}}{BW_{olderchild} \times AT}\right)\right]}$$

COMPOUND OF POTENTIAL CONCERN	ORAL SLOPE FACTOR (mg/kg/day)-1	DERMAL SLOPE FACTOR (mg/kg/day)-1	DERMAL ABSORPTION FACTOR [AbF]	RBC ELCR = 10^{-4} (mg/Kg)	RBC ELCR = 10^{-5} (mg/Kg) (A)	RBC ELCR = 10^{-6} (mg/Kg)
Dioxin-TEQ	150000	150000	0.03	0.0028	0.00028	0.000028

TRsoil - Target Risk
ELCR - Excess Lifetime Cancer Risk
RBC - Risk Based Concentration

Based on non-cancer risk,

$$RBC_{soil,nc} = \frac{THI_{soil}}{\left[\left(\frac{CF \times IR_{agegroup} \times FI \times EF_{agegroup} \times ED_{agegroup}}{RfD_o \times BW_{agegroup} \times AT}\right) + \left(\frac{AF \times AbF \times CF \times EV_{agegroup} \times ED_{agegroup} \times EF_{agegroup} \times SA_{agegroup}}{RfD_d \times BW_{agegroup} \times AT}\right)\right]}$$

COMPOUND OF POTENTIAL CONCERN	ORAL CHRONIC REFERENCE DOSE (mg/kg/day)	DERMAL CHRONIC REFERENCE DOSE (mg/kg/day)	DERMAL ABSORPTION FACTOR [AbF]	RBC ADOLESCENT HI = 0.1 (mg/Kg)	RBC ADOLESCENT HI = 1 (mg/Kg) (A)	RBC ADOLESCENT HI = 10 (mg/Kg)
Dioxin-TEQ	7.00E-10	7.00E-10	0.03	0.0000496	0.000496	0.00496

THI - Target Hazard Index
HI - Hazard Index
RBC - Risk Based Concentration
(A) Using an exposure frequency of 100 days/year (4 days per week, mid-April through September), the cancer and non-cancer RBCs are 0.000508 mg/kg and 0.000893 mg/kg, respectively.

US EPA ARCHIVE DOCUMENT

Table 2-5
Risk Assessment Summary
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Excess Lifetime Cancer Risk	Hazard Index (1)
Hypothetical Future - Source Area					
Resident	Child (ages 1 through 6)	Surface Soil	Incidental ingestion	2.2E-03	223
			Dermal contact	4.6E-04	82
			Dust inhalation	3.8E-08	0.000000002
			Total Risk:	**3E-03**	**305**
	Older Child (ages 7 through 18)	Surface Soil	Incidental ingestion	7.2E-04	38
			Dermal contact	5.0E-04	47
			Dust inhalation	7.5E-08	0.000000002
			Total Risk:	**1E-03**	**85**
	Adult (ages 19 and above)	Surface Soil	Incidental ingestion	4.5E-04	24
			Dermal contact	1.3E-04	13
			Dust inhalation	7.4E-08	0.000000002
			Total Risk:	**6E-04**	**37**
			Total Receptor Risk:	**4E-03**	**NA**
Hypothetical Future - Source Area					
Resident	Child (ages 1 through 6)	Subsurface Soil	Incidental ingestion	8.3E-04	82
			Dermal contact	1.6E-04	27
			Dust inhalation	2.2E-08	0.000003
			Total Risk:	**1E-03**	**109**
	Older Child (ages 7 through 18)	Subsurface Soil	Incidental ingestion	2.7E-04	14
			Dermal contact	1.7E-04	16
			Dust inhalation	4.4E-08	0.000003
			Total Risk:	**4E-04**	**30**
	Adult (ages 19 and above)	Subsurface Soil	Incidental ingestion	1.7E-04	9
			Dermal contact	4.2E-05	4
			Dust inhalation	4.4E-08	0.000003
			Total Risk:	**2E-04**	**13**
			Total Receptor Risk:	**2E-03**	**NA**
Hypothetical Future - Source Area					
Construction Worker	Adult	Soil	Incidental ingestion	4.5E-05	11
			Dermal contact	6.9E-06	4
			Dust inhalation	5.3E-08	0.000007
			Total Risk:	**5E-05**	**15**

NA - Not Applicable
(1) Hazard Index shown is for the target organ/suystem with the highest hazard index.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

Table 3-1.
PRGs for Fish Tissue, Sediment, Banks Soil, and Surface Soil
Technical Memorandum - Impact of Dioxin Reassessment
Preliminary Remediation Goals Report - Human Health
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Fish Tissue (human consumption) PRGs
Resident Living Along the River and Visiting Recreational Angler

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
Benzo(a)pyrene	0.15	0.015	0.0015	15.6	156	1564	15.1	151	1514	10.0	100	998
4,4-DDE	3.2	0.32	0.032	0.26	2.6	26	0.25	2.5	25.2	0.17	1.7	16.6
Aroclor-1254	0.54	0.054	0.0054	0.010	0.10	1.0	0.010	0.10	1.0	0.0067	0.067	0.67
Aroclor-1268	0.54	0.054	0.0054	0.010	0.10	1.0	0.010	0.10	1.0	0.0067	0.067	0.67
Dieldrin	0.067	0.0067	0.00067	0.026	0.26	2.6	0.025	0.25	2.5	0.017	0.17	1.7
Technical Chlordane	3.1	0.31	0.031	0.26	2.6	26.1	0.25	2.5	25.2	0.17	1.7	16.6
Coplanar PCB TEQ	0.0000072	0.00000072	0.000000072	0.00000037	0.0000037	0.000037	0.00000035	0.0000035	0.000035	0.00000023	0.0000023	0.000023
2,3,7,8-TCDD	0.0000072	0.00000072	0.000000072	0.00000037	0.0000037	0.000037	0.00000035	0.0000035	0.000035	0.00000023	0.0000023	0.000023

NC - not carcinogenic
--- No PRG calculated

Sediment (combined fish diet) PRGs
Resident Living Along the River and Visiting Recreational Angler

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
Benzo(a)pyrene	140	14.0	1.4	14,845	148,451	1,484,506	14,366	143,662	1,436,618	9,476	94,756	947,557
4,4-DDE	1.1	0.11	0.011	0.088	0.88	8.8	0.086	0.86	8.6	0.056	0.56	5.6
Aroclor-1254	0.46	0.046	0.0046	0.0088	0.088	0.88	0.0085	0.085	0.85	0.0056	0.056	0.56
Aroclor-1268	1.2	0.12	0.012	0.022	0.22	2.2	0.022	0.22	2.2	0.014	0.14	1.4
Dieldrin	0.16	0.016	0.0016	0.063	0.63	6.3	0.061	0.61	6.1	0.040	0.40	4.0
Technical Chlordane	5.8	0.58	0.058	0.49	4.9	49.1	0.47	4.7	47.5	0.31	3.1	31.3
Coplanar PCB TEQ	0.00000043	0.000000043	0.0000000043	0.000000022	0.00000022	0.0000022	0.000000021	0.00000021	0.0000021	0.000000014	0.00000014	0.0000014
2,3,7,8-TCDD	0.000048	0.0000048	0.00000048	0.0000024	0.000024	0.00024	0.0000023	0.000023	0.00023	0.0000015	0.000015	0.00015

NC - not carcinogenic
--- No PRG calculated

US EPA ARCHIVE DOCUMENT

Table 3-1.
PRGs for Fish Tissue, Sediment, Banks Soil, and Surface Soil
Technical Memorandum - Impact of Dioxin Reassessment
Preliminary Remediation Goals Report - Human Health
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sediment Direct Contact PRGs
Resident Living Along the River

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
Benzo(a)pyrene	40.5	4.0	0.40	13,627	136,271	1,362,712	6,549	65,490	654,901	1,158	11,579	115,786
Dibenzo(a,h)anthracene	40.5	4.0	0.40	13,627	136,271	1,362,712	6,549	65,490	654,901	1,158	11,579	115,786
Ni-nitroso-di-n-propylamine	45.6	4.6	0.46	---	---	---	---	---	---	---	---	---
Arsenic	262	26.2	2.6	178	1,783	17,834	104	1,040	10,404	15	146	1,457
2,3,7,8-TCDD	0.0026	0.00026	0.000026	0.00042	0.0042	0.042	0.00024	0.0024	0.024	0.000034	0.00034	0.0034

NC - not carcinogenic
--- No PRG calculated

Sediment Direct Contact PRGs
Visiting Recreational Angler

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)
Benzo(a)pyrene	496	49.6	5.0	62,575	625,746	6,257,460	26,520	265,203	2,652,028
Dibenzo(a,h)anthracene	496	49.6	5.0	62,575	625,746	6,257,460	26,520	265,203	2,652,028
Ni-nitroso-di-n-propylamine	600	60.0	6.0	---	---	---	---	---	---
Arsenic	4461	446	44.6	979	9,793	97,933	531	5,305	53054
2,3,7,8-TCDD	0.045	0.0045	0.00045	0.0023	0.023	0.23	0.0012	0.012	0.12

NC - not carcinogenic
--- No PRG calculated

Surface Soil Direct Contact PRGs
Worker at Fogarty Center

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)
Benzo(a)pyrene	48.1	4.8	0.48	3,763	37,629	376,289
Arsenic	456	45.6	4.6	73.2	732	7,321

NC - not carcinogenic
--- No PRG calculated

US EPA ARCHIVE DOCUMENT

Table 3-1.
PRGs for Fish Tissue, Sediment, Banks Soil, and Surface Soil
Technical Memorandum - Impact of Dioxin Reassessment
Preliminary Remediation Goals Report - Human Health
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Bank Soil Direct Contact PRGs
Resident Living Along The River visiting Western Shore of Allendale (this is not a residential exposure scenario)

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
2,3,7,8-TCDD	0.0016	0.00016	0.000016	0.00020	0.0020	0.020	0.00011	0.0011	0.011	0.000023	0.00023	0.0023

NC - not carcinogenic
--- No PRG calculated

Bank Soil Direct Contact PRGs
Visiting Recreational Angler

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)
2,3,7,8-TCDD	0.041	0.0041	0.00041	0.0022	0.022	0.22	0.0011	0.011	0.11

NC - not carcinogenic
--- No PRG calculated

Surface Soil Direct Contact PRGs
Passive Recreational Visitor at Oxbow General Area

COMPOUND OF POTENTIAL CONCERN	PRG ELCR = 10-4 (mg/Kg)	PRG ELCR = 10-5 (mg/Kg)	PRG ELCR = 10-6 (mg/Kg)	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
Arsenic	467	46.7	4.7	263	2,633	26,329	147	1,471	14,714	29.1	291	2,914
Benzo(a)pyrene	21.2	2.1	0.21	19,412	194,118	1,941,185	8,431	84,306	843,057	2,316	23,157	231,573
Dioxin-TEQ	0.0053	0.00053	0.000053	0.00061	0.0061	0.061	0.00034	0.0034	0.034	0.000068	0.00068	0.0068

NC - not carcinogenic
--- No PRG calculated

US EPA ARCHIVE DOCUMENT

Table 3-1.
PRGs for Fish Tissue, Sediment, Banks Soil, and Surface Soil
Technical Memorandum - Impact of Dioxin Reassessment
Preliminary Remediation Goals Report - Human Health
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

The information below is an update of Table 5-2 of the Human Health PRG Report

Chemical of Potential Concern	Geometric Mean Combined Fish Diet Sediment PRG			Background Sediment Data Greystone Mill Pond		
	ELCR = 10-4 (mg/Kg)	ELCR = 10-6 (mg/Kg)	HI = 1 (mg/Kg)	Minimum (mg/Kg)	Maximum (mg/Kg)	Geometric Mean (mg/Kg)
Benzo(a)pyrene	231	**2.3**	155,912	0.10	3.1	1.4
4,4-DDE	0.96	**0.01**	0.50	0.0011	0.031	0.0060
Aroclor-1254	**0.37**	**0.004**	**0.045**	0.023	0.38	0.15
Aroclor-1268	1.37	**0.014**	**0.169**	0.022	0.25	0.14
Dieldrin	0.15	**0.002**	0.379	0.0018	0.0051	0.0026
Technical Chlordane	5.01	**0.050**	2.7	0.15	0.63	0.40
Coplanar PCB TEQ	**5.8E-07**	**5.8E-09**	**1.9E-07**	2.5E-05	2.5E-05	2.5E-05
2,3,7,8-TCDD	**5.0E-05**	**5.0E-07**	**1.6E-05**	4.3E-07	8.7E-05	1.5E-05

Bolded PRG values indicate that they are lower than the maximum detected concentration in the background dataset.
mg/Kg - milligrams per kilogram

Chemical of Potential Concern	Combined Fish Diet Sediment PRG					Geometric Mean Combined Fish Diet Sediment PRG	Arithmetic Mean Combined Fish Diet Sediment PRG
	Assapumpset Pond	Allendale Pond	Lyman Mill Pond	Manton Pond	Dyerville Pond		
	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)	ELCR = 10^{-4} (mg/Kg)
Benzo(a)pyrene		281	190			231	235.4
4,4-DDE		0.59	1.5			0.96	1.1
Aroclor-1254		0.22	0.60			0.37	0.4
Aroclor-1268		1.7	1.1			1.37	1.4
Dieldrin		0.081	0.29			0.15	0.2
Technical Chlordane		4.5	5.5			5.01	5.0
Coplanar PCB TEQ		1.8E-08	1.9E-05			5.8E-07	9.5E-06
2,3,7,8-TCDD		4.3E-05	5.7E-05			5.0E-05	5.0E-05

US EPA ARCHIVE DOCUMENT

Table 3-1.
PRGs for Fish Tissue, Sediment, Banks Soil, and Surface Soil
Technical Memorandum - Impact of Dioxin Reassessment
Preliminary Remediation Goals Report - Human Health
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Chemical of Potential Concern	Assapumpset Pond	Allendale Pond	Lyman Mill Pond	Manton Pond	Dyerville Pond	Geometric Mean Combined Fish Diet Sediment PRG	Arithmetic Mean Combined Fish Diet Sediment PRG
	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)	HI = 1 (mg/Kg)
Benzo(a)pyrene		189,587	128,219			155,912	158,903
4,4-DDE		0.31	0.81			0.50	0.56
Aroclor-1254		0.028	0.075			0.045	0.051
Aroclor-1268		0.21	0.14			0.169	0.17
Dieldrin		0.20	0.71			0.379	0.46
Technical Chlordane		2.4	3.0			2.7	2.7
Coplanar PCB TEQ		5.8E-09	6.1E-06			1.9E-07	3.1E-06
2,3,7,8-TCDD		1.4E-05	1.8E-05			1.6E-05	1.6E-05

Prepared by: BJR 3/29/12
Checked by: KJC 3/29/12

US EPA ARCHIVE DOCUMENT

Table 3-2.
Derivation of Surface Soil Based Human Health Preliminary Remediation Goals - Direct Contact
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SURFACE SOIL

EXPOSURE ROUTE	RECEPTOR POPULATION	RECEPTOR AGE	EXPOSURE POINT	PARAMETER CODE	PARAMETER DEFINITION	VALUE	UNITS	RATIONALE/ REFERENCE
INGESTION	Resident	ADULT	Surface Soil	IR-S	INGESTION RATE OF SOIL	100	mg/day	USEPA, 1994
		(ages 19 and above)		FI	FRACTION INGESTED	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	70	kg	USEPA, 1994
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	1	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	
		ADOLESCENT	Surface Soil	IR-S	INGESTION RATE OF SOIL	100	mg/day	USEPA, 1994
		(ages 7 - 18)		FI	FRACTION INGESTED	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	45	kg	USEPA, 1997[2]
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	2.5	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	
		CHILD	Surface Soil	IR-S	INGESTION RATE OF SOIL	200	mg/day	USEPA, 1994
		(ages 1 - 6)		FI	FRACTION INGESTED	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	6	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	15	kg	USEPA, 1994
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	2190	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	4.2	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	
DERMAL	Resident	ADULT	Surface Soil	AF	ADHERENCE FACTOR	0.07	mg/cm2	USEPA, 2001
		(ages 19 and above)		AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2001[3]
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	5700	cm2/day	USEPA, 2001
				EV	EVENT DAY	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	70	kg	USEPA, 1994
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	1	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	
		ADOLESCENT	Surface Soil	AF	ADHERENCE FACTOR	0.2	mg/cm2	USEPA, 2001
		(ages 7 - 18)		AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2001[3]
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	4800	cm2/day	USEPA, 1997[4]
				EV	EVENT DAY	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	45	kg	USEPA, 1997[2]
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	2.5	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	
		CHILD	Surface Soil	AF	ADHERENCE FACTOR	0.2	mg/cm2	USEPA, 2001
		(ages 1 - 6)		AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2001[3]
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	2800	cm2/day	USEPA, 2001
				EV	EVENT DAY	1	unitless	Professional Judgement
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 1989
				ED	EXPOSURE DURATION	6	yr	USEPA, 1994[1]
				BW	BODY WEIGHT	15	kg	USEPA, 1994
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 1989
				AT-N	AVERAGING TIME (NONCANCER)	2190	day	USEPA, 1989
				ADAF	AGE DEPENDENT ADJUSTMENT FACTOR	4.2	unitless	USEPA, 2005[3]
				CF	CONVERSION FACTOR	0.000001	kg/mg	

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.
USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No. 2.
USEPA, 1997. "Exposure Factors Handbook, Volume 1"; Office of Research and Development; EPA-600/P-95/002Fa; Washington, D.C.; August.
USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
USEPA, 2005. "Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, Risk Assessment Forum; EPA/630/R-03/003F; Washington, D.C. March.
1 - The total RME exposure duration is 30 years, consistent with USEPA, 1994. The allocation of exposure duration for the three age groups is based on professional judgement.
2 - Values are the average of 50th percentile body weights for males and females ages 7 through 18.
3 - Values are provided (Exhibit 3-4 of USEPA, 2004)
4 - Values are the average of 50th percentile body surface areas (sum of areas for face, hands, forearms, lower legs, and feet) for males in the various age groups indicated.
mg - milligrams
cm2 - square centimeters
kg - kilograms

US EPA ARCHIVE DOCUMENT

Table 3-2.
Derivation of Surface Soil Based Human Health Preliminary Remediation Goals - Direct Contact
Technical Memorandum - Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SURFACE SOIL

Based on cancer risk,

$$PRG_{soil,c} = \frac{TR_{soil}}{\left[\left(\frac{CSF_o \times ADAF \times IR_{child} \times FI \times EF_{child} \times ED_{child} \times CF}{BW_{child} \times AT}\right) + \left(\frac{CSF_o \times ADAF \times IR_{olderchild} \times FI \times EF_{olderchild} \times ED_{olderchild} \times CF}{BW_{olderchild} \times AT}\right) + \left(\frac{CSF_o \times ADAF \times IR_{adult} \times FI \times EF_{adult} \times ED_{adult} \times CF}{BW_{adult} \times AT}\right)\right] + \left[\left(\frac{CSF_d \times ADAF \times AF \times AbF \times CF \times EV_{child} \times ED_{child} \times EF_{child} \times SA_{child}}{BW_{child} \times AT}\right) + \left(\frac{CSF_d \times ADAF \times AF \times AbF \times CF \times EV_{olderchild} \times ED_{olderchild} \times EF_{olderchild} \times SA_{olderchild}}{BW_{olderchild} \times AT}\right) + \left(\frac{CSF_d \times ADAF \times AF \times AbF \times CF \times EV_{adult} \times ED_{adult} \times EF_{adult} \times SA_{adult}}{BW_{adult} \times AT}\right)\right]}$$

COMPOUND OF POTENTIAL CONCERN	ORAL SLOPE FACTOR (mg/kg/day)-1	DERMAL SLOPE FACTOR (mg/kg/day)-1	DERMAL ABSORPTION FACTOR [AbF]	PRG ELCR = 10^{-4} (mg/Kg)	PRG ELCR = 10^{-5} (mg/Kg)	PRG ELCR = 10^{-6} (mg/Kg)
Arsenic	1.5	1.5	0.03	35	3.5	0.35
Benzo(a)pyrene	7.3	7.3	0.13	1.6	0.16	0.016
Dibenzo(a,h)anthracene	7.3	7.3	0.13	1.6	0.16	0.016
Ni-nitroso-di-n-propylamine	7	7	0.1	1.8	0.18	0.018
2,3,7,8-TCDD	150000	150000	0.03	0.00035	0.000035	0.0000035
Dioxin TEQ	150000	150000	0.03	0.00035	0.000035	0.0000035
Aroclor-1254	2	2	0.14	18.2	1.8	0.18
Aroclor-1268	2	2	0.14	18.2	1.8	0.18
PCB Congener TEQ	150000	150000	0.03	0.00035	0.000035	0.0000035

TRsoil - Target Risk
ELCR - Excess Lifetime Cancer Risk
ADAF used for Benzo(a)pyrene and Dibenzo(a,h)anthracene

Based on non-cancer risk,

$$PRG_{soil,nc} = \frac{THI_{soil}}{\left[\left(\frac{CF \times IR_{agegroup} \times FI \times EF_{agegroup} \times ED_{agegroup}}{RfD_o \times BW_{agegroup} \times AT}\right) + \left(\frac{AF \times AbF \times CF \times EV_{agegroup} \times ED_{agegroup} \times EF_{agegroup} \times SA_{agegroup}}{RfD_d \times BW_{agegroup} \times AT}\right)\right]}$$

COMPOUND OF POTENTIAL CONCERN	ORAL CHRONIC REFERENCE DOSE (mg/kg/day)	DERMAL CHRONIC REFERENCE DOSE (mg/kg/day)	DERMAL ABSORPTION FACTOR [AbF]	PRG ADULT HI = 0.1 (mg/Kg)	PRG ADULT HI = 1 (mg/Kg)	PRG ADULT HI = 10 (mg/Kg)	PRG ADOLESCENT HI = 0.1 (mg/Kg)	PRG ADOLESCENT HI = 1 (mg/Kg)	PRG ADOLESCENT HI = 10 (mg/Kg)	PRG CHILD HI = 0.1 (mg/Kg)	PRG CHILD HI = 1 (mg/Kg)	PRG CHILD HI = 10 (mg/Kg)
Arsenic	0.0003	0.0003	0.03	19.6	196	1956	10.9	109	1093	2.2	21.6	216
Benzo(a)pyrene	0.03	0.03	0.13	1442	14420	144202	626	6263	62627	172	1720	17203
Dibenzo(a,h)anthracene	0.03	0.03	0.13	1442	14420	144202	626	6263	62627	172	1720	17203
Ni-nitroso-di-n-propylamine	NA	NA	0.1	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	7E-10	7E-10	0.03	0.000046	0.00046	0.0046	0.000026	0.00026	0.0026	0.0000051	0.000051	0.00051
Dioxin TEQ	7E-10	7E-10	0.03	0.000046	0.00046	0.0046	0.000026	0.00026	0.0026	0.0000051	0.000051	0.00051
Aroclor-1254	0.00002	0.00002	0.14	0.94	9.4	94	0.40	4.0	40	0.11	1.1	11.2
Aroclor-1268	0.00002	0.00002	0.14	0.94	9.4	94	0.40	4.0	40	0.11	1.1	11.2
PCB Congener TEQ	7.00E-10	7.00E-10	0.03	0.000046	0.00046	0.0046	0.000026	0.00026	0.0026	0.0000051	0.000051	0.00051

THI - Target Hazard Index
HI - Hazard Index
NA - not available

Prepared by: BJR 4/27/12
Checked by: KJC 4/27/12

US EPA ARCHIVE DOCUMENT

Table 4-1. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soil[1]
Technical Memorandum – Impact of Dioxin Reassessment

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Media/ Exposure Area	Contaminant	Cleanup Goal	Basis	Explanation (Receptor/ Exposure Pathway)
Recreational-use Soil/Western Bank of Allendale Pond	2,3,7,8-TCDD	17 ng/kg	Background	Human-health risk PRG (direct contact 10^{-6}) value of 16 ng/kg is below upstream background[3] value of 17 ng/kg (Ecological risk-based PRG for Short-tailed Shrew Diet [HQ of 1] value of 35 ng/kg)
Residential-use Soil/Eastern Shore of Allendale and Lyman Mill Ponds	Arsenic	7.7 mg/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 0.35 mg/kg is below upstream background[3] value of 7.7 mg/kg
	Benzo(a)pyrene	3.1 mg/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 0.016 mg/kg is below upstream background[3] value of 3.1 mg/kg
	Dibenz(a,h)-anthracene	0.61 mg/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 0.016 mg/kg is below upstream background[3] value of 0.61 mg/kg
	Dioxin-like PCB Congener TEQ	38 ng/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 3.5 ng/kg is below upstream background[3] value of 37.9 ng/kg
	2,3,7,8-TCDD	17 ng/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 3.5 ng/kg is below upstream background[3] value of 17 ng/kg
	Dioxin TEQ	50 ng/kg	Background	Human-health risk PRG (Resident, direct contact 10^{-6}) value of 3.5 ng/kg is below upstream background value of 50 ng/kg *Human-health risk PRG (HQ of 1) value of 50 ng/kg equal to upstream background*
Recreational-use Soil/Oxbow	Antimony[2]	0.62 mg/kg	Background	Ecological risk based PRG (Short-tailed Shrew Diet, HQ of 1) value of 0.44 mg/kg is below upstream background value of 0.62 mg/kg
	Arsenic	7.7 mg/kg	Background	Human-health risk PRG (Passive Recreational Visitor, direct contact 10^{-6}) value of 4.7 mg/kg is below upstream background[3] value of 7.7 mg/kg
	Copper[2]	205 mg/kg	Background	Ecological risk based PRG (Short-tailed Shrew Diet, HQ of 1) value of 19 mg/kg is below upstream background value of 205 mg/kg
	Benzo(a)pyrene	3.1 mg/kg	Background	Human-health risk PRG (Passive Recreational Visitor, direct contact 10^{-6}) value of 0.21 mg/kg is below upstream background[3] value of 3.1 mg/kg

US EPA ARCHIVE DOCUMENT

Table 4-1. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soil[1] (cont)
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Media/ Exposure Area	Contaminant	Cleanup Goal	Basis	Explanation (Receptor/ Exposure Pathway)
Recreational Soil/ Oxbow	4,4'-DDE[2]	0.013 mg/kg	Background	Ecological risk-based PRG (American Woodcock CBR, HQ of 1) value of 0.0046 mg/kg is below upstream background value of 0.013 mg/kg
	4,4'-DDT[2]	0.10 mg/kg	Ecological risk-based PRG	American Woodcock Diet, HQ of 1
	2,3,7,8-TCDD[2]	35 ng/kg	Ecological risk-based PRG	Short-tailed Shrew Diet (HQ of 1) value of 35 ng/kg is higher than upstream background value of 17 ng/kg (and more protective than Human-health risk PRG [Passive Recreational Visitor, direct contact 10^{-6}] value of 53 ng/kg)
	Dioxin TEQ	53 ng/kg	Human Health risk-based PRG	Passive Recreational Visitor (direct contact 10^{-6}) value of 53 ng/kg is higher than upstream background[3] value of 50 ng/kg

Notes:

[1] Cleanup goals presented here are revised from Table 3-4 of the FS (Battelle, 2011). Proposed cleanup goals are based on an evaluation of risk-based PRGs (developed for the most sensitive receptor and/or exposure pathway), potential ARARs, TBCs, and site background data (Appendix E, Table E-2). Cleanup goals were not developed for undetected contaminants where the laboratory detection limits were in excess of ARARs. Additional sampling will be performed during the design phase to verify background conditions and the statistical comparisons, and verify undetected contaminants using analytical methods capable of measuring concentrations at levels below the ARARs. These data will be evaluated to assess impacts, if any, to the proposed cleanup goals. However, all numeric criteria included in ARARs identified for the CMRP site must also be met by the cleanup regardless of whether or not they are identified above except where background is an issue.

[2] Ecological cleanup goals pertain to floodplain soil at the Oxbow and areas abutting Allendale and Lyman Mill Ponds which provide floodplain habitat to wildlife.

[3] Human-health risk PRG (HQ of 1) values are above the upstream background value; see Table E-2 in Appendix E.

Key:

ARAR – Applicable or Relevant and Appropriate Requirement; CBR – critical body residue; HQ – hazard quotient; PCB – polychlorinated biphenyls; PRG - preliminary remediation goal; TBC – to be considered; TCDD –Tetrachlorodibenzo-*p*-Dioxin; TEQ - toxicity equivalence; mg/kg – milligrams per kilogram; ng/kg - nanograms per kilogram

Table 5-1. Areas and Volumes of Soil above the Cleanup Goals at the CMRP Site
Technical Memorandum – Impact of Dioxin Reassessment

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Action Area	Cleanup Area and Volumes Proposed in the FS (Battelle, 2010 and 2011)			Proposed Expanded Cleanup Areas and Volumes[1]		
	Square Feet	Acres	Cubic Yards[2]	Square Feet	Acres	Cubic Yards[2]
Source Area	339,500	7.8	62,900	11,500	0.3	430
Allendale Reach	64,600	1.5	2,400	72,300	1.7	4,200
Lyman Mill Reach	1,251,370	28.7	58,400	150,000	3.4	5,600

[1] Expanded areas proposed for cleanup are based on a comparison of site soil data to the revised cleanup goals for 2,3,7,8-TCDD. Expanded cleanup areas include additional landscape areas at the Source Area and additional floodplain areas at the reaches of Allendale and Lyman Mill.

[2] In-situ removal volumes do not include any allowance for over-excavation.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Table 6-1
Soil Residual Risks – Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-1A. Soil Residual Risks - Allendale Reach Floodplain Soil - Human Health

Carcinogenic Compounds of Concern	Cancer Classification	Cleanup Goal	Basis	RME Residual Cancer Risk	
Residential-use Soil/Eastern Shore of Allendale Pond					
Arsenic	A	7.7	Background*	(1)	A
Benzo(a)pyrene	B2	2.0[1]	Background*	(2)	A
Dibenz(a,h)-anthracene	B2	0.61	Background*	(3)	A
Dioxin TEQ	B2	0.000050	Background*	1.E-05	A
			Sum of Carcinogenic Risk	**1.E-05**	
Non-Carcinogenic Compounds of Concern	**Target Endpoint**	**Cleanup Goal**	**Basis**	**RME Residual Hazard Index**	
Residential-use Soil/Eastern Shore of Allendale Pond					
Arsenic	Skin	7.7	Background*	(1)	A
Benzo(a)pyrene	Kidney	2.0[1]	Background*	(2)	A
Dibenz(a,h)-anthracene	Kidney	0.61	Background*	(3)	A
Dioxin TEQ	Reproductive / Endocrine	0.000050	Background*	1	A

[1]Estimated regional background values based on upstream background samples from Esmond Dam south to Route 44 (Data source: Battelle, 2005).
A - Residual cancer risk and/or hazard index for direct contact.
(1) - Residual risks are not presented here because the arsenic concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related (i.e., do not appear to be related to sediment deposition). Using the proposed cleanup goal of 7.7. mg/kg arsenic as a post-remedial would result in a substantial overestimation of post-remedial risks for the eastern shore of Lyman Mill Pond (and possibly for Allendale Pond) because pre-remedial concentrations (with a few exceptions) are lower than the cleanup goal.

(2) - Residual risks are not presented here because benzo(a)pyrene concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related. Using the proposed cleanup goal of 3.1 mg/kg benzo(a)pyrene as a post-remedial soil concentration would result in substantial overestimation of risks for the eastern shore of Lyman Mill Pond (and likely of Allendale Pond) because pre-remedial concentrations (with only a few exceptions) are lower than the cleanup goal.

(3) - Residual risks are not presented here because dibenz(a,h)anthracene concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related. Using the proposed cleanup goal of 0.6 mg/kg benzo(a)pyrene as a post-remedial soil concentration would result in substantial overestimation of risks for the eastern shore of Lyman Mill Pond (and likely of Allendale Pond) because pre-remedial concentrations (with only a few exceptions) are lower than the cleanup goal.

(1), (2), (3) - There are substantial numbers of soil samples analyzed for of Dioxin TEQ along Allendale Pond (69 surface soil samples and 24 subsurface soil samples). However, there are much fewer soil samples analyzed for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene along Allendale Pond (1 surface soil sample and 5 subsurface soil samples).

RME - Reasonable Maximum Exposure
mg/kg - milligrams/kilogram
TEQ - toxicity equivalence
Background* - background values are arithmetic mean concentration, Upstream Floodplain Soil, Table A-1, Data Evaluation Report, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island (Battelle, (2003)

US EPA ARCHIVE DOCUMENT

Table 6-1
Soil Residual Risks – Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-1B. Soil Residual Risks - Allendale Reach Bank - Human Health

Carcinogenic Compounds of Concern	Cancer Classification	Cleanup Goal	Basis	RME Residual Cancer Risk
Recreational-use Soil/Western Bank of Allendale Pond				
2,3,7,8-TCDD	B2	0.000017	Background*	1.E-06 A
			Sum of Carcinogenic Risk	**1.E-06**
Non-Carcinogenic Compounds of Concern	**Target Endpoint**	**Cleanup Goal**	**Basis**	**RME Residual Hazard Index**
Recreational-use Soil/Western Bank of Allendale Pond				
2,3,7,8-TCDD	Reproductive / Endocrine	0.000017	Background*	0.07 A

A - Residual cancer risk and/or hazard index for direct contact.
RME - Reasonable Maximum Exposure
mg/kg - milligrams/kilogram
Background* - background values are arithmetic mean concentration, Upstream Floodplain Soil, Table A-1, Data Evaluation Report, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island (Battelle, (2003)

US EPA ARCHIVE DOCUMENT

Table 6-1
Soil Residual Risks – Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-1-C. Soil Residual Risks - Lyman Mill Reach Floodplain Soil - Human Health

Carcinogenic Compounds of Concern	Cancer Classification	Cleanup Goal	Basis	RME Residual Cancer Risk	
Residential-use Soil/Eastern Shore of Lyman Mill Pond					
Arsenic	A	7.7	Background*	(1)	A
Benzo(a)pyrene	B2	2.0[1]	Background*	(2)	A
Dibenz(a,h)-anthracene	B2	0.61	Background*	(3)	A
Dioxin-like PCB Congener TEQ	B2	0.0000379	Background*	(4)	A
Dioxin TEQ	B2	0.000050	Background*	1.E-05	A
			Sum of Carcinogenic Risk	**1.E-05**	
Non-Carcinogenic Compounds of Concern	**Target Endpoint**	**Cleanup Goal**	**Basis**	**RME Residual Hazard Index**	
Residential-use Soil/Eastern Shore of Lyman Mill Pond					
Arsenic	Skin	7.7	Background*	(1)	A
Benzo(a)pyrene	Kidney	2.0[1]	Background*	(2)	A
Dibenz(a,h)-anthracene	Kidney	0.61	Background*	(3)	A
Dioxin-like PCB Congener TEQ	Reproductive / Endocrine	0.0000379	Background*	(4)	A
Dioxin TEQ	Reproductive / Endocrine	0.000050	Background*	1	A

[1]Estimated regional background values based on upstream background samples from Esmond Dam south to Route 44 (Data source: Battelle, 2005).
A - Residual cancer risk and/or hazard index for direct contact.
(1) - Residual risks are not presented here because the arsenic concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related. Using the proposed cleanup goal of 7.7. mg/kg arsenic as a post-remedial would result in a substantial overestimation of post-remedial risks for the eastern shore of Lyman Mill Pond (and possibly for Allendale Pond) because pre-remedial concentrations (with a few exceptions) are lower than the cleanup goal.

US EPA ARCHIVE DOCUMENT

(2) - Residual risks are not presented here because benzo(a)pyrene concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related. Using the proposed cleanup goal of 3.1 mg/kg benzo(a)pyrene as a post-remedial soil concentration would result in substantial overestimation of risks for the eastern shore of Lyman Mill Pond (and likely of Allendale Pond) because pre-remedial concentrations (with only a few exceptions) are lower than the cleanup goal.

(3) - Residual risks are not presented here because dibenz(a,h)anthracene concentrations in the eastern shore floodplain soil are generally consistent with background conditions and do not appear to be site-related. Using the proposed cleanup goal of 0.6 mg/kg benzo(a)pyrene as a post-remedial soil concentration would result in substantial overestimation of risks for the eastern shore of Lyman Mill Pond (and likely of Allendale Pond) because pre-remedial concentrations (with only a few exceptions) are lower than the cleanup goal.

(4) - Residual risks are not presented here because PCB Congener TEQ data are very limited for surface soil at along the eastern shore of Lyman Mill Pond (one sample).

(1), (2), (3), and (4) - There are substantial numbers of soil samples analyzed for of Dioxin TEQ Lyman Mill Pond (97 surface soil samples). However, there are fewer soil samples analyzed for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene along Lyman Mill Pond (31 surface soil samples analyzed for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene).

RME - Reasonable Maximum Exposure
mg/kg - milligrams/kilogram
TEQ - toxicity equivalence
Background* - background values are arithmetic mean concentration, Upstream Floodplain Soil, Table A-1, Data Evaluation Report, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island (Battelle, (2003)

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Table 6-1
Soil Residual Risks – Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-14b REVISED. Summary of Residual Risks[1] for Human Health,
Allendale Reach Sediment Action-Based Alternatives (Alternatives 7, 8, 10, and 11)
Sediment and Sediment Associated Fish Consumption
for a Resident Living Along the River

Carcinogenic Contaminant	Cancer Classification	Sediment Cleanup Goal (mg/Kg)	Basis	RME Residual Cancer Risk	
Benzo(a)pyrene	B2	1.4	Background	4.E-06	A
Dibenz(a,h)anthracene	B2	0.97	Background	2.E-06	A
Dieldrin	B2	0.0026	Background	2.E-06	B
Technical Chlordane	B2	0.4	Background	8.E-06	B
Aroclor 1254	B2	0.031	Background[2]	8.E-06	B
Aroclor 1268	B2	0.023	Background[2]	2.E-06	B
Arsenic	A	3.9	Background	1.E-06	A
2,3,7,8-TCDD	B2	0.000015	Background	3.E-05	C
Coplanar PCBs (TEQ)	B2	0.000025	Background	--	D
			Sum of Carcinogenic Risk	**5.E-05**	
Non-Carcinogenic Contaminant	**Target Endpoint**	**Sediment Cleanup Goal (mg/Kg)**	**Basis**	**RME Residual Hazard Index**	
Benzo(a)pyrene	Kidney	1.4	Background	0.0001	A
Dibenz(a,h)anthracene	Kidney	0.97	Background	0.00008	A
Dieldrin	Liver	0.0026	Background	0.007	B
Technical Chlordane	Liver	0.4	Background	0.1	B
Aroclor 1254	Immune system	0.031	Background[2]	0.7	B
Aroclor 1268	Immune system	0.023	Background[2]	0.1	B
Arsenic	Skin	3.9	Background	0.03	A
2,3,7,8-TCDD	Reproductive / Endocrine	0.000015	Background	1	C
Coplanar PCBs (TEQ)	--	0.000025	Background	--	D
			HI Kidney	**0.00008**	
			HI Liver	**0.2**	
			HI Immune System	**0.8**	
			HI Skin	**0.03**	
			HI Reproductive	**1**	

Notes:
[1]Residual risks are those risks that remain following attainment of the cleanup objectives.
[2]Estimated regional background values derived by excluding elevated upriver background results collected between the Smithfield Wastewater Treatment Plant and Route 44.

Key:
A - Residual cancer risk and/or hazard index for direct contact.
B - Residual cancer risk and/or hazard index for fish consumption.
C - Residual cancer risk and/or hazard index for fish consumption and direct contact.

Table 6-1
Soil Residual Risks – Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

D – Residual cancer risk and/or hazard index not calculated for Coplanar PCBs due to highly uncertain BSAFs. Use of this Cleanup Goal with the existing BSAFs would be inconsistent with the previously calculated risk at Greystone Mill Pond (the background area).
HI - Hazard Index
RME - Reasonable Maximum Exposure
mg/kg - milligrams/kilogram
PCB - polychlorinated biphenyl
TEQ - toxic equivalent

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Table 6-1
Residual Risk Calculations for Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-15b REVISED. Summary of Residual Risks[1] for Human Health,
Lyman Mill Reach Sediment Action-Based Alternatives (Alternatives 7, 8, 10, and 11)
Sediment and Sediment Associated Fish Consumption
for a Resident Living Along the River

Carcinogenic Contaminant[3]	Cancer Classification	Sediment Cleanup Goal (mg/Kg)	Basis	RME Residual Cancer Risk	
Benzo(a)pyrene	B2	1.4	Background	4.E-06	C
Dibenz(a,h)anthracene	B2	0.97	Background	2.E-06	A
N-Nitroso-di-n-propylamine	B2	0.46	Risk	1.E-06	A
Dieldrin	B2	0.0026	Background	2.E-06	B
Technical Chlordane	B2	0.40	Background	8.E-06	B
Aroclor 1254	B2	0.031	Background[2]	8.E-06	B
Aroclor 1268	B2	0.023	Background[2]	2.E-06	B
Arsenic	A	3.9	Background	1.E-06	A
2,3,7,8-TCDD	B2	0.000015	Background	3.E-05	C
Coplanar PCBs (TEQ)	B2	0.000025	Background	--	D
			Sum of Carcinogenic Risk	**6.E-05**	
Non-Carcinogenic Contaminant	**Target Endpoint**	**Sediment Cleanup Goal (mg/Kg)**	**Basis**	**RME Residual Hazard Index**	
Benzo(a)pyrene	Kidney	1.4	Background	0.0001	C
Dibenz(a,h)anthracene	Kidney	0.97	Background	0.00008	A
N-Nitroso-di-n-propylamine	--	0.46	Risk	--	E
Dieldrin	Liver	0.0026	Background	0.007	B
Technical Chlordane	Liver	0.40	Background	0.1	B
Aroclor 1254	Immune system	0.031	Background[2]	0.7	B
Aroclor 1268	Immune system	0.023	Background[2]	0.1	B
Arsenic	Skin	3.9	Background	0.03	A
2,3,7,8-TCDD	Reproductive / Endocrine	0.000015	Background	1	C
Coplanar PCBs (TEQ)	--	0.000025	Background	--	D
			HI Kidney	**0.0002**	
			HI Liver	**0.2**	
			HI Immune System	**0.8**	
			HI Skin	**0.03**	
			HI Reproductive	**1**	

Notes:
[1]Residual risks are those risks that remain following attainment of the cleanup objectives.
[2]Estimated regional background values derived by excluding elevated upriver background results collected between the Smithfield Wastewater Treatment Plant and Route 44.
[3]Comprehensive list of all sediment contaminants identified for human receptors; see Table 1-3 in the Interim Final PRG (Part I) report (MACTEC, 2005).

Key:
A - Residual cancer risk and/or hazard index for direct contact.
B - Residual cancer risk and/or hazard index for fish consumption.
C - Residual cancer risk and/or hazard index for fish consumption and direct contact.

Table 6-1
Residual Risk Calculations for Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

D - Residual cancer risk and/or hazard index not calculated for Coplanar PCBs due to highly uncertain BSAFs. Use of this Remedial Goal with the existing BSAFs would be inconsistent with the previously calculated risk at Greystone Mill Pond (the background area).
HI - Hazard Index
RME - Reasonable Maximum Exposure
mg/kg - milligrams/kilogram
PCB - polychlorinated biphenyl
TEQ - toxic equivalent

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Table 6-1
Residual Risk Calculations for Human Health
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Table 6-29b REVISED. Summary of Residual Risks[1] for Human Health,
Lyman Mill Reach Stream Sediment and Floodplain Soil Action-Based Alternatives
(Alternatives 3 and 5)
Surface Soil Contact for a Passive Recreational Visitor

Carcinogenic Contaminant	Cancer Classification	Floodplain Soil Cleanup Goal[2] (mg/Kg)	Basis	RME Residual Cancer Risk[3]	
Dioxin TEQ	B2	0.000053	HH PRG	1.E-06	A
Benzo(a)pyrene	B2	2.0[4]	Background[4]	9.E-06	A
Arsenic	A	7.7	Background	2.E-06	A
			Sum of Carcinogenic Risk	**1.E-05**	
Non-Carcinogenic Contaminant	**Target Endpoint**	**Floodplain Soil Cleanup Goal (mg/Kg)**	**Basis**	**RME Residual Hazard Index**	
Dioxin TEQ	Reproductive / Endocrine	0.000053	HH PRG	0.08	A
Benzo(a)pyrene	Kidney	2.0[4]	Background[4]	0.00008	A
Arsenic	Skin	7.7	Background	0.03	A
			HI Kidney	**0.00008**	
			HI Liver	--	
			HI Immune System	--	
			HI Skin	**0.03**	
			HI Reproductive	**0.08**	

Notes:
[1]Residual risks are those risks that remain following attainment of the cleanup objectives. Estimates are based on anticipated average concentrations throughout relevant human exposure areas within the Oxbow.
[2]Floodplain soil cleanup goals are summarized in Table 3-4 of the Addendum to the FW (Battelle, 2011).
[3]A - Residual cancer risk and/or hazard index for direct contact.
[4]Estimated regional background values based on upstream background samples from Esmond Dam south to Route 44 (Data source: Battelle, 2005).

HH PRG - Human Health Risk-based PRG
HI - Hazard Index
RME - Reasonable Maximum Exposure
mg/Kg - milligrams/kilogram
TEQ - toxic equivalent

Table 6-29d (revised). Summary of Residual Risks[1] for Ecological Health,
Lyman Mill Reach Stream Sediment and Floodplain Soil Action-Based Alternatives
(Alternatives 3 and 5)
Floodplain Soil Contact and Prey Consumption by Ecological Receptors
Technical Memorandum – Impact of Dioxin Reassessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant	Floodplain Soil Cleanup Goal[a] (mg/Kg)	Basis	Residual Hazard Quotients[b]			
			Wildlife - Birds[c]		Wildlife - Mammals[d]	
2,3,7,8-TCDD[e]	0.000035	Mammal Dose	0.21	A	1.0	B
4,4'-DDT	0.10	Bird Dose	1.0	B	-	
4,4'-DDE	0.013	Background	2.8	A	-	
Antimony	0.62	Background	-		1.4	B
Copper	205	Background	-		11	B
Notes		**HI[f]**	**4**		**10**	

Notes:
[1]Residual risks are those risks that remain following attainment of the cleanup objectives. Estimates are based on anticipated average concentrations throughout the exposure area.
a. Floodplain soil cleanup goals are summarized in Table 3-4 of this Addendum.
b. Calculated by dividing the cleanup goal concentration by the PRG for the most sensitive measurement endpoint for each receptor category. A dash indicates no unacceptable risk for that particular receptor.
c. Floodplain soil concentrations protective of vermivorous wildlife (birds) were derived using: (A) literature-derived CBRs and (B) dietary exposure modeling. The American woodcock is the representative receptor species for this assessment endpoint.
d. Floodplain soil concentrations protective of vermivorous wildlife (mammals) were derived using: (B) dietary exposure modeling. The short-tailed shrew is the representative receptor species for this assessment endpoint.
e. Residual risk estimates are for the Oxbow Area (i.e., west of the Woonasquatucket River below Allendale Dam); risk estimates would be slightly lower for the eastern shore of Lyman Mill Pond where the lower cleanup goal for 2,3,7,8-TCDD, based on background (i.e., 0.000017 mg/kg or 17 ng/kg), would apply. As discussed in Section 4.0, the separate cleanup goals for the Oxbow area and eastern shoreline are necessary because of the applicable human health exposure scenarios (passive recreational and residential) that apply to these two areas. The overall HIs for wildlife would not change as 2,3,7,8-TCDD is not the largest contributor to the residual risk estimates.
f. Consistent with CERCLA Risk Assessment Guidance (RAGs) for human health risk assessments, HIs are reported using one significant figure; as a result the values may not appear to be equivalent to the sum of the individual contaminant-specific risk estimates (i.e., Hazard Quotients).

ARAR – Applicable or Relevant and Appropriate Requirement
HI - Hazard Index
mg/Kg - milligrams/kilogram

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

FIGURES

TECHNICAL MEMORANDUM – IMPACT OF DIOXIN REASSESSMENT

CMS-508 18
SB-14-271 0.32
AP-DEL-01 80
14-271
AP-DEL-01 52
CMS-506 25
CMS-507 47
CMS-220 2.9
CMS-108 95
CMS-223 120
AP-DEL-02 3.6
CMS-116 130
AP-DEL-02 160
14-272
CMS-502 69
02-DEL-202 30
14-302
CMS-501 23
CMS-222 99
CMS-137 4.1
AP-DEL-03 77
AP-DEL-03 22
14-303
CMS-225 130
RES-14-333-02 100
14-333
03-DEL-102 5.1
03/04-DEL-104 19
03/04-DEL-105 27
03/04-DEL-102 290
RES-14-365-03 110
RES-14-365-02 86
14-365
AP-DEL-05 16
AP-DEL-05 480
RES-14-366-03 13
CMS-185 62
CMS-184 88
14-366
CMS-499 93
04-DEL-202 58
CMS-498 87
04-DEL-201 140
14-398
CMS-497 81
04-DEL-203 310
CMS-189 150
05-DEL-100 120
14-399
14-418
CMS-197 620
AP-DEL-07 140
AP-DEL-07 140
14-419
CMS-418 210
CMS-418 240
14-424 & 14-425
AP-DEL-09 18
CMS-463 23
AP-DEL-09 0.7
AP-DEL-10 2.2
CMS-461 30
14-420
14-421
14-422
AP-DEL-08 8.7
RES-14-422-02 25
AP-DEL-10 2.9
06-DEL-100 2.2
AP-DEL-08 100
06-DEL-200 0.48

Steere Avenue
Grover Street
Redfern Street
George Street
Stephen Street
Aldrich Street

Parameter	Clean Up Goal Residential-use Soil/Eastern Shore of Allendale and Lyman Mill Ponds
Arsenic	7.7 mg/kg
Benzo(a)pyrene	3.1 mg/kg
Dibenz(a,h)-anthracene	0.61 mg/kg
Dioxin-like PCB Congener TEQ	37.9 ng/kg
2,3,7,8-TCDD	17 ng/kg
Dioxin TEQ	50 ng/kg

Notes: 1. Circle symbols indicate surface soil sample, square indicate subsurface soil sample.
2. Parcel text background color orange indicates cancer risk above 1E-5 or HQ above 1.
3. Parcel text background color green indicates cancer risk below 1E-5 and HQ below 1.
4. Value shown with sample ID is TEQ concentration in ppt.
5. Parcel boundaries and fence are approximate.
6. 2011 Ortho Photo obtained from RIGIS.

0 25 50 Feet

N

Prepared by BJR | Checked by MJM

Legend

- TEQ Alone or TEQ and Others Above Cleanup Goals in Surface Soil
- Arsenic Only Above Cleanup Goal in Surface Soil
- PAHs Only Above Cleanup Goal in Surface Soil
- PAHs and Arsenic Above Cleanup Goal in Surface Soil
- Nothing Above Cleanup Goals in Surface Soil
- Soil Location Not Used in Risk Calculations Sample is Not Site-Related
- TEQ Alone or TEQ and Others Above Cleanup Goals in Subsurface Soil
- Arsenic Only Above Cleanup Goal in Subsurface Soil
- PAHs Only Above Cleanup Goal in Subsurface Soil
- PAHs and Arsenic Above Cleanup Goal in Subsurface Soil
- Nothing Above Cleanup Goals in Subsurface Soil
- Approximate Fence Line
- 2002 NTCRA Excavaction Area
- 100 Year Flood Plain

Figure 2-1
Residential Soil Compared to Cleanup Goals - Allendale North Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY25 DELIVERABLE\FIGURES\Figure 2-1.pdf 6/5/2012 3:01 PM brian.roden

Parameter	Clean Up Goal Residential-use Soil/Eastern Shore of Allendale and Lyman Mill Ponds
Arsenic	7.7 mg/kg
Benzo(a)pyrene	3.1 mg/kg
Dibenz(a,h)-anthracene	0.61 mg/kg
Dioxin-like PCB Congener TEQ	37.9 ng/kg
2,3,7,8-TCDD	17 ng/kg
Dioxin TEQ	50 ng/kg

Notes: 1. Circle symbols indicate surface soil sample, square indicate subsurface soil sample.
2. Parcel text background color orange indicates cancer risk above 1E-5 or HQ above 1.
3. Parcel text background color green indicates cancer risk below 1E-5 and HQ below 1.
4. Value shown with sample ID is TEQ concentration in ppt.
5. Parcel boundaries and fence are approximate.
6. 2011 Ortho Photo obtained from RIGIS.

0 25 50 Feet

N

Prepared by BJR | Checked by MJM

Legend

- TEQ Alone or TEQ and Others Above Cleanup Goals in Surface Soil
- Arsenic Only Above Cleanup Goal in Surface Soil
- PAHs Only Above Cleanup Goal in Surface Soil
- PAHs and Arsenic Above Cleanup Goal in Surface Soil
- Nothing Above Cleanup Goals in Surface Soil
- Soil Location Not Used in Risk Calculations Sample is Not Site-Related
- TEQ Alone or TEQ and Others Above Cleanup Goals in Subsurface Soil
- Arsenic Only Above Cleanup Goal in Subsurface Soil
- PAHs Only Above Cleanup Goal in Subsurface Soil
- PAHs and Arsenic Above Cleanup Goal in Subsurface Soil
- Nothing Above Cleanup Goals in Subsurface Soil
- Approximate Fence Line
- 2002 NTCRA Excavaction Area
- 100 Year Flood Plain

Figure 2-2
Residential Soil Compared to Cleanup Goals - Allendale South Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY25 DELIVERABLE\FIGURES\Figure 2-2.pdf 6/5/2012 1:52 PM brian.roden

US EPA ARCHIVE DOCUMENT

RES-11-011-02 4.4
RES-11-011-03 4.5
RES-11-011-01 7.2
11-011 &11-012
RES-11-012-01 14
RES-11-012-03 5.7
RES-11-012-02 3.5
Warren Avenue
Zambarano Avenue
Falco Street
RES-11-419-01 600
11-419
RES-11-419-03 2.1
RES-11-423-02 0.8
11-420
11-422
RES-11-423-03 0.89
RES-11-422-03 4.4
11-423 & 11-424
11-425 & 11-426
RES-11-420-04 120
RES-11-420-02 6.4
RES-11-420-01 11
RES-11-422-02 6.7
RES-11-422-01 40
RES-11-423-01 14
RES-11-424-01 40
RES-11-424-02 30
RES-11-424-03 28
9-DEL-202 16
RES-11-425-03 1.1
RES-11-425-02 10
9-DEL-203 52
11-427 & 14-428 & 14-429
RES-11-426-03 0.73
RES-11-428-03 2.9
RES-11-427-03 1.1
9-DEL-201 20
RES-11-426-01 37
RES-11-426-02 1.9
RES-11-428-02 3.4
RES-11-429-02 7.9
11-430 & 11-431
11-432 & 11-433
RES-11-427-01 0.91
RES-11-428-01 5
RES-11-427-02 1.2
RES-11-429-01 17
RES-11-431-03 4.3
RES-11-430-02 8.2
RES-11-430-01 1.5
RES-11-431-01 35
RES-11-432-03 8.2
RES-11-433-03 28
RES-11-433-01 1000
RES-11-432-02 5
RES-11-433-02 140
RES-11-432-01 120
RES-11-486-02 73
RES-11-486-03 59
RES-11-431-02 30
RES-11-486-01 46
11-486
LPX-FP-4006 150
11-328
RES-11-328-01 390
RES-11-328-03 3.5
RES-11-328-02 22
RES-11-497-02 6.2
RES-11-497-03 5.1
RES-11-497-01 7.5
11-497
10-DEL-304 67
10-DEL-301 330
10-DEL-302 100
RES-11-396-02 61
RES-11-396-03 8.5
11-396
RES-11-577-01 420
11-577
RES-11-577-02 67
RES-11-577-03 19

Parameter	Clean Up Goal Residential-use Soil/Eastern Shore of Allendale and Lyman Mill Ponds
Arsenic	7.7 mg/kg
Benzo(a)pyrene	3.1 mg/kg
Dibenz(a,h)-anthracene	0.61 mg/kg
Dioxin-like PCB Congener TEQ	37.9 ng/kg
2,3,7,8-TCDD	17 ng/kg
Dioxin TEQ	50 ng/kg

Notes: 1. Circle symbols indicate surface soil sample, square indicate subsurface soil sample.
2. Parcel text background color orange indicates cancer risk above 1E-5 or HQ above 1.
3. Parcel text background color green indicates cancer risk below 1E-5 and HQ below 1.
4. Value shown with sample ID is TEQ concentration in ppt.
5. Parcel boundaries and fence are approximate.
6. 2011 Ortho Photo obtained from RIGIS.

0 25 50 Feet

N

Prepared by BJR | Checked by MJM

Legend

- TEQ Alone or TEQ and Others Above Cleanup Goals in Surface Soil
- Arsenic Only Above Cleanup Goal in Surface Soil
- PAHs Only Above Cleanup Goal in Surface Soil
- PAHs and Arsenic Above Cleanup Goal in Surface Soil
- Nothing Above Cleanup Goals in Surface Soil
- Soil Location Not Used in Risk Calculations Sample is Not Site-Related
- TEQ Alone or TEQ and Others Above Cleanup Goals in Subsurface Soil
- Arsenic Only Above Cleanup Goal in Subsurface Soil
- PAHs Only Above Cleanup Goal in Subsurface Soil
- PAHs and Arsenic Above Cleanup Goal in Subsurface Soil
- Nothing Above Cleanup Goals in Subsurface Soil
- Approximate Fence Line
- 2002 NTCRA Excavaction Area
- 100 Year Flood Plain

Figure 2-3
Residential Soil Compared to Cleanup Goals - Lyman Mill North
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY25 DELIVERABLE\FIGURES\Figure 2-3.pdf 6/5/2012 2:04 PM brian.roden

US EPA ARCHIVE DOCUMENT

Oak Street

Woonasquatucket Avenue

Water Street

RES-10-004-01
120

RES-10-004-03
2.1

RES-10-004-02
6.6

10-004

RES-10-005-02
9

10-005

RES-10-005-01
150

RES-10-005-03
3.2

RES-10-042-01
330

RES-10-042-03
4.1

RES-10-042-02
4.3

10-042 & 10-044 & 10-604

RES-10-604-02
52

RES-10-604-03
3.2

LPX-FPE-4007
83

RES-10-604-01
260

RES-10-044-01
530

RES-10-044-03
12

RES-10-044-02
62

10-068

RES-10-053-02
8.5

RES-10-053-03
2.3

RES-10-053-01
42

11-DEL-100
52

10-074

RES-10-068-01
26

RES-10-074-02
86

RES-10-074-01
17

RES-10-075-03
5.4

RES-10-075-02
3.3

RES-10-075-01
14

10-075 & 10-076

RES-10-076-03
3.5

RES-10-076-01
120

RES-10-076-02
17

Parameter	Clean Up Goal Residential-use Soil/Eastern Shore of Allendale and Lyman Mill Ponds
Arsenic	7.7 mg/kg
Benzo(a)pyrene	3.1 mg/kg
Dibenz(a,h)-anthracene	0.61 mg/kg
Dioxin-like PCB Congener TEQ	37.9 ng/kg
2,3,7,8-TCDD	17 ng/kg
Dioxin TEQ	50 ng/kg

Notes:
1. Circle symbols indicate surface soil sample, square indicate subsurface soil sample.
2. Parcel text background color orange indicates cancer risk above 1E-5 or HQ above 1.
3. Parcel text background color green indicates cancer risk below 1E-5 and HQ below 1.
4. Value shown with sample ID is TEQ concentration in ppt.
5. Parcel boundaries and fence are approximate.
6. 2011 Ortho Photo obtained from RIGIS.

0 25 50
Feet

N

Prepared by BJR | Checked by MJM

Legend

- TEQ Alone or TEQ and Others Above Cleanup Goals in Surface Soil
- Arsenic Only Above Cleanup Goal in Surface Soil
- PAHs Only Above Cleanup Goal in Surface Soil
- PAHs and Arsenic Above Cleanup Goal in Surface Soil
- Nothing Above Cleanup Goals in Surface Soil
- Soil Location Not Used in Risk Calculations Sample is Not Site-Related
- TEQ Alone or TEQ and Others Above Cleanup Goals in Subsurface Soil
- Arsenic Only Above Cleanup Goal in Subsurface Soil
- PAHs Only Above Cleanup Goal in Subsurface Soil
- PAHs and Arsenic Above Cleanup Goal in Subsurface Soil
- Nothing Above Cleanup Goals in Subsurface Soil
- Approximate Fence Line
- 2002 NTCRA Excavaction Area
- 100 Year Flood Plain

Figure 2-4
Residential Soil Compared to Cleanup Goals - Lyman Mill South
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY25 DELIVERABLE\FIGURES\Figure 2-4.pdf 6/5/2012 2:07 PM brian.roden

US EPA ARCHIVE DOCUMENT

SS-99-16
SS-99-25
SS-99-13
SS-99-24
SS-99-12
SS-99-23
SS-99-14
SS-99-22
SS-99-15
SS-99-11
SS-99-21
SS-99-08
SS-99-07
SS-99-10
SS-99-09

Legend

- Ballfield Surface Soil Location
- 100 Year Flood Plain

0 15 30 Feet

N

Prepared by BJR | Checked by MJM

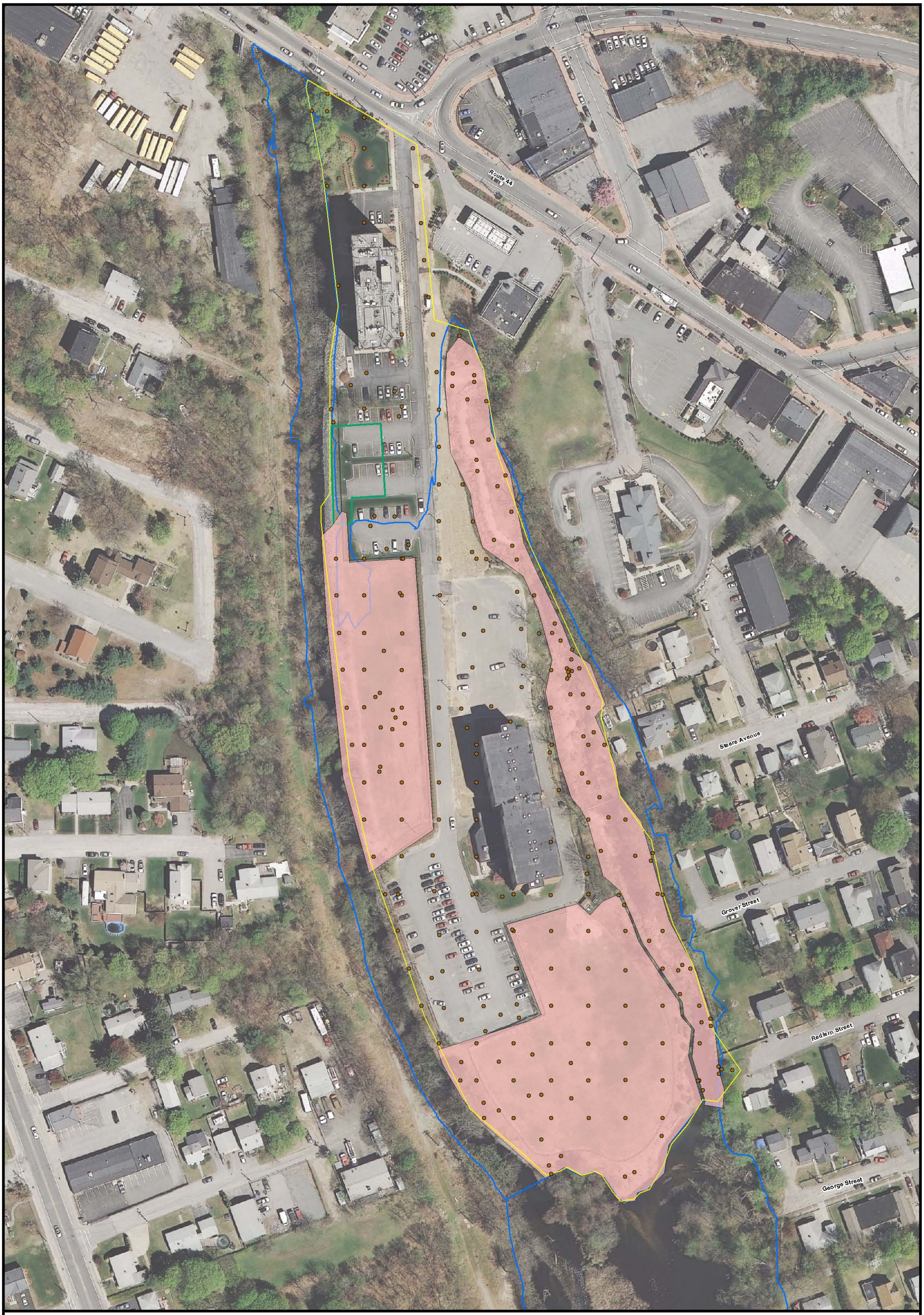
Figure 2-5
Lee Romano Ballfield Soil Samples

Centredale Manor Restoration
Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY14DRAFT\FIGURES\Figure 2-5.pdf 5/17/2012 12:37 PM brian.roden

US EPA ARCHIVE DOCUMENT



Legend

- 100 Year Flood Plain
- Source Area Soil Location
- Excavated Area
- Existing Cap
- Source Area

0 30 60 Feet

N

Prepared by BJR | Checked by MJM

Figure 2-6
Source Area Soil Samples

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY14DRAFT\FIGURES\Figure 2-6 - Source Area Soil Samples.pdf 5/25/2012 4:50 PM brian.roden

US EPA ARCHIVE DOCUMENT

Figure 5-1. Dioxin in Surface Soil Relative to Proposed Cleanup Areas at the Source Area

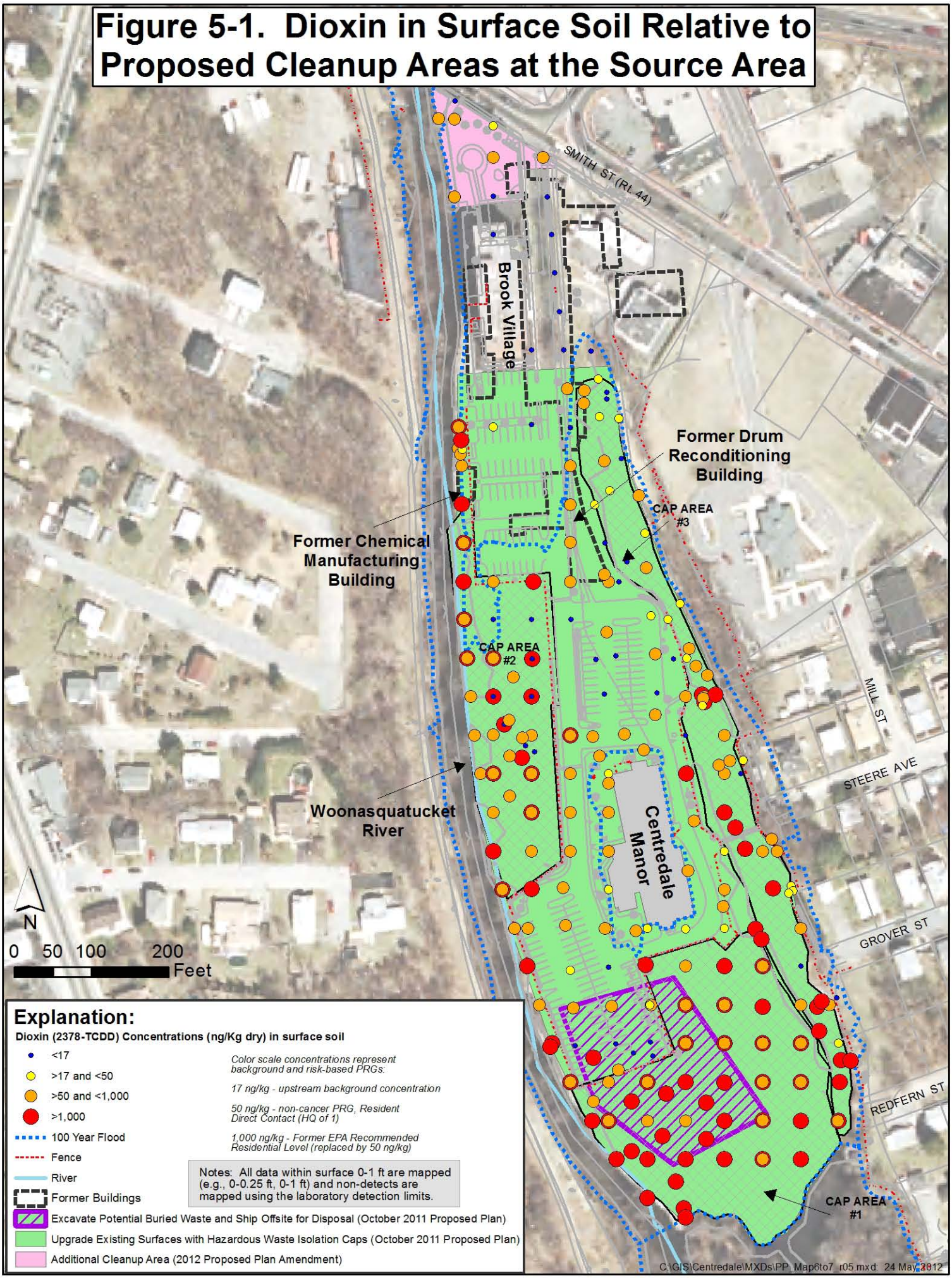
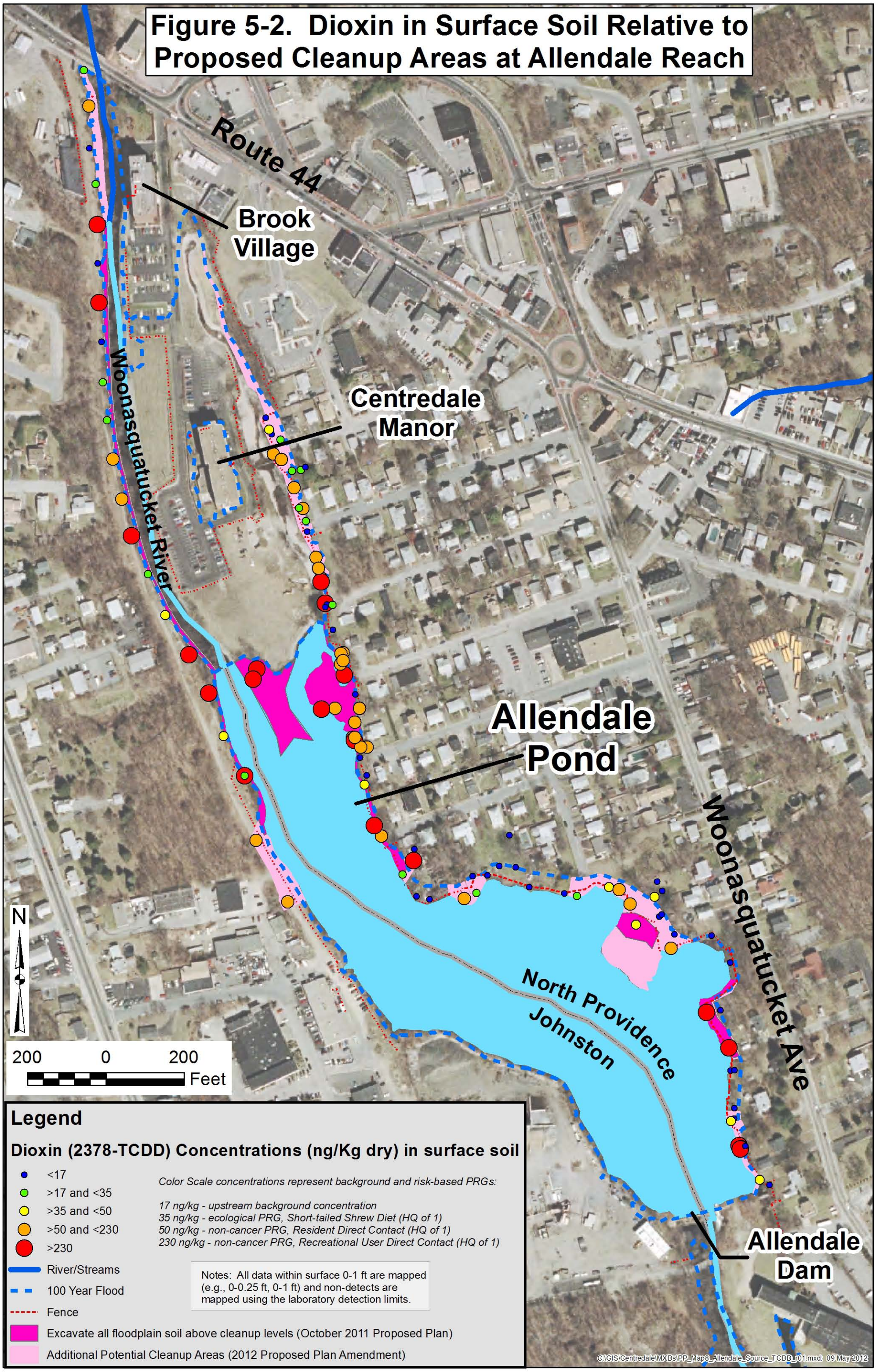


Figure 5-2. Dioxin in Surface Soil Relative to Proposed Cleanup Areas at Allendale Reach



Legend

Dioxin (2378-TCDD) Concentrations (ng/Kg dry) in surface soil

- <17
- >17 and <35
- >35 and <50
- >50 and <230
- >230
- River/Streams
- 100 Year Flood
- Fence
- Excavate all floodplain soil above cleanup levels (October 2011 Proposed Plan)
- Additional Potential Cleanup Areas (2012 Proposed Plan Amendment)

Color Scale concentrations represent background and risk-based PRGs:

17 ng/kg - upstream background concentration
35 ng/kg - ecological PRG, Short-tailed Shrew Diet (HQ of 1)
50 ng/kg - non-cancer PRG, Resident Direct Contact (HQ of 1)
230 ng/kg - non-cancer PRG, Recreational User Direct Contact (HQ of 1)

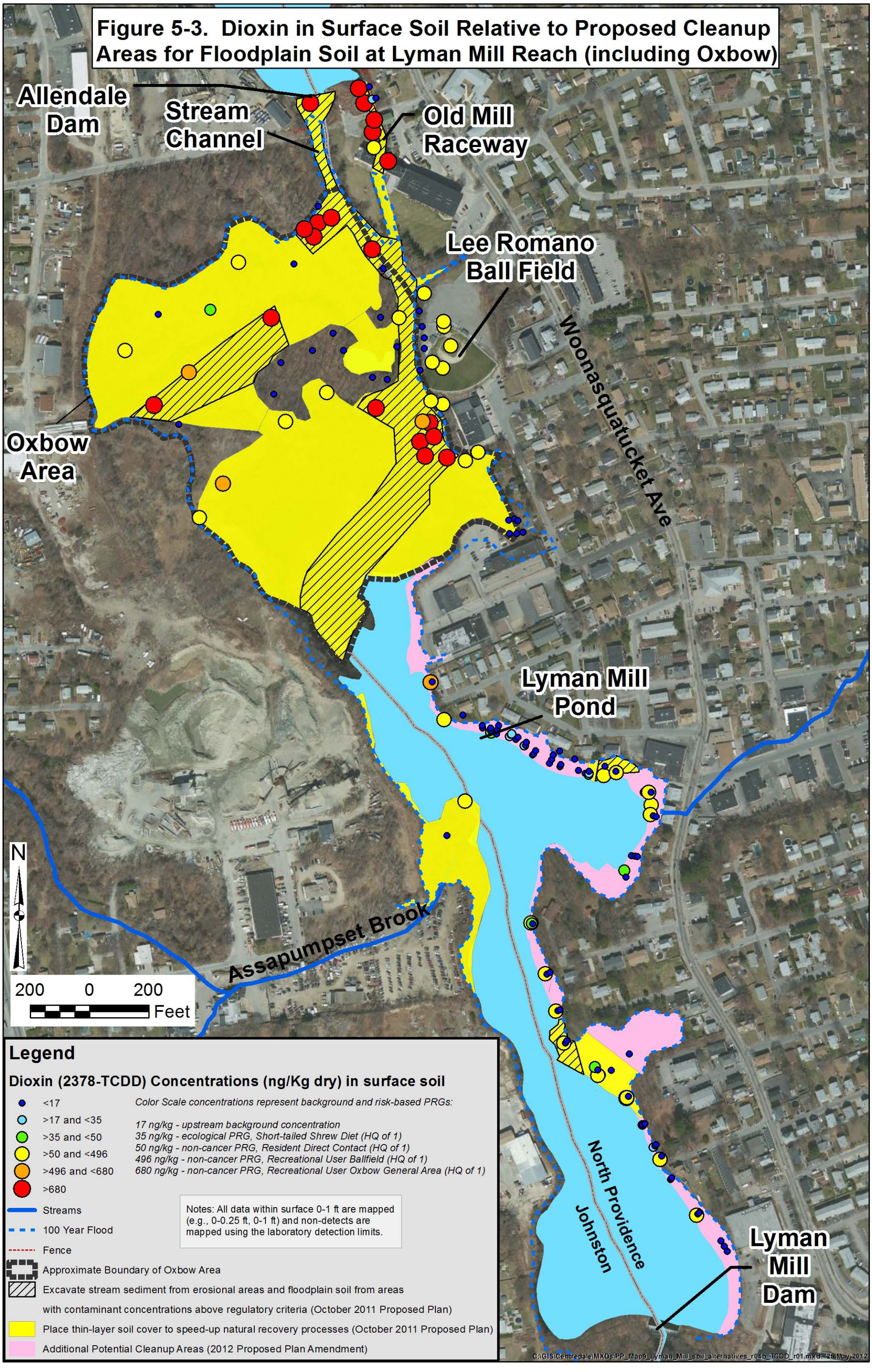
Notes: All data within surface 0-1 ft are mapped (e.g., 0-0.25 ft, 0-1 ft) and non-detects are mapped using the laboratory detection limits.

C:\GIS\Centredale\MXDs\PP_Map8_Allendale_Source_TCDD_r01.mxd: 09 May 2012

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Figure 5-3. Dioxin in Surface Soil Relative to Proposed Cleanup Areas for Floodplain Soil at Lyman Mill Reach (including Oxbow)



Legend

Dioxin (2378-TCDD) Concentrations (ng/Kg dry) in surface soil

- <17
- >17 and <35
- >35 and <50
- >50 and <496
- >496 and <680
- >680

Color Scale concentrations represent background and risk-based PRGs:

17 ng/kg - upstream background concentration
35 ng/kg - ecological PRG, Short-tailed Shrew Diet (HQ of 1)
50 ng/kg - non-cancer PRG, Resident Direct Contact (HQ of 1)
496 ng/kg - non-cancer PRG, Recreational User Ballfield (HQ of 1)
680 ng/kg - non-cancer PRG, Recreational User Oxbow General Area (HQ of 1)

Notes: All data within surface 0-1 ft are mapped (e.g., 0-0.25 ft, 0-1 ft) and non-detects are mapped using the laboratory detection limits.

- Streams
- 100 Year Flood
- Fence
- Approximate Boundary of Oxbow Area
- Excavate stream sediment from erosional areas and floodplain soil from areas with contaminant concentrations above regulatory criteria (October 2011 Proposed Plan)
- Place thin-layer soil cover to speed-up natural recovery processes (October 2011 Proposed Plan)
- Additional Potential Cleanup Areas (2012 Proposed Plan Amendment)

US EPA ARCHIVE DOCUMENT

APPENDIX A

Historical Risk Calculation Spreadsheets

Risk Calculation Spreadsheets from the 2005 Interim Final Baseline Human Health Risk Assessment and the 2011 Interim Final Supplemental Baseline Human and Ecological Risk Assessment: Oxbow Area Floodplain Soil and Sediment, Part I

US EPA ARCHIVE DOCUMENT

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SEDIMENT	SEDIMENT	ASSAPUMPSET POND	INGESTION	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			4.7E-10	mg/kg/day	2.0E-02	mg/kg/day	2.E-08
				Acenaphthylene	0.0589	mg/kg	NC		NC			1.5E-09	mg/kg/day	6.0E-02	mg/kg/day	2.E-08
				Benzo(a)anthracene	1	mg/kg	4.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.5E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Benzo(a)pyrene	0.84	mg/kg	3.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.1E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Benzo(b)fluoranthene	1.4	mg/kg	6.1E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-09	3.6E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			1.5E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Dibenzo(a,h)anthracene	0.17898	mg/kg	7.8E-10	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-09	4.6E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	2.8E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	1.7E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Phenanthrene	0.79474	mg/kg	NC		NC			2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				alpha-Chlordane	0.00133	mg/kg	5.8E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	3.4E-11	mg/kg/day	5.0E-04	mg/kg/day	7.E-08
				Aroclor-1254	0.05755	mg/kg	2.5E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-10	1.5E-09	mg/kg/day	2.0E-05	mg/kg/day	7.E-05
				Aroclor-1268	0.04166	mg/kg	1.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-10	1.1E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-05
				gamma-Chlordane	0.00065	mg/kg	2.8E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-12	1.7E-11	mg/kg/day	5.0E-04	mg/kg/day	3.E-08
				Technical Chlordane	0.15253	mg/kg	6.7E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	3.9E-09	mg/kg/day	5.0E-04	mg/kg/day	8.E-06
				Aluminum	21774	mg/kg	NC		NC			5.5E-04	mg/kg/day	1.0E+00	mg/kg/day	6.E-04
				Arsenic	5.21	mg/kg	2.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-08	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Cadmium	0.858	mg/kg	NC		NC			2.2E-08	mg/kg/day	1.0E-03	mg/kg/day	2.E-05
				Chromium	17.5	mg/kg	NC		NC			4.5E-07	mg/kg/day	3.0E-03	mg/kg/day	1.E-04
				Copper	18.3	mg/kg	NC		NC			4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Lead	88.6	mg/kg	3.9E-07	mg/kg/day				2.3E-06	mg/kg/day			
				Manganese	1590	mg/kg	NC		NC			4.0E-05	mg/kg/day	7.1E-02	mg/kg/day	6.E-04
				Mercury	0.114	mg/kg	NC		NC			2.9E-09	mg/kg/day	3.0E-04	mg/kg/day	1.E-05
				Nickel	20	mg/kg	NC		NC			5.1E-07	mg/kg/day	2.0E-02	mg/kg/day	3.E-05
				Thallium	0.354	mg/kg	NC		NC			9.0E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Vanadium	32	mg/kg	NC		NC			8.1E-07	mg/kg/day	7.0E-03	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.00000773	mg/kg	3.4E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-09	2.0E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								8.E-08					2.E-03
			DERMAL	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			4.2E-10	mg/kg/day	2.0E-02	mg/kg/day	2.E-08
				Acenaphthylene	0.0589	mg/kg	NC		NC			1.3E-09	mg/kg/day	6.0E-02	mg/kg/day	2.E-08
				Benzo(a)anthracene	1	mg/kg	3.9E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.3E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Benzo(a)pyrene	0.84	mg/kg	3.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.9E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Benzo(b)fluoranthene	1.4	mg/kg	5.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-09	3.2E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			1.3E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Dibenzo(a,h)anthracene	0.17898	mg/kg	6.9E-10	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-09	4.0E-09	mg/kg/day	3.0E-02	mg/kg/day	1.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	2.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	1.5E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Phenanthrene	0.79474	mg/kg	NC		NC			1.8E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				alpha-Chlordane	0.00133	mg/kg	1.6E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-13	9.2E-12	mg/kg/day	5.0E-04	mg/kg/day	2.E-08
				Aroclor-1254	0.05755	mg/kg	2.4E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-10	1.4E-09	mg/kg/day	2.0E-05	mg/kg/day	7.E-05
				Aroclor-1268	0.04166	mg/kg	1.7E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-10	1.0E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-05
				gamma-Chlordane	0.00065	mg/kg	7.7E-13	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-13	4.5E-12	mg/kg/day	5.0E-04	mg/kg/day	9.E-09
				Technical Chlordane	0.15253	mg/kg	1.8E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-11	1.1E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aluminum	21774	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	5.21	mg/kg	4.6E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	7.E-09	2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	9.E-05
				Cadmium	0.858	mg/kg	NC		NC			1.5E-10	mg/kg/day	2.5E-05	mg/kg/day	6.E-06
				Chromium	17.5	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	18.3	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	88.6	mg/kg	--					--				
				Manganese	1590	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.114	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	20	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.354	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	32	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00000773	mg/kg	6.9E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-09	4.0E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-08					2.E-04
		EXPOSURE POINT TOTAL									1.E-07					2.E-03
	EXPOSURE MEDIUM TOTAL										1.E-07					2.E-03
IMENT TOTAL											**1.E-07**					**2.E-03**

US EPA ARCHIVE DOCUMENT

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
URFACE WATER	SURFACE WATER	ASSAPUMPSET POND	INGESTION	Arsenic	0.000491	mg/l	2.1E-10	mg/kg/day	1.5E+00	mg/kg/day	3.E-10	1.2E-09	mg/kg/day	3.0E-04	mg/kg/day	4.E-06
WATER				Manganese	0.166	mg/l	NC		NC			4.2E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000215	mg/l	NC		NC			5.5E-12	mg/kg/day	3.0E-04	mg/kg/day	2.E-08
				Nitrite-N	0.0051	mg/l	NC		NC			1.3E-08	mg/kg/day	1.0E-01	mg/kg/day	1.E-07
				Toxicity Equivalency (Dioxins/Furans)	5.34E-09	mg/l	2.3E-15	mg/kg/day	1.5E+05	mg/kg/day	3.E-10	1.4E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-10					2.E-05
			DERMAL	Arsenic	0.000491	mg/l	3.7E-10	mg/kg/day	1.5E+00	mg/kg/day	6.E-10	2.2E-09	mg/kg/day	3.0E-04	mg/kg/day	7.E-06
				Manganese	0.166	mg/l	NC		NC			7.3E-07	mg/kg/day	9.6E-04	mg/kg/day	8.E-04
				Mercury	0.00000215	mg/l	NC		NC			9.5E-12	mg/kg/day	2.1E-05	mg/kg/day	5.E-07
				Nitrite-N	0.0051	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	5.34E-09	mg/l	1.3E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	7.6E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					8.E-04
		EXPOSURE POINT TOTAL									2.E-06					8.E-04
	EXPOSURE MEDIUM TOTAL										2.E-06					8.E-04
RFACE WATER TOTAL											**2.E-06**					**8.E-04**
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			2.1E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	0.0031	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.00329	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	2.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	8.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.00445	mg/kg	1.5E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	4.E-08	8.5E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				4,4'-DDE	0.0235	mg/kg	7.7E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.5E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.0027	mg/kg	8.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.2E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.03979	mg/kg	1.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	7.6E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Dieldrin	0.0013	mg/kg	4.3E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-07	2.5E-07	mg/kg/day	5.0E-05	mg/kg/day	5.E-03
				gamma-Chlordane	0.0012	mg/kg	3.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Heptachlor Epoxide	0.00091	mg/kg	3.0E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	1.7E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.11	mg/kg	3.6E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	2.1E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0764	mg/kg	2.5E-06	mg/kg/day				1.5E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			3.8E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			4.2E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Zinc	15.7	mg/kg	NC		NC			3.0E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.00000238	mg/kg	7.8E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.0.E+00
		EXPOSURE POINT TOTAL									2.E-05					1.0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					1.0.E+00
MBINED FISH DIET TOTAL											**2.E-05**					**1.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**			**1.0.E+00**

TES:
Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
- Not carcinogenic by this exposure route.
- Not applicable; exposure route not applicable for this chemical/exposure medium.
Not calculated; dose-response data and/or dermal absorption values are not available.

ared by: KJA
cked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	ASSAPUMPSET POND	INGESTION	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			7.3E-10	mg/kg/day	2.0E-02	mg/kg/day	4.E-08
				Acenaphthylene	0.0589	mg/kg	NC		NC			2.3E-09	mg/kg/day	6.0E-02	mg/kg/day	4.E-08
				Benzo(a)anthracene	1	mg/kg	6.8E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	4.0E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(a)pyrene	0.84	mg/kg	5.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	9.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-09	5.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			2.4E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Dibenzo(a,h)anthracene	0.17898	mg/kg	1.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-09	7.1E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	4.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.6E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Phenanthrene	0.79474	mg/kg	NC		NC			3.1E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				alpha-Chlordane	0.00133	mg/kg	9.0E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-12	5.3E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Aroclor-1254	0.05755	mg/kg	3.9E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-10	2.3E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				Aroclor-1268	0.04166	mg/kg	2.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-10	1.6E-09	mg/kg/day	2.0E-05	mg/kg/day	8.E-05
				gamma-Chlordane	0.00065	mg/kg	4.4E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	2.6E-11	mg/kg/day	5.0E-04	mg/kg/day	5.E-08
				Technical Chlordane	0.15253	mg/kg	1.0E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-10	6.0E-09	mg/kg/day	5.0E-04	mg/kg/day	1.E-05
				Aluminum	21774	mg/kg	NC		NC			8.6E-04	mg/kg/day	1.0E+00	mg/kg/day	9.E-04
				Arsenic	5.21	mg/kg	3.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-08	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Cadmium	0.858	mg/kg	NC		NC			3.4E-08	mg/kg/day	1.0E-03	mg/kg/day	3.E-05
				Chromium	17.5	mg/kg	NC		NC			6.9E-07	mg/kg/day	3.0E-03	mg/kg/day	2.E-04
				Copper	18.3	mg/kg	NC		NC			7.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Lead	88.6	mg/kg	6.0E-07	mg/kg/day				3.5E-06	mg/kg/day			
				Manganese	1590	mg/kg	NC		NC			6.3E-05	mg/kg/day	7.1E-02	mg/kg/day	9.E-04
				Mercury	0.114	mg/kg	NC		NC			4.5E-09	mg/kg/day	3.0E-04	mg/kg/day	2.E-05
				Nickel	20	mg/kg	NC		NC			7.9E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Thallium	0.354	mg/kg	NC		NC			1.4E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Vanadium	32	mg/kg	NC		NC			1.3E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	5.2E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-09	3.1E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-07					3.E-03
			DERMAL	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			1.4E-09	mg/kg/day	2.0E-02	mg/kg/day	7.E-08
				Acenaphthylene	0.0589	mg/kg	NC		NC			4.3E-09	mg/kg/day	6.0E-02	mg/kg/day	7.E-08
				Benzo(a)anthracene	1	mg/kg	1.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	7.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	0.84	mg/kg	1.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-08	6.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	1.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			4.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.17898	mg/kg	2.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.3E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	8.2E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.79474	mg/kg	NC		NC			5.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.00133	mg/kg	5.2E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	3.0E-11	mg/kg/day	5.0E-04	mg/kg/day	6.E-08
				Aroclor-1254	0.05755	mg/kg	7.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	4.6E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Aroclor-1268	0.04166	mg/kg	5.7E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	3.3E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				gamma-Chlordane	0.00065	mg/kg	2.5E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-13	1.5E-11	mg/kg/day	5.0E-04	mg/kg/day	3.E-08
				Technical Chlordane	0.15253	mg/kg	5.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	3.5E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Aluminum	21774	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	5.21	mg/kg	1.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	8.8E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	0.858	mg/kg	NC		NC			4.9E-10	mg/kg/day	2.5E-05	mg/kg/day	2.E-05
				Chromium	17.5	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	18.3	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	88.6	mg/kg	--					--				
				Manganese	1590	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.114	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	20	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.354	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	32	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	2.2E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-09	1.3E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					7.E-04
		EXPOSURE POINT TOTAL									3.E-07					4.E-03
	EXPOSURE MEDIUM TOTAL										3.E-07					4.E-03
SEDIMENT TOTAL											**3.E-07**					**4.E-03**

US EPA ARCHIVE DOCUMENT

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	ASSAPUMPSET POND	INGESTION	Arsenic	0.000491	mg/l	3.3E-10	mg/kg/day	1.5E+00	mg/kg/day	5.E-10	1.9E-09	mg/kg/day	3.0E-04	mg/kg/day	6.E-06
				Manganese	0.166	mg/l	NC		NC			6.6E-07	mg/kg/day	2.4E-02	mg/kg/day	3.E-05
				Mercury	0.00000215	mg/l	NC		NC			8.5E-12	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Nitrite-N	0.0051	mg/l	NC		NC			2.0E-08	mg/kg/day	1.0E-01	mg/kg/day	2.E-07
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	3.6E-15	mg/kg/day	1.5E+05	mg/kg/day	5.E-10	2.1E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-09					3.E-05
			DERMAL	Arsenic	0.000491	mg/l	4.2E-10	mg/kg/day	1.5E+00	mg/kg/day	6.E-10	2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				Manganese	0.166	mg/l	NC		NC			8.2E-07	mg/kg/day	9.6E-04	mg/kg/day	9.E-04
				Mercury	0.00000215	mg/l	NC		NC			1.1E-11	mg/kg/day	2.1E-05	mg/kg/day	5.E-07
				Nitrite-N	0.0051	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	1.5E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	8.5E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					9.E-04
		EXPOSURE POINT TOTAL									2.E-06					9.E-04
	EXPOSURE MEDIUM TOTAL										2.E-06					9.E-04
SURFACE WATER TOTAL											**2.E-06**					**9.E-04**
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			2.2E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	0.0031	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.00329	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			5.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	2.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	8.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.00445	mg/kg	1.5E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	4.E-08	8.8E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				4,4'-DDE	0.0235	mg/kg	8.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.7E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.0027	mg/kg	9.2E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.4E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.03979	mg/kg	1.4E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	7.9E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Dieldrin	0.0013	mg/kg	4.4E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-07	2.6E-07	mg/kg/day	5.0E-05	mg/kg/day	5.E-03
				gamma-Chlordane	0.0012	mg/kg	4.1E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	2.4E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Heptachlor Epoxide	0.00091	mg/kg	3.1E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	1.8E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.11	mg/kg	3.7E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	2.2E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0764	mg/kg	2.6E-06	mg/kg/day				1.5E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			4.0E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			4.4E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Zinc	15.7	mg/kg	NC		NC			3.1E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000238	mg/kg	8.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.0.E+00
		EXPOSURE POINT TOTAL									2.E-05					1.0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					1.0.E+00
COMBINED FISH DIET TOTAL											**2.E-05**					**1.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**			**1.1.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			3.3E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.0031	mg/kg	8.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	9.3E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00329	mg/kg	8.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			8.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	1.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	6.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	7.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.8E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.00445	mg/kg	1.1E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				4,4'-DDE	0.0235	mg/kg	6.1E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	7.1E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				alpha-Chlordane	0.0027	mg/kg	7.0E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	8.1E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1254	0.03979	mg/kg	1.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	1.2E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Dieldrin	0.0013	mg/kg	3.3E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-07	3.9E-07	mg/kg/day	5.0E-05	mg/kg/day	8.E-03
				gamma-Chlordane	0.0012	mg/kg	3.1E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	3.6E-07	mg/kg/day	5.0E-04	mg/kg/day	7.E-04
				Heptachlor Epoxide	0.00091	mg/kg	2.3E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.11	mg/kg	2.8E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	3.3E-05	mg/kg/day	5.0E-04	mg/kg/day	7.E-02
				Lead	0.0764	mg/kg	2.0E-06	mg/kg/day				2.3E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			6.0E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			6.6E-05	mg/kg/day	1.0E-04	mg/kg/day	7.E-01
				Zinc	15.7	mg/kg	NC		NC			4.7E-03	mg/kg/day	3.0E-01	mg/kg/day	2.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000238	mg/kg	6.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-06	7.2E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					1.6.E+00
		EXPOSURE POINT TOTAL									1.E-05					1.6.E+00
	EXPOSURE MEDIUM TOTAL										1.E-05					1.6.E+00
COMBINED FISH DIET TOTAL											**1.E-05**					**1.6.E+00**
									TOTAL RECEPTOR RISK ACROSS ALL MEDIA		**1.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**1.6.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	ASSAPUMPSET POND	INGESTION	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			2.8E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Acenaphthylene	0.0589	mg/kg	NC		NC			9.0E-09	mg/kg/day	6.0E-02	mg/kg/day	1.E-07
				Benzo(a)anthracene	1	mg/kg	2.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(a)pyrene	0.84	mg/kg	2.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	3.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			9.1E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.17898	mg/kg	4.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.7E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Phenanthrene	0.79474	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.00133	mg/kg	3.5E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.0E-10	mg/kg/day	5.0E-04	mg/kg/day	4.E-07
				Aroclor-1254	0.05755	mg/kg	1.5E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	8.8E-09	mg/kg/day	2.0E-05	mg/kg/day	4.E-04
				Aroclor-1268	0.04166	mg/kg	1.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.4E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				gamma-Chlordane	0.00065	mg/kg	1.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-12	9.9E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Technical Chlordane	0.15253	mg/kg	4.0E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	2.3E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Aluminum	21774	mg/kg	NC		NC			3.3E-03	mg/kg/day	1.0E+00	mg/kg/day	3.E-03
				Arsenic	5.21	mg/kg	1.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	8.0E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	0.858	mg/kg	NC		NC			1.3E-07	mg/kg/day	1.0E-03	mg/kg/day	1.E-04
				Chromium	17.5	mg/kg	NC		NC			2.7E-06	mg/kg/day	3.0E-03	mg/kg/day	9.E-04
				Copper	18.3	mg/kg	NC		NC			2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Lead	88.6	mg/kg	2.3E-06	mg/kg/day				1.4E-05	mg/kg/day			
				Manganese	1590	mg/kg	NC		NC			2.4E-04	mg/kg/day	7.1E-02	mg/kg/day	3.E-03
				Mercury	0.114	mg/kg	NC		NC			1.7E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Nickel	20	mg/kg	NC		NC			3.1E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Thallium	0.354	mg/kg	NC		NC			5.4E-08	mg/kg/day	8.0E-05	mg/kg/day	7.E-04
				Vanadium	32	mg/kg	NC		NC			4.9E-06	mg/kg/day	7.0E-03	mg/kg/day	7.E-04
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	2.0E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	1.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					1.E-02
			DERMAL	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			1.3E-09	mg/kg/day	2.0E-02	mg/kg/day	6.E-08
				Acenaphthylene	0.0589	mg/kg	NC		NC			4.0E-09	mg/kg/day	6.0E-02	mg/kg/day	7.E-08
				Benzo(a)anthracene	1	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	0.84	mg/kg	9.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	1.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.5E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			4.0E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.17898	mg/kg	2.1E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.2E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	7.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	4.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.79474	mg/kg	NC		NC			5.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.00133	mg/kg	4.7E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	2.8E-11	mg/kg/day	5.0E-04	mg/kg/day	6.E-08
				Aroclor-1254	0.05755	mg/kg	7.2E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	4.2E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Aroclor-1268	0.04166	mg/kg	5.2E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	3.0E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				gamma-Chlordane	0.00065	mg/kg	2.3E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-13	1.4E-11	mg/kg/day	5.0E-04	mg/kg/day	3.E-08
				Technical Chlordane	0.15253	mg/kg	5.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	3.2E-09	mg/kg/day	5.0E-04	mg/kg/day	6.E-06
				Aluminum	21774	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	5.21	mg/kg	1.4E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	8.1E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	0.858	mg/kg	NC		NC			4.5E-10	mg/kg/day	2.5E-05	mg/kg/day	2.E-05
				Chromium	17.5	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	18.3	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	88.6	mg/kg	--					--				
				Manganese	1590	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.114	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	20	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.354	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	32	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	2.1E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-09	1.2E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-07					7.E-04
		EXPOSURE POINT TOTAL									6.E-07					1.E-02
	EXPOSURE MEDIUM TOTAL										6.E-07					1.E-02
SEDIMENT TOTAL											**6.E-07**					**1.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	ASSAPUMPSET POND	INGESTION	Arsenic	0.000491	mg/l	8.6E-09	mg/kg/day	1.5E+00	mg/kg/day	1.E-08	5.0E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Manganese	0.166	mg/l	NC		NC			1.7E-05	mg/kg/day	2.4E-02	mg/kg/day	7.E-04
				Mercury	0.00000215	mg/l	NC		NC			2.2E-10	mg/kg/day	3.0E-04	mg/kg/day	7.E-07
				Nitrite-N	0.0051	mg/l	NC		NC			5.2E-07	mg/kg/day	1.0E-01	mg/kg/day	5.E-06
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	9.3E-14	mg/kg/day	1.5E+05	mg/kg/day	1.E-08	5.4E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-08					9.E-04
			DERMAL	Arsenic	0.000491	mg/l	3.1E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	1.8E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Manganese	0.166	mg/l	NC		NC			6.1E-06	mg/kg/day	9.6E-04	mg/kg/day	6.E-03
				Mercury	0.00000215	mg/l	NC		NC			7.9E-11	mg/kg/day	2.1E-05	mg/kg/day	4.E-06
				Nitrite-N	0.0051	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	1.1E-10	mg/kg/day	1.5E+05	mg/kg/day	2.E-05	6.3E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					6.E-03
		EXPOSURE POINT TOTAL									2.E-05					7.E-03
	EXPOSURE MEDIUM TOTAL										2.E-05					7.E-03
SURFACE WATER TOTAL											**2.E-05**					**7.E-03**
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			2.1E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	0.0031	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.00329	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	2.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	8.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.00445	mg/kg	1.5E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	4.E-08	8.5E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				4,4'-DDE	0.0235	mg/kg	7.7E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.5E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.0027	mg/kg	8.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.2E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.03979	mg/kg	1.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	7.6E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Dieldrin	0.0013	mg/kg	4.3E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-07	2.5E-07	mg/kg/day	5.0E-05	mg/kg/day	5.E-03
				gamma-Chlordane	0.0012	mg/kg	3.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Heptachlor Epoxide	0.00091	mg/kg	3.0E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	1.7E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.11	mg/kg	3.6E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	2.1E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0764	mg/kg	2.5E-06	mg/kg/day				1.5E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			3.8E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			4.2E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Zinc	15.7	mg/kg	NC		NC			3.0E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000238	mg/kg	7.8E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.0.E+00
		EXPOSURE POINT TOTAL									2.E-05					1.0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					1.0.E+00
COMBINED FISH DIET TOTAL											**2.E-05**					**1.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-05**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**1.0.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	ASSAPUMPSET POND	INGESTION	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			4.4E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.0589	mg/kg	NC		NC			1.4E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	1	mg/kg	4.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(a)pyrene	0.84	mg/kg	3.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	5.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.17898	mg/kg	7.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	4.2E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	2.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.79474	mg/kg	NC		NC			1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				alpha-Chlordane	0.00133	mg/kg	5.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.2E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Aroclor-1254	0.05755	mg/kg	2.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.4E-08	mg/kg/day	2.0E-05	mg/kg/day	7.E-04
				Aroclor-1268	0.04166	mg/kg	1.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	9.9E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				gamma-Chlordane	0.00065	mg/kg	2.6E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-12	1.5E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Technical Chlordane	0.15253	mg/kg	6.2E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-09	3.6E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Aluminum	21774	mg/kg	NC		NC			5.2E-03	mg/kg/day	1.0E+00	mg/kg/day	5.E-03
				Arsenic	5.21	mg/kg	2.1E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-07	1.2E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Cadmium	0.858	mg/kg	NC		NC			2.0E-07	mg/kg/day	1.0E-03	mg/kg/day	2.E-04
				Chromium	17.5	mg/kg	NC		NC			4.2E-06	mg/kg/day	3.0E-03	mg/kg/day	1.E-03
				Copper	18.3	mg/kg	NC		NC			4.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Lead	88.6	mg/kg	3.6E-06	mg/kg/day				2.1E-05	mg/kg/day			
				Manganese	1590	mg/kg	NC		NC			3.8E-04	mg/kg/day	7.1E-02	mg/kg/day	5.E-03
				Mercury	0.114	mg/kg	NC		NC			2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	9.E-05
				Nickel	20	mg/kg	NC		NC			4.7E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Thallium	0.354	mg/kg	NC		NC			8.4E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Vanadium	32	mg/kg	NC		NC			7.6E-06	mg/kg/day	7.0E-03	mg/kg/day	1.E-03
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	3.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-08	1.8E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								8.E-07					2.E-02
			DERMAL	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			4.1E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.0589	mg/kg	NC		NC			1.3E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	1	mg/kg	3.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.84	mg/kg	3.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(b)fluoranthene	1.4	mg/kg	5.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.17898	mg/kg	6.8E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	3.9E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	2.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.79474	mg/kg	NC		NC			1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				alpha-Chlordane	0.00133	mg/kg	1.5E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-12	9.0E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Aroclor-1254	0.05755	mg/kg	2.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.4E-08	mg/kg/day	2.0E-05	mg/kg/day	7.E-04
				Aroclor-1268	0.04166	mg/kg	1.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	9.9E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				gamma-Chlordane	0.00065	mg/kg	7.6E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-12	4.4E-11	mg/kg/day	5.0E-04	mg/kg/day	9.E-08
				Technical Chlordane	0.15253	mg/kg	1.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-10	1.0E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aluminum	21774	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	5.21	mg/kg	4.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	7.E-08	2.7E-07	mg/kg/day	3.0E-04	mg/kg/day	9.E-04
				Cadmium	0.858	mg/kg	NC		NC			1.5E-09	mg/kg/day	2.5E-05	mg/kg/day	6.E-05
				Chromium	17.5	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	18.3	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	88.6	mg/kg	--					--				
				Manganese	1590	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.114	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	20	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.354	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	32	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	6.7E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-08	3.9E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					2.E-03
		EXPOSURE POINT TOTAL									1.E-06					2.E-02
	EXPOSURE MEDIUM TOTAL										1.E-06					2.E-02
SEDIMENT TOTAL											**1.E-06**					**2.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	ASSAPUMPSET POND	INGESTION	Arsenic	0.000491	mg/l	1.3E-08	mg/kg/day	1.5E+00	mg/kg/day	2.E-08	7.8E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Manganese	0.166	mg/l	NC		NC			2.6E-05	mg/kg/day	2.4E-02	mg/kg/day	1.E-03
				Mercury	0.00000215	mg/l	NC		NC			3.4E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Nitrite-N	0.0051	mg/l	NC		NC			8.1E-07	mg/kg/day	1.0E-01	mg/kg/day	8.E-06
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	1.4E-13	mg/kg/day	1.5E+05	mg/kg/day	2.E-08	8.5E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-08					1.E-03
			DERMAL	Arsenic	0.000491	mg/l	3.8E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.2E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Manganese	0.166	mg/l	NC		NC			7.5E-06	mg/kg/day	9.6E-04	mg/kg/day	8.E-03
				Mercury	0.00000215	mg/l	NC		NC			9.7E-11	mg/kg/day	2.1E-05	mg/kg/day	5.E-06
				Nitrite-N	0.0051	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	1.3E-10	mg/kg/day	1.5E+05	mg/kg/day	2.E-05	7.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					8.E-03
		EXPOSURE POINT TOTAL									2.E-05					9.E-03
	EXPOSURE MEDIUM TOTAL										2.E-05					9.E-03
SURFACE WATER TOTAL											**2.E-05**					**9.E-03**
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			2.2E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	0.0031	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.00329	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			5.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	2.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	8.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.00445	mg/kg	1.5E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	4.E-08	8.8E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				4,4'-DDE	0.0235	mg/kg	8.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.7E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.0027	mg/kg	9.2E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.4E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.03979	mg/kg	1.4E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	7.9E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Dieldrin	0.0013	mg/kg	4.4E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-07	2.6E-07	mg/kg/day	5.0E-05	mg/kg/day	5.E-03
				gamma-Chlordane	0.0012	mg/kg	4.1E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	2.4E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Heptachlor Epoxide	0.00091	mg/kg	3.1E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	1.8E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.11	mg/kg	3.7E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	2.2E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0764	mg/kg	2.6E-06	mg/kg/day				1.5E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			4.0E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			4.4E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Zinc	15.7	mg/kg	NC		NC			3.1E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000238	mg/kg	8.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.0.E+00
		EXPOSURE POINT TOTAL									2.E-05					1.0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					1.0.E+00
COMBINED FISH DIET TOTAL											**2.E-05**					**1.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**4.E-05**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**1.1.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	ASSAPUMPSET POND	INGESTION	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			3.5E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Acenaphthylene	0.0589	mg/kg	NC		NC			1.1E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Benzo(a)anthracene	1	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Benzo(a)pyrene	0.84	mg/kg	1.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(b)fluoranthene	1.4	mg/kg	2.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	0.17898	mg/kg	2.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	3.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Phenanthrene	0.79474	mg/kg	NC		NC			1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				alpha-Chlordane	0.00133	mg/kg	2.2E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-11	2.5E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Aroclor-1254	0.05755	mg/kg	9.4E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	1.1E-07	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Aroclor-1268	0.04166	mg/kg	6.8E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	7.9E-08	mg/kg/day	2.0E-05	mg/kg/day	4.E-03
				gamma-Chlordane	0.00065	mg/kg	1.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	1.2E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	0.15253	mg/kg	2.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	2.9E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Aluminum	21774	mg/kg	NC		NC			4.1E-02	mg/kg/day	1.0E+00	mg/kg/day	4.E-02
				Arsenic	5.21	mg/kg	8.5E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	9.9E-06	mg/kg/day	3.0E-04	mg/kg/day	3.E-02
				Cadmium	0.858	mg/kg	NC		NC			1.6E-06	mg/kg/day	1.0E-03	mg/kg/day	2.E-03
				Chromium	17.5	mg/kg	NC		NC			3.3E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Copper	18.3	mg/kg	NC		NC			3.5E-05	mg/kg/day	3.0E-02	mg/kg/day	1.E-03
				Lead	88.6	mg/kg	1.4E-05	mg/kg/day				1.7E-04	mg/kg/day			
				Manganese	1590	mg/kg	NC		NC			3.0E-03	mg/kg/day	7.1E-02	mg/kg/day	4.E-02
				Mercury	0.114	mg/kg	NC		NC			2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Nickel	20	mg/kg	NC		NC			3.8E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Thallium	0.354	mg/kg	NC		NC			6.7E-07	mg/kg/day	8.0E-05	mg/kg/day	8.E-03
				Vanadium	32	mg/kg	NC		NC			6.1E-05	mg/kg/day	7.0E-03	mg/kg/day	9.E-03
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	1.3E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	1.5E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					2.E-01
			DERMAL	2-Methylnaphthalene	0.01855	mg/kg	NC		NC			1.3E-08	mg/kg/day	2.0E-02	mg/kg/day	6.E-07
				Acenaphthylene	0.0589	mg/kg	NC		NC			4.1E-08	mg/kg/day	6.0E-02	mg/kg/day	7.E-07
				Benzo(a)anthracene	1	mg/kg	5.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	6.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.84	mg/kg	5.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	5.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	1.4	mg/kg	8.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	9.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.59468	mg/kg	NC		NC			4.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	0.17898	mg/kg	1.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-08	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.65	mg/kg	3.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.5E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	0.79474	mg/kg	NC		NC			5.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.00133	mg/kg	2.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-12	2.8E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Aroclor-1254	0.05755	mg/kg	3.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-09	4.3E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.04166	mg/kg	2.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	3.1E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				gamma-Chlordane	0.00065	mg/kg	1.2E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-12	1.4E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Technical Chlordane	0.15253	mg/kg	2.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	3.2E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Aluminum	21774	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	5.21	mg/kg	7.1E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	8.3E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	0.858	mg/kg	NC		NC			4.6E-09	mg/kg/day	2.5E-05	mg/kg/day	2.E-04
				Chromium	17.5	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	18.3	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	88.6	mg/kg	--					--				
				Manganese	1590	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.114	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	20	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.354	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	32	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.00000773	mg/kg	1.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	1.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-07					7.E-03
		EXPOSURE POINT TOTAL									4.E-06					2.E-01
	EXPOSURE MEDIUM TOTAL										4.E-06					2.E-01
SEDIMENT TOTAL											**4.E-06**					**2.E-01**

US EPA ARCHIVE DOCUMENT

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - ASSAPUMPSET
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	ASSAPUMPSET POND	INGESTION	Arsenic	0.000491	mg/l	2.0E-08	mg/kg/day	1.5E+00	mg/kg/day	3.E-08	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Manganese	0.166	mg/l	NC		NC			7.9E-05	mg/kg/day	2.4E-02	mg/kg/day	3.E-03
				Mercury	0.00000215	mg/l	NC		NC			1.0E-09	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				Nitrite-N	0.0051	mg/l	NC		NC			2.4E-06	mg/kg/day	1.0E-01	mg/kg/day	2.E-05
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	2.2E-13	mg/kg/day	1.5E+05	mg/kg/day	3.E-08	2.5E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-08					4.E-03
			DERMAL	Arsenic	0.000491	mg/l	1.1E-09	mg/kg/day	1.5E+00	mg/kg/day	2.E-09	1.2E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Manganese	0.166	mg/l	NC		NC			4.2E-06	mg/kg/day	9.6E-04	mg/kg/day	4.E-03
				Mercury	0.00000215	mg/l	NC		NC			5.5E-11	mg/kg/day	2.1E-05	mg/kg/day	3.E-06
				Nitrite-N	0.0051	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.34E-09	mg/l	3.7E-11	mg/kg/day	1.5E+05	mg/kg/day	6.E-06	4.4E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					4.E-03
		EXPOSURE POINT TOTAL									6.E-06					9.E-03
	EXPOSURE MEDIUM TOTAL										6.E-06					9.E-03
SURFACE WATER TOTAL											**6.E-06**					**9.E-03**
BIOTA	COMBINED FISH DIET	ASSAPUMPSET POND	INGESTION	Acenaphthylene	0.0011	mg/kg	NC		NC			3.3E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.0031	mg/kg	8.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	9.3E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00329	mg/kg	8.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	0.004	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(g,h,i)perylene	0.00295	mg/kg	NC		NC			8.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.00071	mg/kg	1.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Indeno(1,2,3-cd)pyrene	0.0026	mg/kg	6.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	7.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.0059	mg/kg	NC		NC			1.8E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.00445	mg/kg	1.1E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				4,4'-DDE	0.0235	mg/kg	6.1E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	7.1E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				alpha-Chlordane	0.0027	mg/kg	7.0E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	8.1E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1254	0.03979	mg/kg	1.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	1.2E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Dieldrin	0.0013	mg/kg	3.3E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-07	3.9E-07	mg/kg/day	5.0E-05	mg/kg/day	8.E-03
				gamma-Chlordane	0.0012	mg/kg	3.1E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	3.6E-07	mg/kg/day	5.0E-04	mg/kg/day	7.E-04
				Heptachlor Epoxide	0.00091	mg/kg	2.3E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.11	mg/kg	2.8E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-06	3.3E-05	mg/kg/day	5.0E-04	mg/kg/day	7.E-02
				Lead	0.0764	mg/kg	2.0E-06	mg/kg/day				2.3E-05	mg/kg/day			
				Mercury	0.2	mg/kg	NC		NC			6.0E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.22	mg/kg	NC		NC			6.6E-05	mg/kg/day	1.0E-04	mg/kg/day	7.E-01
				Zinc	15.7	mg/kg	NC		NC			4.7E-03	mg/kg/day	3.0E-01	mg/kg/day	2.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000238	mg/kg	6.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-06	7.2E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					1.6.E+00
		EXPOSURE POINT TOTAL									1.E-05					1.6.E+00
	EXPOSURE MEDIUM TOTAL										1.E-05					1.6.E+00
COMBINED FISH DIET TOTAL											**1.E-05**					**1.6.E+00**
									TOTAL RECEPTOR RISK ACROSS ALL MEDIA		**2.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**1.8.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			4.3E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.49749	mg/kg	NC		NC			1.3E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	3.41086	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.7E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	3.41803	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	8.7E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	4.28861	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			7.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.72851	mg/kg	3.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.9E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	1.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Phenanthrene	5.30136	mg/kg	NC		NC			1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.03592	mg/kg	1.6E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-11	9.1E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.83872	mg/kg	3.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-09	2.1E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor-1268	0.13953	mg/kg	6.1E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	3.5E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			3.2E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Technical Chlordane	0.73538	mg/kg	3.2E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	1.9E-08	mg/kg/day	5.0E-04	mg/kg/day	4.E-05
				Aluminum	21793	mg/kg	NC		NC			5.5E-04	mg/kg/day	1.0E+00	mg/kg/day	6.E-04
				Arsenic	12.2	mg/kg	5.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-08	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Chromium	291	mg/kg	NC		NC			7.4E-06	mg/kg/day	3.0E-03	mg/kg/day	2.E-03
				Copper	324	mg/kg	NC		NC			8.2E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Lead	591	mg/kg	2.6E-06	mg/kg/day	--			1.5E-05	mg/kg/day			
				Manganese	4126	mg/kg	NC		NC			1.0E-04	mg/kg/day	7.1E-02	mg/kg/day	1.E-03
				Mercury	0.811	mg/kg	NC		NC			2.1E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Molybdenum	87.7	mg/kg	NC		NC			2.2E-06	mg/kg/day	5.0E-03	mg/kg/day	4.E-04
				Nickel	387	mg/kg	NC		NC			9.8E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				Thallium	0.585	mg/kg	NC		NC			1.5E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Vanadium	103	mg/kg	NC		NC			2.6E-06	mg/kg/day	7.0E-03	mg/kg/day	4.E-04
				Toxicity Equivalency (Dioxins/Furans	0.000109	mg/kg	4.8E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-08	2.8E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-07					9.E-03
			DERMAL	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			4.5E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.49749	mg/kg	NC		NC			1.3E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	3.41086	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	3.41803	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	9.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	4.28861	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			7.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.72851	mg/kg	3.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.9E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.2E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Phenanthrene	5.30136	mg/kg	NC		NC			1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				alpha-Chlordane	0.03592	mg/kg	5.0E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	2.9E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Aroclor-1254	0.83872	mg/kg	4.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-09	2.4E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor-1268	0.13953	mg/kg	6.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	4.0E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			2.6E-10	mg/kg/day	6.0E-03	mg/kg/day	4.E-08
				Technical Chlordane	0.73538	mg/kg	1.0E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-10	6.0E-09	mg/kg/day	5.0E-04	mg/kg/day	1.E-05
				Aluminum	21793	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	12.2	mg/kg	1.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	7.4E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Chromium	291	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	324	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	591	mg/kg	--		--			--				
				Manganese	4126	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.811	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Molybdenum	87.7	mg/kg	NC		NC			--		5.0E-03	mg/kg/day	
				Nickel	387	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.585	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	103	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.000109	mg/kg	1.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	6.6E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					2.E-03
		EXPOSURE POINT TOTAL									5.E-07					1.E-02
	EXPOSURE MEDIUM TOTAL										5.E-07					1.E-02
SOIL TOTAL											**5.E-07**					**1.E-02**
SEDIMENT	SEDIMENT	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.9E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			4.9E-09	mg/kg/day	6.0E-02	mg/kg/day	8.E-08
				Benzo(a)anthracene	3.5	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	3.1	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06

US EPA ARCHIVE DOCUMENT

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Benzo(b)fluoranthene	3.1	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			5.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.77	mg/kg	3.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	9.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-09	5.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.0061	mg/kg	2.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-12	1.6E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Aroclor-1254	0.38	mg/kg	1.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	9.7E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				Aroclor-1268	0.24667	mg/kg	1.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.3E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				gamma-Chlordane	0.005	mg/kg	2.2E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-12	1.3E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Technical Chlordane	0.62618	mg/kg	2.7E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	1.6E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Aluminum	15554	mg/kg	NC		NC			4.0E-04	mg/kg/day	1.0E+00	mg/kg/day	4.E-04
				Antimony	4.3	mg/kg	NC		NC			1.1E-07	mg/kg/day	4.0E-04	mg/kg/day	3.E-04
				Arsenic	9.6	mg/kg	4.2E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-08	2.4E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Cadmium	4.35	mg/kg	NC		NC			1.1E-07	mg/kg/day	1.0E-03	mg/kg/day	1.E-04
				Chromium	271	mg/kg	NC		NC			6.9E-06	mg/kg/day	3.0E-03	mg/kg/day	2.E-03
				Copper	436	mg/kg	NC		NC			1.1E-05	mg/kg/day	3.0E-02	mg/kg/day	4.E-04
				Lead	179	mg/kg	7.8E-07	mg/kg/day				4.6E-06	mg/kg/day			
				Manganese	599	mg/kg	NC		NC			1.5E-05	mg/kg/day	7.1E-02	mg/kg/day	2.E-04
				Mercury	0.757	mg/kg	NC		NC			1.9E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Nickel	142	mg/kg	NC		NC			3.6E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Thallium	0.37	mg/kg	NC		NC			9.4E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Vanadium	79	mg/kg	NC		NC			2.0E-06	mg/kg/day	7.0E-03	mg/kg/day	3.E-04
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	5.2E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-08	3.1E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners	0.0000249	mg/kg	1.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	6.3E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-07					6.E-03
			DERMAL	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.7E-09	mg/kg/day	2.0E-02	mg/kg/day	8.E-08
				Acenaphthylene	0.19279	mg/kg	NC		NC			4.3E-09	mg/kg/day	6.0E-02	mg/kg/day	7.E-08
				Benzo(a)anthracene	3.5	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	3.1	mg/kg	1.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-08	7.0E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	3.1	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	7.0E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			4.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.77	mg/kg	3.0E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.7E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	8.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.0061	mg/kg	7.2E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-12	4.2E-11	mg/kg/day	5.0E-04	mg/kg/day	8.E-08
				Aroclor-1254	0.38	mg/kg	1.6E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	9.2E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				Aroclor-1268	0.24667	mg/kg	1.0E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.0E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				gamma-Chlordane	0.005	mg/kg	5.9E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	3.5E-11	mg/kg/day	5.0E-04	mg/kg/day	7.E-08
				Technical Chlordane	0.62618	mg/kg	7.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	4.3E-09	mg/kg/day	5.0E-04	mg/kg/day	9.E-06
				Aluminum	15554	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Antimony	4.3	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.6	mg/kg	8.5E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-08	5.0E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Cadmium	4.35	mg/kg	NC		NC			7.5E-10	mg/kg/day	2.5E-05	mg/kg/day	3.E-05
				Chromium	271	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	436	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	179	mg/kg	--					--				
				Manganese	599	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.757	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	142	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.37	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	79	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	1.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	6.2E-13	mg/kg/day			
				Toxicity Equivalency (PCB Congeners	0.0000249	mg/kg	2.2E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-09	1.3E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					1.E-03
		EXPOSURE POINT TOTAL									5.E-07					7.E-03
	EXPOSURE MEDIUM TOTAL										5.E-07					7.E-03
SEDIMENT TOTAL											**5.E-07**					**7.E-03**
SURFACE WATER	SURFACE WATER	GREYSTONE MILL POND	INGESTION	Arsenic	0.00055	mg/l	2.4E-10	mg/kg/day	1.5E+00	mg/kg/day	4.E-10	1.4E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				Manganese	0.144	mg/l	NC		NC			3.7E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000193	mg/l	NC		NC			4.9E-12	mg/kg/day	3.0E-04	mg/kg/day	2.E-08
				Nitrite-N	0.13	mg/l	NC		NC			3.3E-07	mg/kg/day	1.0E-01	mg/kg/day	3.E-06
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	2.5E-15	mg/kg/day	1.5E+05	mg/kg/day	4.E-10	1.4E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-10					2.E-05
			DERMAL	Arsenic	0.00055	mg/l	4.2E-10	mg/kg/day	1.5E+00	mg/kg/day	6.E-10	2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				Manganese	0.144	mg/l	NC		NC			6.4E-07	mg/kg/day	9.6E-04	mg/kg/day	7.E-04
				Mercury	0.00000193	mg/l	NC		NC			8.5E-12	mg/kg/day	2.1E-05	mg/kg/day	4.E-07
				Nitrite-N	0.13	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	1.4E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	8.0E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					7.E-04
		EXPOSURE POINT TOTAL									2.E-06					7.E-04
	EXPOSURE MEDIUM TOTAL										2.E-06					7.E-04
SURFACE WATER TOTAL											**2.E-06**					**7.E-04**
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			4.2E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.00099	mg/kg	3.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(b)fluoranthene	0.00092	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDD	0.013	mg/kg	4.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0329	mg/kg	1.1E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	4.E-07	6.3E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.003	mg/kg	9.9E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.8E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.014	mg/kg	4.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.7E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Aroclor-1254	0.177	mg/kg	5.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	3.4E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.0851	mg/kg	2.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	1.6E-05	mg/kg/day	2.0E-05	mg/kg/day	8.E-01
				Dieldrin	0.0027	mg/kg	8.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	5.2E-07	mg/kg/day	5.0E-05	mg/kg/day	1.E-02
				gamma-Chlordane	0.006	mg/kg	2.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	1.5E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.2056	mg/kg	6.8E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	3.9E-05	mg/kg/day	5.0E-04	mg/kg/day	8.E-02
				Lead	0.5	mg/kg	1.6E-05	mg/kg/day				9.6E-05	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			4.3E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			6.3E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Zinc	22	mg/kg	NC		NC			4.2E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000136	mg/kg	4.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.4E+00
		EXPOSURE POINT TOTAL									3.E-05					3.4E+00
	EXPOSURE MEDIUM TOTAL										3.E-05					3.4E+00
COMBINED FISH DIET TOTAL											**3.E-05**					**3.4E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**3.4E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- OLDER CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			6.7E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				Acenaphthylene	0.49749	mg/kg	NC		NC			2.0E-08	mg/kg/day	6.0E-02	mg/kg/day	3.E-07
				Benzo(a)anthracene	3.41086	mg/kg	2.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(a)pyrene	3.41803	mg/kg	2.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(b)fluoranthene	4.28861	mg/kg	2.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.72851	mg/kg	4.9E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	2.9E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	2.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Phenanthrene	5.30136	mg/kg	NC		NC			2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				alpha-Chlordane	0.03592	mg/kg	2.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-11	1.4E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	0.83872	mg/kg	5.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.3E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.13953	mg/kg	9.5E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	5.5E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			5.0E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08
				Technical Chlordane	0.73538	mg/kg	5.0E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-09	2.9E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Aluminum	21793	mg/kg	NC		NC			8.6E-04	mg/kg/day	1.0E+00	mg/kg/day	9.E-04
				Arsenic	12.2	mg/kg	8.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	4.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Chromium	291	mg/kg	NC		NC			1.2E-05	mg/kg/day	3.0E-03	mg/kg/day	4.E-03
				Copper	324	mg/kg	NC		NC			1.3E-05	mg/kg/day	3.0E-02	mg/kg/day	4.E-04
				Lead	591	mg/kg	4.0E-06	mg/kg/day	--			2.3E-05	mg/kg/day			
				Manganese	4126	mg/kg	NC		NC			1.6E-04	mg/kg/day	7.1E-02	mg/kg/day	2.E-03
				Mercury	0.811	mg/kg	NC		NC			3.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Molybdenum	87.7	mg/kg	NC		NC			3.5E-06	mg/kg/day	5.0E-03	mg/kg/day	7.E-04
				Nickel	387	mg/kg	NC		NC			1.5E-05	mg/kg/day	2.0E-02	mg/kg/day	8.E-04
				Thallium	0.585	mg/kg	NC		NC			2.3E-08	mg/kg/day	8.0E-05	mg/kg/day	3.E-04
				Vanadium	103	mg/kg	NC		NC			4.1E-06	mg/kg/day	7.0E-03	mg/kg/day	6.E-04
				Toxicity Equivalency (Dioxins/Furans	0.000109	mg/kg	7.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	4.3E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					1.E-02
			DERMAL	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			1.7E-08	mg/kg/day	2.0E-02	mg/kg/day	8.E-07
				Acenaphthylene	0.49749	mg/kg	NC		NC			4.9E-08	mg/kg/day	6.0E-02	mg/kg/day	8.E-07
				Benzo(a)anthracene	3.41086	mg/kg	5.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	3.41803	mg/kg	5.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	4.28861	mg/kg	7.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	4.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Dibenzo(a,h)anthracene	0.72851	mg/kg	1.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-08	7.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	5.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	5.30136	mg/kg	NC		NC			5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.03592	mg/kg	1.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	1.1E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.83872	mg/kg	1.5E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	8.9E-08	mg/kg/day	2.0E-05	mg/kg/day	4.E-03
				Aroclor-1268	0.13953	mg/kg	2.5E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.5E-08	mg/kg/day	2.0E-05	mg/kg/day	7.E-04
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			9.6E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Technical Chlordane	0.73538	mg/kg	3.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	2.2E-08	mg/kg/day	5.0E-04	mg/kg/day	4.E-05
				Aluminum	21793	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	12.2	mg/kg	4.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	7.E-08	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	9.E-04
				Chromium	291	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	324	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	591	mg/kg	--		--			--				
				Manganese	4126	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.811	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Molybdenum	87.7	mg/kg	NC		NC			--		5.0E-03	mg/kg/day	
				Nickel	387	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.585	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	103	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.000109	mg/kg	4.3E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	2.5E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								8.E-07					6.E-03
		EXPOSURE POINT TOTAL									1.E-06					2.E-02
	EXPOSURE MEDIUM TOTAL										1.E-06					2.E-02
SOIL TOTAL											**1.E-06**					**2.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- OLDER CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			3.0E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			7.6E-09	mg/kg/day	6.0E-02	mg/kg/day	1.E-07
				Benzo(a)anthracene	3.5	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(a)pyrene	3.1	mg/kg	2.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(b)fluoranthene	3.1	mg/kg	2.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			8.2E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.77	mg/kg	5.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.0E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				alpha-Chlordane	0.0061	mg/kg	4.1E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.4E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				Aroclor-1254	0.38	mg/kg	2.6E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.5E-08	mg/kg/day	2.0E-05	mg/kg/day	8.E-04
				Aroclor-1268	0.24667	mg/kg	1.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	9.8E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				gamma-Chlordane	0.005	mg/kg	3.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.0E-10	mg/kg/day	5.0E-04	mg/kg/day	4.E-07
				Technical Chlordane	0.62618	mg/kg	4.2E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	2.5E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Aluminum	15554	mg/kg	NC		NC			6.2E-04	mg/kg/day	1.0E+00	mg/kg/day	6.E-04
				Antimony	4.3	mg/kg	NC		NC			1.7E-07	mg/kg/day	4.0E-04	mg/kg/day	4.E-04
				Arsenic	9.6	mg/kg	6.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	3.8E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Cadmium	4.35	mg/kg	NC		NC			1.7E-07	mg/kg/day	1.0E-03	mg/kg/day	2.E-04
				Chromium	271	mg/kg	NC		NC			1.1E-05	mg/kg/day	3.0E-03	mg/kg/day	4.E-03
				Copper	436	mg/kg	NC		NC			1.7E-05	mg/kg/day	3.0E-02	mg/kg/day	6.E-04
				Lead	179	mg/kg	1.2E-06	mg/kg/day				7.1E-06	mg/kg/day			
				Manganese	599	mg/kg	NC		NC			2.4E-05	mg/kg/day	7.1E-02	mg/kg/day	3.E-04
				Mercury	0.757	mg/kg	NC		NC			3.0E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Nickel	142	mg/kg	NC		NC			5.6E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Thallium	0.37	mg/kg	NC		NC			1.5E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Vanadium	79	mg/kg	NC		NC			3.1E-06	mg/kg/day	7.0E-03	mg/kg/day	4.E-04
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	8.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	4.7E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.0000249	mg/kg	1.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	9.9E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					9.E-03
			DERMAL	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			5.5E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			1.4E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	3.5	mg/kg	4.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(a)pyrene	3.1	mg/kg	3.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(b)fluoranthene	3.1	mg/kg	3.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.77	mg/kg	9.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	2.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			3.5E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				alpha-Chlordane	0.0061	mg/kg	2.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-12	1.4E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Aroclor-1254	0.38	mg/kg	5.2E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.0E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.24667	mg/kg	3.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-09	2.0E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				gamma-Chlordane	0.005	mg/kg	1.9E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-12	1.1E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Technical Chlordane	0.62618	mg/kg	2.4E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-10	1.4E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Aluminum	15554	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Antimony	4.3	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.6	mg/kg	2.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	4.35	mg/kg	NC		NC			2.5E-09	mg/kg/day	2.5E-05	mg/kg/day	1.E-04
				Chromium	271	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	436	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	179	mg/kg	--					--				
				Manganese	599	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.757	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	142	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.37	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	79	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- OLDER CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	3.5E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-08	2.0E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.0000249	mg/kg	7.2E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-08	4.2E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-07					3.E-03
		EXPOSURE POINT TOTAL									1.E-06					1.E-02
	EXPOSURE MEDIUM TOTAL										1.E-06					1.E-02
SEDIMENT TOTAL											**1.E-06**					**1.E-02**
SURFACE WATER	SURFACE WATER	GREYSTONE MILL POND	INGESTION	Arsenic	0.00055	mg/l	3.7E-10	mg/kg/day	1.5E+00	mg/kg/day	6.E-10	2.2E-09	mg/kg/day	3.0E-04	mg/kg/day	7.E-06
				Manganese	0.144	mg/l	NC		NC			5.7E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000193	mg/l	NC		NC			7.6E-12	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Nitrite-N	0.13	mg/l	NC		NC			5.1E-07	mg/kg/day	1.0E-01	mg/kg/day	5.E-06
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	3.8E-15	mg/kg/day	1.5E+05	mg/kg/day	6.E-10	2.2E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-09					4.E-05
			DERMAL	Arsenic	0.00055	mg/l	4.7E-10	mg/kg/day	1.5E+00	mg/kg/day	7.E-10	2.7E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06
				Manganese	0.144	mg/l	NC		NC			7.1E-07	mg/kg/day	9.6E-04	mg/kg/day	7.E-04
				Mercury	0.00000193	mg/l	NC		NC			9.6E-12	mg/kg/day	2.1E-05	mg/kg/day	5.E-07
				Nitrite-N	0.13	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	1.5E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	9.0E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					8.E-04
		EXPOSURE POINT TOTAL									2.E-06					8.E-04
	EXPOSURE MEDIUM TOTAL										2.E-06					8.E-04
SURFACE WATER TOTAL											**2.E-06**					**8.E-04**
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			4.4E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.00099	mg/kg	3.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(b)fluoranthene	0.00092	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDD	0.013	mg/kg	4.4E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.6E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0329	mg/kg	1.1E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	4.E-07	6.5E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.003	mg/kg	1.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.9E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.014	mg/kg	4.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				Aroclor-1254	0.177	mg/kg	6.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	3.5E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.0851	mg/kg	2.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	1.7E-05	mg/kg/day	2.0E-05	mg/kg/day	8.E-01
				Dieldrin	0.0027	mg/kg	9.2E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	5.4E-07	mg/kg/day	5.0E-05	mg/kg/day	1.E-02
				gamma-Chlordane	0.006	mg/kg	2.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	1.6E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.2056	mg/kg	7.0E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	4.1E-05	mg/kg/day	5.0E-04	mg/kg/day	8.E-02
				Lead	0.5	mg/kg	1.7E-05	mg/kg/day				9.9E-05	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			4.5E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			6.5E-05	mg/kg/day	1.0E-04	mg/kg/day	7.E-01
				Zinc	22	mg/kg	NC		NC			4.4E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000136	mg/kg	4.6E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.5.E+00
		EXPOSURE POINT TOTAL									3.E-05					3.5.E+00
	EXPOSURE MEDIUM TOTAL										3.E-05					3.5.E+00
COMBINED FISH DIET TOTAL											**3.E-05**					**3.5.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-05**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**3.6.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RECREATIONAL ANGLER- CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			6.6E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	0.00099	mg/kg	2.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			3.6E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.00092	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				4,4'-DDD	0.013	mg/kg	3.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	8.E-08	3.9E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				4,4'-DDE	0.0329	mg/kg	8.5E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	9.9E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDT	0.003	mg/kg	7.7E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	9.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				alpha-Chlordane	0.014	mg/kg	3.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	4.2E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	0.177	mg/kg	4.6E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-06	5.3E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aroclor-1268	0.0851	mg/kg	2.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	2.6E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Dieldrin	0.0027	mg/kg	7.0E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	8.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.006	mg/kg	1.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-08	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.1E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	2.4E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.2056	mg/kg	5.3E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	6.2E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Lead	0.5	mg/kg	1.3E-05	mg/kg/day				1.5E-04	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			6.8E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			9.9E-05	mg/kg/day	1.0E-04	mg/kg/day	1.E+00
				Zinc	22	mg/kg	NC		NC			6.6E-03	mg/kg/day	3.0E-01	mg/kg/day	2.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000136	mg/kg	3.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-06	4.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					5.4.E+00
		EXPOSURE POINT TOTAL									2.E-05					5.4.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					5.4.E+00
COMBINED FISH DIET TOTAL											**2.E-05**					**5.4.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											2.E-05					**5.4.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.10.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			5.2E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Acenaphthylene	0.49749	mg/kg	NC		NC			1.5E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Benzo(a)anthracene	3.41086	mg/kg	1.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	3.41803	mg/kg	1.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	4.28861	mg/kg	2.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			8.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.72851	mg/kg	3.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	5.30136	mg/kg	NC		NC			1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				alpha-Chlordane	0.03592	mg/kg	1.9E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-10	1.1E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.83872	mg/kg	4.4E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-08	2.6E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				Aroclor-1268	0.13953	mg/kg	7.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	4.3E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			3.9E-09	mg/kg/day	6.0E-03	mg/kg/day	6.E-07
				Technical Chlordane	0.73538	mg/kg	3.8E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	2.2E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Aluminum	21793	mg/kg	NC		NC			6.7E-03	mg/kg/day	1.0E+00	mg/kg/day	7.E-03
				Arsenic	12.2	mg/kg	6.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	3.7E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Chromium	291	mg/kg	NC		NC			8.9E-05	mg/kg/day	3.0E-03	mg/kg/day	3.E-02
				Copper	324	mg/kg	NC		NC			9.9E-05	mg/kg/day	3.0E-02	mg/kg/day	3.E-03
				Lead	591	mg/kg	3.1E-05	mg/kg/day	--			1.8E-04	mg/kg/day			
				Manganese	4126	mg/kg	NC		NC			1.3E-03	mg/kg/day	7.1E-02	mg/kg/day	2.E-02
				Mercury	0.811	mg/kg	NC		NC			2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Molybdenum	87.7	mg/kg	NC		NC			2.7E-05	mg/kg/day	5.0E-03	mg/kg/day	5.E-03
				Nickel	387	mg/kg	NC		NC			1.2E-04	mg/kg/day	2.0E-02	mg/kg/day	6.E-03
				Thallium	0.585	mg/kg	NC		NC			1.8E-07	mg/kg/day	8.0E-05	mg/kg/day	2.E-03
				Vanadium	103	mg/kg	NC		NC			3.1E-05	mg/kg/day	7.0E-03	mg/kg/day	4.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.000109	mg/kg	5.7E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-07	3.3E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					1.E-01
			DERMAL	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			2.7E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Acenaphthylene	0.49749	mg/kg	NC		NC			7.9E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	3.41086	mg/kg	9.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	3.41803	mg/kg	9.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-07	5.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4.28861	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			4.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.72851	mg/kg	2.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	8.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	5.30136	mg/kg	NC		NC			8.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				alpha-Chlordane	0.03592	mg/kg	3.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	1.8E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Aroclor-1254	0.83872	mg/kg	2.5E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-08	1.4E-07	mg/kg/day	2.0E-05	mg/kg/day	7.E-03
				Aroclor-1268	0.13953	mg/kg	4.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-09	2.4E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Technical Chlordane	0.73538	mg/kg	6.1E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-09	3.6E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Aluminum	21793	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	12.2	mg/kg	7.6E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	4.5E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Chromium	291	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	324	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	591	mg/kg	--		--			--				
				Manganese	4126	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.811	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Molybdenum	87.7	mg/kg	NC		NC			--		5.0E-03	mg/kg/day	
				Nickel	387	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.585	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	103	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000109	mg/kg	6.8E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	4.0E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					1.E-02
		EXPOSURE POINT TOTAL									5.E-06					1.E-01
	EXPOSURE MEDIUM TOTAL										5.E-06					1.E-01
L TOTAL											**5.E-06**					**1.E-01**

US EPA ARCHIVE DOCUMENT

TABLE 7.10.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
EDIMENT	SEDIMENT	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.1E-08	mg/kg/day	2.0E-02	mg/kg/day	6.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			2.9E-08	mg/kg/day	6.0E-02	mg/kg/day	5.E-07
				Benzo(a)anthracene	3.5	mg/kg	9.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	3.1	mg/kg	8.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	3.1	mg/kg	8.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	0.77	mg/kg	2.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	5.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			7.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.0061	mg/kg	1.6E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-11	9.3E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.38	mg/kg	9.9E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	5.8E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Aroclor-1268	0.24667	mg/kg	6.5E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.8E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				gamma-Chlordane	0.005	mg/kg	1.3E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-11	7.6E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	0.62618	mg/kg	1.6E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-09	9.6E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Aluminum	15554	mg/kg	NC		NC			2.4E-03	mg/kg/day	1.0E+00	mg/kg/day	2.E-03
				Antimony	4.3	mg/kg	NC		NC			6.6E-07	mg/kg/day	4.0E-04	mg/kg/day	2.E-03
				Arsenic	9.6	mg/kg	2.5E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-07	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Cadmium	4.35	mg/kg	NC		NC			6.6E-07	mg/kg/day	1.0E-03	mg/kg/day	7.E-04
				Chromium	271	mg/kg	NC		NC			4.1E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Copper	436	mg/kg	NC		NC			6.7E-05	mg/kg/day	3.0E-02	mg/kg/day	2.E-03
				Lead	179	mg/kg	4.7E-06	mg/kg/day				2.7E-05	mg/kg/day			
				Manganese	599	mg/kg	NC		NC			9.1E-05	mg/kg/day	7.1E-02	mg/kg/day	1.E-03
				Mercury	0.757	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Nickel	142	mg/kg	NC		NC			2.2E-05	mg/kg/day	2.0E-02	mg/kg/day	1.E-03
				Thallium	0.37	mg/kg	NC		NC			5.6E-08	mg/kg/day	8.0E-05	mg/kg/day	7.E-04
				Vanadium	79	mg/kg	NC		NC			1.2E-05	mg/kg/day	7.0E-03	mg/kg/day	2.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.00012	mg/kg	3.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-07	1.8E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000249	mg/kg	6.5E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	3.8E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					4.E-02
			DERMAL	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			5.0E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			1.3E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	3.5	mg/kg	4.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(a)pyrene	3.1	mg/kg	3.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	3.1	mg/kg	3.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.77	mg/kg	8.9E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	2.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				alpha-Chlordane	0.0061	mg/kg	2.2E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-12	1.3E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Aroclor-1254	0.38	mg/kg	4.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-09	2.8E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor-1268	0.24667	mg/kg	3.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-09	1.8E-08	mg/kg/day	2.0E-05	mg/kg/day	9.E-04
				gamma-Chlordane	0.005	mg/kg	1.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-12	1.0E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Technical Chlordane	0.62618	mg/kg	2.2E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-10	1.3E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Aluminum	15554	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Antimony	4.3	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.6	mg/kg	2.6E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	4.35	mg/kg	NC		NC			2.3E-09	mg/kg/day	2.5E-05	mg/kg/day	9.E-05
				Chromium	271	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	436	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	179	mg/kg	--					--				
				Manganese	599	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.757	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	142	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.37	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	79	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.10.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- ADULT - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans)	0.00012	mg/kg	3.2E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-08	1.9E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000249	mg/kg	6.6E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-08	3.9E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					3.E-03
		EXPOSURE POINT TOTAL									2.E-06					4.E-02
	EXPOSURE MEDIUM TOTAL										2.E-06					4.E-02
DIMENT TOTAL											**2.E-06**					**4.E-02**
URFACE WATER	SURFACE WATER	GREYSTONE MILL POND	INGESTION	Arsenic	0.00055	mg/l	9.6E-09	mg/kg/day	1.5E+00	mg/kg/day	1.E-08	5.6E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Manganese	0.144	mg/l	NC		NC			1.5E-05	mg/kg/day	2.4E-02	mg/kg/day	6.E-04
				Mercury	0.00000193	mg/l	NC		NC			2.0E-10	mg/kg/day	3.0E-04	mg/kg/day	7.E-07
				Nitrite-N	0.13	mg/l	NC		NC			1.3E-05	mg/kg/day	1.0E-01	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	5.64E-09	mg/l	9.8E-14	mg/kg/day	1.5E+05	mg/kg/day	1.E-08	5.7E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-08					9.E-04
			DERMAL	Arsenic	0.00055	mg/l	3.5E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Manganese	0.144	mg/l	NC		NC			5.3E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000193	mg/l	NC		NC			7.1E-11	mg/kg/day	2.1E-05	mg/kg/day	3.E-06
				Nitrite-N	0.13	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	5.64E-09	mg/l	1.1E-10	mg/kg/day	1.5E+05	mg/kg/day	2.E-05	6.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					6.E-03
		EXPOSURE POINT TOTAL									2.E-05					6.E-03
	EXPOSURE MEDIUM TOTAL										2.E-05					6.E-03
RFACE WATER TOTAL											**2.E-05**					**6.E-03**
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			4.2E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.00099	mg/kg	3.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(b)fluoranthene	0.00092	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDD	0.013	mg/kg	4.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0329	mg/kg	1.1E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	4.E-07	6.3E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.003	mg/kg	9.9E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.8E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.014	mg/kg	4.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.7E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Aroclor-1254	0.177	mg/kg	5.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	3.4E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.0851	mg/kg	2.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	1.6E-05	mg/kg/day	2.0E-05	mg/kg/day	8.E-01
				Dieldrin	0.0027	mg/kg	8.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	5.2E-07	mg/kg/day	5.0E-05	mg/kg/day	1.E-02
				gamma-Chlordane	0.006	mg/kg	2.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	1.5E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.2056	mg/kg	6.8E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	3.9E-05	mg/kg/day	5.0E-04	mg/kg/day	8.E-02
				Lead	0.5	mg/kg	1.6E-05	mg/kg/day				9.6E-05	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			4.3E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			6.3E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Zinc	22	mg/kg	NC		NC			4.2E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.00000136	mg/kg	4.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.4.E+00
		EXPOSURE POINT TOTAL									3.E-05					3.4.E+00
	EXPOSURE MEDIUM TOTAL										3.E-05					3.4.E+00
MBINED FISH DIET TOTAL											**3.E-05**					**3.4.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**5.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**			**3.6.E+00**

TES:
Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
- Not carcinogenic by this exposure route.
- Not applicable; exposure route not applicable for this chemical/exposure medium.
Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.11.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- OLDER CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.8E-08	mg/kg/day	2.0E-02	mg/kg/day	9.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			4.6E-08	mg/kg/day	6.0E-02	mg/kg/day	8.E-07
				Benzo(a)anthracene	3.5	mg/kg	1.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.3E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	3.1	mg/kg	1.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-07	7.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	3.1	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	7.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			4.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.77	mg/kg	3.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	8.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				alpha-Chlordane	0.0061	mg/kg	2.5E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-11	1.4E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	0.38	mg/kg	1.5E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	9.0E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Aroclor-1268	0.24667	mg/kg	1.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	5.9E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				gamma-Chlordane	0.005	mg/kg	2.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	1.2E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	0.62618	mg/kg	2.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Aluminum	15554	mg/kg	NC		NC			3.7E-03	mg/kg/day	1.0E+00	mg/kg/day	4.E-03
				Antimony	4.3	mg/kg	NC		NC			1.0E-06	mg/kg/day	4.0E-04	mg/kg/day	3.E-03
				Arsenic	9.6	mg/kg	3.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	2.3E-06	mg/kg/day	3.0E-04	mg/kg/day	8.E-03
				Cadmium	4.35	mg/kg	NC		NC			1.0E-06	mg/kg/day	1.0E-03	mg/kg/day	1.E-03
				Chromium	271	mg/kg	NC		NC			6.4E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Copper	436	mg/kg	NC		NC			1.0E-04	mg/kg/day	3.0E-02	mg/kg/day	3.E-03
				Lead	179	mg/kg	7.3E-06	mg/kg/day				4.3E-05	mg/kg/day			
				Manganese	599	mg/kg	NC		NC			1.4E-04	mg/kg/day	7.1E-02	mg/kg/day	2.E-03
				Mercury	0.757	mg/kg	NC		NC			1.8E-07	mg/kg/day	3.0E-04	mg/kg/day	6.E-04
				Nickel	142	mg/kg	NC		NC			3.4E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Thallium	0.37	mg/kg	NC		NC			8.8E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Vanadium	79	mg/kg	NC		NC			1.9E-05	mg/kg/day	7.0E-03	mg/kg/day	3.E-03
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	4.9E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-07	2.8E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.0000249	mg/kg	1.0E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	5.9E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					6.E-02
			DERMAL	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.6E-08	mg/kg/day	2.0E-02	mg/kg/day	8.E-07
				Acenaphthylene	0.19279	mg/kg	NC		NC			4.3E-08	mg/kg/day	6.0E-02	mg/kg/day	7.E-07
				Benzo(a)anthracene	3.5	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	3.1	mg/kg	1.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-07	6.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	3.1	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	6.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			4.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.77	mg/kg	2.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	8.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				alpha-Chlordane	0.0061	mg/kg	7.1E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	4.1E-10	mg/kg/day	5.0E-04	mg/kg/day	8.E-07
				Aroclor-1254	0.38	mg/kg	1.5E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	9.0E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Aroclor-1268	0.24667	mg/kg	1.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	5.9E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				gamma-Chlordane	0.005	mg/kg	5.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.4E-10	mg/kg/day	5.0E-04	mg/kg/day	7.E-07
				Technical Chlordane	0.62618	mg/kg	7.3E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	4.3E-08	mg/kg/day	5.0E-04	mg/kg/day	9.E-05
				Aluminum	15554	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Antimony	4.3	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.6	mg/kg	8.4E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	4.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Cadmium	4.35	mg/kg	NC		NC			7.4E-09	mg/kg/day	2.5E-05	mg/kg/day	3.E-04
				Chromium	271	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	436	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	179	mg/kg	--					--				
				Manganese	599	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.757	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	142	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.37	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	79	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.11.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- OLDER CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans	0.00012	mg/kg	1.0E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	6.1E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.0000249	mg/kg	2.2E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	1.3E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					1.E-02
		EXPOSURE POINT TOTAL									5.E-06					7.E-02
	EXPOSURE MEDIUM TOTAL										5.E-06					7.E-02
SEDIMENT TOTAL											**5.E-06**					**7.E-02**
SURFACE WATER	SURFACE WATER	GREYSTONE MILL POND	INGESTION	Arsenic	0.00055	mg/l	1.5E-08	mg/kg/day	1.5E+00	mg/kg/day	2.E-08	8.7E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Manganese	0.144	mg/l	NC		NC			2.3E-05	mg/kg/day	2.4E-02	mg/kg/day	9.E-04
				Mercury	0.00000193	mg/l	NC		NC			3.1E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Nitrite-N	0.13	mg/l	NC		NC			2.1E-05	mg/kg/day	1.0E-01	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	1.5E-13	mg/kg/day	1.5E+05	mg/kg/day	2.E-08	8.9E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-08					1.E-03
			DERMAL	Arsenic	0.00055	mg/l	4.2E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Manganese	0.144	mg/l	NC		NC			6.5E-06	mg/kg/day	9.6E-04	mg/kg/day	7.E-03
				Mercury	0.00000193	mg/l	NC		NC			8.7E-11	mg/kg/day	2.1E-05	mg/kg/day	4.E-06
				Nitrite-N	0.13	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	5.64E-09	mg/l	1.4E-10	mg/kg/day	1.5E+05	mg/kg/day	2.E-05	8.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					7.E-03
		EXPOSURE POINT TOTAL									2.E-05					8.E-03
	EXPOSURE MEDIUM TOTAL										2.E-05					8.E-03
SURFACE WATER TOTAL											**2.E-05**					**8.E-03**
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			4.4E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.00099	mg/kg	3.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(b)fluoranthene	0.00092	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDD	0.013	mg/kg	4.4E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.6E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0329	mg/kg	1.1E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	4.E-07	6.5E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.003	mg/kg	1.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.9E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.014	mg/kg	4.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				Aroclor-1254	0.177	mg/kg	6.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	3.5E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.0851	mg/kg	2.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	1.7E-05	mg/kg/day	2.0E-05	mg/kg/day	8.E-01
				Dieldrin	0.0027	mg/kg	9.2E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	5.4E-07	mg/kg/day	5.0E-05	mg/kg/day	1.E-02
				gamma-Chlordane	0.006	mg/kg	2.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	1.6E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Technical Chlordane	0.2056	mg/kg	7.0E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	4.1E-05	mg/kg/day	5.0E-04	mg/kg/day	8.E-02
				Lead	0.5	mg/kg	1.7E-05	mg/kg/day				9.9E-05	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			4.5E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			6.5E-05	mg/kg/day	1.0E-04	mg/kg/day	7.E-01
				Zinc	22	mg/kg	NC		NC			4.4E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans	0.00000136	mg/kg	4.6E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.5.E+00
		EXPOSURE POINT TOTAL									3.E-05					3.5.E+00
	EXPOSURE MEDIUM TOTAL										3.E-05					3.5.E+00
COMBINED FISH DIET TOTAL											**3.E-05**					**3.5.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**7.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**3.8.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.12.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			4.9E-07	mg/kg/day	2.0E-02	mg/kg/day	2.E-05
				Acenaphthylene	0.49749	mg/kg	NC		NC			1.4E-06	mg/kg/day	6.0E-02	mg/kg/day	2.E-05
				Benzo(a)anthracene	3.41086	mg/kg	8.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-07	9.7E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(a)pyrene	3.41803	mg/kg	8.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-06	9.7E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(b)fluoranthene	4.28861	mg/kg	1.0E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-07	1.2E-05	mg/kg/day	3.0E-02	mg/kg/day	4.E-04
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			8.2E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Dibenzo(a,h)anthracene	0.72851	mg/kg	1.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	7.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-07	8.8E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Phenanthrene	5.30136	mg/kg	NC		NC			1.5E-05	mg/kg/day	3.0E-02	mg/kg/day	5.E-04
				alpha-Chlordane	0.03592	mg/kg	8.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	1.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Aroclor-1254	0.83872	mg/kg	2.0E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-07	2.4E-06	mg/kg/day	2.0E-05	mg/kg/day	1.E-01
				Aroclor-1268	0.13953	mg/kg	3.4E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-08	4.0E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			3.6E-08	mg/kg/day	6.0E-03	mg/kg/day	6.E-06
				Technical Chlordane	0.73538	mg/kg	1.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-08	2.1E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Aluminum	21793	mg/kg	NC		NC			6.2E-02	mg/kg/day	1.0E+00	mg/kg/day	6.E-02
				Arsenic	12.2	mg/kg	3.0E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-06	3.5E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Chromium	291	mg/kg	NC		NC			8.3E-04	mg/kg/day	3.0E-03	mg/kg/day	3.E-01
				Copper	324	mg/kg	NC		NC			9.2E-04	mg/kg/day	3.0E-02	mg/kg/day	3.E-02
				Lead	591	mg/kg	1.4E-04	mg/kg/day	--			1.7E-03	mg/kg/day			
				Manganese	4126	mg/kg	NC		NC			1.2E-02	mg/kg/day	7.1E-02	mg/kg/day	2.E-01
				Mercury	0.811	mg/kg	NC		NC			2.3E-06	mg/kg/day	3.0E-04	mg/kg/day	8.E-03
				Molybdenum	87.7	mg/kg	NC		NC			2.5E-04	mg/kg/day	5.0E-03	mg/kg/day	5.E-02
				Nickel	387	mg/kg	NC		NC			1.1E-03	mg/kg/day	2.0E-02	mg/kg/day	6.E-02
				Thallium	0.585	mg/kg	NC		NC			1.7E-06	mg/kg/day	8.0E-05	mg/kg/day	2.E-02
				Vanadium	103	mg/kg	NC		NC			2.9E-04	mg/kg/day	7.0E-03	mg/kg/day	4.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.000109	mg/kg	2.7E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-06	3.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.E+00
			DERMAL	2-Methylnaphthalene	0.17022	mg/kg	NC		NC			1.8E-07	mg/kg/day	2.0E-02	mg/kg/day	9.E-06
				Acenaphthylene	0.49749	mg/kg	NC		NC			5.2E-07	mg/kg/day	6.0E-02	mg/kg/day	9.E-06
				Benzo(a)anthracene	3.41086	mg/kg	3.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	3.5E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(a)pyrene	3.41803	mg/kg	3.0E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	3.5E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(b)fluoranthene	4.28861	mg/kg	3.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	4.4E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(g,h,i)perylene	2.87139	mg/kg	NC		NC			3.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Dibenzo(a,h)anthracene	0.72851	mg/kg	6.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-07	7.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Indeno(1,2,3-cd)pyrene	3.0929	mg/kg	2.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	3.2E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Phenanthrene	5.30136	mg/kg	NC		NC			5.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				alpha-Chlordane	0.03592	mg/kg	9.8E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	1.1E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.83872	mg/kg	8.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	9.4E-07	mg/kg/day	2.0E-05	mg/kg/day	5.E-02
				Aroclor-1268	0.13953	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	1.6E-07	mg/kg/day	2.0E-05	mg/kg/day	8.E-03
				Endosulfan Sulfate	0.01269	mg/kg	NC		NC			1.0E-08	mg/kg/day	6.0E-03	mg/kg/day	2.E-06
				Technical Chlordane	0.73538	mg/kg	2.0E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-09	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Aluminum	21793	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Arsenic	12.2	mg/kg	2.5E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-07	2.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Chromium	291	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	324	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	591	mg/kg	--		--			--				
				Manganese	4126	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.811	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Molybdenum	87.7	mg/kg	NC		NC			--		5.0E-03	mg/kg/day	
				Nickel	387	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.585	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	103	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000109	mg/kg	2.2E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-07	2.6E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					7.E-02
		EXPOSURE POINT TOTAL									2.E-05					1.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					1.E+00
SOIL TOTAL											**2.E-05**					**1.E+00**

US EPA ARCHIVE DOCUMENT

TABLE 7.12.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	GREYSTONE MILL POND	INGESTION	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			1.4E-07	mg/kg/day	2.0E-02	mg/kg/day	7.E-06
				Acenaphthylene	0.19279	mg/kg	NC		NC			3.7E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	3.5	mg/kg	5.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	6.6E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	3.1	mg/kg	5.0E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-06	5.9E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(b)fluoranthene	3.1	mg/kg	5.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	5.9E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			3.9E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Dibenzo(a,h)anthracene	0.77	mg/kg	1.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-07	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	3.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	4.1E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Phenanthrene	4.8	mg/kg	NC		NC			9.1E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				alpha-Chlordane	0.0061	mg/kg	9.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	1.2E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.38	mg/kg	6.2E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	7.2E-07	mg/kg/day	2.0E-05	mg/kg/day	4.E-02
				Aroclor-1268	0.24667	mg/kg	4.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-08	4.7E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.005	mg/kg	8.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	9.5E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Technical Chlordane	0.62618	mg/kg	1.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aluminum	15554	mg/kg	NC		NC			3.0E-02	mg/kg/day	1.0E+00	mg/kg/day	3.E-02
				Antimony	4.3	mg/kg	NC		NC			8.2E-06	mg/kg/day	4.0E-04	mg/kg/day	2.E-02
				Arsenic	9.6	mg/kg	1.6E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.E-02
				Cadmium	4.35	mg/kg	NC		NC			8.3E-06	mg/kg/day	1.0E-03	mg/kg/day	8.E-03
				Chromium	271	mg/kg	NC		NC			5.1E-04	mg/kg/day	3.0E-03	mg/kg/day	2.E-01
				Copper	436	mg/kg	NC		NC			8.3E-04	mg/kg/day	3.0E-02	mg/kg/day	3.E-02
				Lead	179	mg/kg	2.9E-05	mg/kg/day				3.4E-04	mg/kg/day			
				Manganese	599	mg/kg	NC		NC			1.1E-03	mg/kg/day	7.1E-02	mg/kg/day	2.E-02
				Mercury	0.757	mg/kg	NC		NC			1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Nickel	142	mg/kg	NC		NC			2.7E-04	mg/kg/day	2.0E-02	mg/kg/day	1.E-02
				Thallium	0.37	mg/kg	NC		NC			7.0E-07	mg/kg/day	8.0E-05	mg/kg/day	9.E-03
				Vanadium	79	mg/kg	NC		NC			1.5E-04	mg/kg/day	7.0E-03	mg/kg/day	2.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.00012	mg/kg	2.0E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-06	2.3E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000249	mg/kg	4.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-07	4.7E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					4.E-01
			DERMAL	2-Methylnaphthalene	0.07478	mg/kg	NC		NC			5.2E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Acenaphthylene	0.19279	mg/kg	NC		NC			1.3E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Benzo(a)anthracene	3.5	mg/kg	2.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				Benzo(a)pyrene	3.1	mg/kg	1.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Benzo(b)fluoranthene	3.1	mg/kg	1.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Benzo(g,h,i)perylene	2.07671	mg/kg	NC		NC			1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Dibenzo(a,h)anthracene	0.77	mg/kg	4.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	5.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Indeno(1,2,3-cd)pyrene	2.18335	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			3.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				alpha-Chlordane	0.0061	mg/kg	1.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	1.3E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	0.38	mg/kg	2.4E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-08	2.8E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				Aroclor-1268	0.24667	mg/kg	1.6E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	1.8E-07	mg/kg/day	2.0E-05	mg/kg/day	9.E-03
				gamma-Chlordane	0.005	mg/kg	9.1E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	1.1E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	0.62618	mg/kg	1.1E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-09	1.3E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Aluminum	15554	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Antimony	4.3	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.6	mg/kg	1.3E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Cadmium	4.35	mg/kg	NC		NC			2.3E-08	mg/kg/day	2.5E-05	mg/kg/day	9.E-04
				Chromium	271	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Copper	436	mg/kg	NC		NC			--		3.0E-02	mg/kg/day	
				Lead	179	mg/kg	--					--				
				Manganese	599	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	0.757	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Nickel	142	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Thallium	0.37	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	79	mg/kg	NC		NC			--		1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.12.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans)	0.00012	mg/kg	1.6E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	1.9E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000249	mg/kg	3.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-08	4.0E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					3.E-02
		EXPOSURE POINT TOTAL									1.E-05					5.E-01
	EXPOSURE MEDIUM TOTAL										1.E-05					5.E-01
SEDIMENT TOTAL											**1.E-05**					**5.E-01**
SURFACE WATER	SURFACE WATER	GREYSTONE MILL POND	INGESTION	Arsenic	0.00055	mg/l	2.2E-08	mg/kg/day	1.5E+00	mg/kg/day	3.E-08	2.6E-07	mg/kg/day	3.0E-04	mg/kg/day	9.E-04
				Manganese	0.144	mg/l	NC		NC			6.8E-05	mg/kg/day	2.4E-02	mg/kg/day	3.E-03
				Mercury	0.00000193	mg/l	NC		NC			9.2E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				Nitrite-N	0.13	mg/l	NC		NC			6.2E-05	mg/kg/day	1.0E-01	mg/kg/day	6.E-04
				Toxicity Equivalency (Dioxins/Furans)	5.64E-09	mg/l	2.3E-13	mg/kg/day	1.5E+05	mg/kg/day	3.E-08	2.7E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-08					4.E-03
			DERMAL	Arsenic	0.00055	mg/l	1.2E-09	mg/kg/day	1.5E+00	mg/kg/day	2.E-09	1.4E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				Manganese	0.144	mg/l	NC		NC			3.7E-06	mg/kg/day	9.6E-04	mg/kg/day	4.E-03
				Mercury	0.00000193	mg/l	NC		NC			4.9E-11	mg/kg/day	2.1E-05	mg/kg/day	2.E-06
				Nitrite-N	0.13	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	5.64E-09	mg/l	3.9E-11	mg/kg/day	1.5E+05	mg/kg/day	6.E-06	4.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					4.E-03
		EXPOSURE POINT TOTAL									6.E-06					8.E-03
	EXPOSURE MEDIUM TOTAL										6.E-06					8.E-03
SURFACE WATER TOTAL											**6.E-06**					**8.E-03**
BIOTA	COMBINED FISH DIET	GREYSTONE MILL POND	INGESTION	Acenaphthylene	0.0022	mg/kg	NC		NC			6.6E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	0.00099	mg/kg	2.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.0012	mg/kg	NC		NC			3.6E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.00092	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Dibenzo(a,h)anthracene	0.00057	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Indeno(1,2,3-cd)pyrene	0.00092	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Phenanthrene	0.008	mg/kg	NC		NC			2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				4,4'-DDD	0.013	mg/kg	3.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	8.E-08	3.9E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				4,4'-DDE	0.0329	mg/kg	8.5E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	9.9E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDT	0.003	mg/kg	7.7E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	9.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				alpha-Chlordane	0.014	mg/kg	3.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	4.2E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	0.177	mg/kg	4.6E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-06	5.3E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aroclor-1268	0.0851	mg/kg	2.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	2.6E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Dieldrin	0.0027	mg/kg	7.0E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	8.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.006	mg/kg	1.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-08	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Heptachlor Epoxide	0.0008	mg/kg	2.1E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	2.E-07	2.4E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.2056	mg/kg	5.3E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	6.2E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Lead	0.5	mg/kg	1.3E-05	mg/kg/day				1.5E-04	mg/kg/day			
				Mercury	0.226	mg/kg	NC		NC			6.8E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.328	mg/kg	NC		NC			9.9E-05	mg/kg/day	1.0E-04	mg/kg/day	1.E+00
				Zinc	22	mg/kg	NC		NC			6.6E-03	mg/kg/day	3.0E-01	mg/kg/day	2.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.00000136	mg/kg	3.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-06	4.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					5.4.E+00
		EXPOSURE POINT TOTAL									2.E-05					5.4.E+00
	EXPOSURE MEDIUM TOTAL										2.E-05					5.4.E+00
COMBINED FISH DIET TOTAL											**2.E-05**					**5.4.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**7.E-05**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**6.9.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

US EPA ARCHIVE DOCUMENT

TABLE 7.12.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- RESIDENT- CHILD - COMBINED FISH DIET - GREYSTONE MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	

Prepared by: RAR
Checked by: KJA

US EPA ARCHIVE DOCUMENT

TABLE 7.13.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	ALLENDALE POND	INGESTION	2,3,7,8-TCDD	0.00027	mg/kg	1.2E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	6.9E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					--
			DERMAL	2,3,7,8-TCDD	0.00027	mg/kg	2.8E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-08	1.6E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-08					--
		EXPOSURE POINT TOTAL									2.E-07					0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-07					0.E+00
SOIL TOTAL											**2.E-07**					**0.E+00**
SEDIMENT	SEDIMENT	ALLENDALE POND	INGESTION	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			3.5E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.97	mg/kg	NC		NC			2.5E-08	mg/kg/day	6.0E-02	mg/kg/day	4.E-07
				Benzo(a)anthracene	3.4	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	4	mg/kg	1.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	4.4	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			5.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	3.9	mg/kg	1.7E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	9.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	1.4E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	8.1E-08	mg/kg/day	2.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	2	mg/kg	8.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	5.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.1E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Pentachlorophenol	6.5	mg/kg	2.8E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	3.E-09	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.0113	mg/kg	4.9E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	2.9E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Aroclor-1254	2.4	mg/kg	1.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	6.1E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Aroclor-1260	0.2	mg/kg	8.7E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	5.1E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				Aroclor-1268	0.079	mg/kg	3.4E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-10	2.0E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			3.6E-11	mg/kg/day	3.0E-04	mg/kg/day	1.E-07
				Dieldrin	0.009	mg/kg	3.9E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-10	2.3E-10	mg/kg/day	5.0E-05	mg/kg/day	5.E-06
				Endosulfan II	0.037	mg/kg	NC		NC			9.4E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			6.9E-11	mg/kg/day	6.0E-03	mg/kg/day	1.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			7.4E-11	mg/kg/day	3.0E-04	mg/kg/day	2.E-07
				Endrin Ketone	0.0038	mg/kg	NC		NC			9.7E-11	mg/kg/day	3.0E-04	mg/kg/day	3.E-07
				gamma-Chlordane	0.017	mg/kg	7.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	4.3E-10	mg/kg/day	5.0E-04	mg/kg/day	9.E-07
				Technical Chlordane	0.65	mg/kg	2.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	1.7E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Antimony	4.8	mg/kg	NC		NC			1.2E-07	mg/kg/day	4.0E-04	mg/kg/day	3.E-04
				Arsenic	5.8	mg/kg	2.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	1.2	mg/kg	NC		NC			3.1E-08	mg/kg/day	1.0E-03	mg/kg/day	3.E-05
				Chromium	238	mg/kg	NC		NC			6.1E-06	mg/kg/day	3.0E-03	mg/kg/day	2.E-03
				Lead	488	mg/kg	2.1E-06	mg/kg/day	--			1.2E-05	mg/kg/day			
				Manganese	531	mg/kg	NC		NC			1.4E-05	mg/kg/day	7.1E-02	mg/kg/day	2.E-04
				Mercury	0.97	mg/kg	NC		NC			2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Nickel	26.7	mg/kg	NC		NC			6.8E-07	mg/kg/day	2.0E-02	mg/kg/day	3.E-05
				Thallium	6.8	mg/kg	NC		NC			1.7E-07	mg/kg/day	8.0E-05	mg/kg/day	2.E-03
				Vanadium	45.9	mg/kg	NC		NC			1.2E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans	0.0057	mg/kg	2.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-06	1.5E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.000000112	mg/kg	4.9E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-11	2.8E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					9.E-03
			DERMAL	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			3.1E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.97	mg/kg	NC		NC			2.2E-08	mg/kg/day	6.0E-02	mg/kg/day	4.E-07
				Benzo(a)anthracene	3.4	mg/kg	1.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.7E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	4	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	9.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	4.4	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	3.9	mg/kg	1.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	8.8E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	9.5E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-10	5.5E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	2	mg/kg	7.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	7.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Pentachlorophenol	6.5	mg/kg	4.8E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	6.E-09	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06

US EPA ARCHIVE DOCUMENT

TABLE 7.13.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				alpha-Chlordane	0.0113	mg/kg	1.3E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-12	7.8E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Aroclor-1254	2.4	mg/kg	1.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	5.8E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Aroclor-1260	0.2	mg/kg	8.3E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	4.8E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Aroclor-1268	0.079	mg/kg	3.3E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-10	1.9E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			2.4E-11	mg/kg/day	3.0E-04	mg/kg/day	8.E-08
				Dieldrin	0.009	mg/kg	2.7E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-10	1.6E-10	mg/kg/day	5.0E-05	mg/kg/day	3.E-06
				Endosulfan II	0.037	mg/kg	NC		NC			6.4E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			4.7E-11	mg/kg/day	6.0E-03	mg/kg/day	8.E-09
				Endrin aldehyde	0.0029	mg/kg	NC		NC			5.0E-11	mg/kg/day	3.0E-04	mg/kg/day	2.E-07
				Endrin Ketone	0.0038	mg/kg	NC		NC			6.6E-11	mg/kg/day	3.0E-04	mg/kg/day	2.E-07
				gamma-Chlordane	0.017	mg/kg	2.0E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-12	1.2E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Technical Chlordane	0.65	mg/kg	7.7E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	4.5E-09	mg/kg/day	5.0E-04	mg/kg/day	9.E-06
				Antimony	4.8	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	5.8	mg/kg	5.2E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-09	3.0E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Cadmium	1.2	mg/kg	NC		NC			2.1E-10	mg/kg/day	2.5E-05	mg/kg/day	8.E-06
				Chromium	238	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	488	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	531	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.97	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	26.7	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	6.8	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	45.9	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.0057	mg/kg	5.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-07	3.0E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congener	0.000000112	mg/kg	1.0E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-11	5.8E-16	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					3.E-03
		EXPOSURE POINT TOTAL									5.E-06					1.E-02
	EXPOSURE MEDIUM TOTAL										5.E-06					1.E-02
SEDIMENT TOTAL											**5.E-06**					**1.E-02**
SURFACE WATER	SURFACE WATER	ALLENDALE POND	INGESTION	Tetrachloroethene	0.0007	mg/l	3.1E-10	mg/kg/day	5.4E-01	mg/kg/day	2.E-10	1.8E-09	mg/kg/day	1.0E-02	mg/kg/day	2.E-07
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	4.4E-10	mg/kg/day	1.4E-02	mg/kg/day	6.E-12	2.5E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Aldrin	0.000011	mg/l	4.8E-12	mg/kg/day	1.7E+01	mg/kg/day	8.E-11	2.8E-11	mg/kg/day	3.0E-05	mg/kg/day	9.E-07
				alpha-Chlordane	0.00000069	mg/l	3.0E-13	mg/kg/day	3.5E-01	mg/kg/day	1.E-13	1.8E-12	mg/kg/day	5.0E-04	mg/kg/day	4.E-09
				Aroclor-1254	0.0006	mg/l	2.6E-10	mg/kg/day	2.0E+00	mg/kg/day	5.E-10	1.5E-09	mg/kg/day	2.0E-05	mg/kg/day	8.E-05
				delta-BHC	0.0000096	mg/l	NC		NC			2.4E-11	mg/kg/day	3.0E-04	mg/kg/day	8.E-08
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			1.1E-09	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			7.1E-12	mg/kg/day	3.0E-04	mg/kg/day	2.E-08
				gamma-Chlordane	0.000025	mg/l	1.1E-11	mg/kg/day	3.5E-01	mg/kg/day	4.E-12	6.4E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Arsenic	0.0044	mg/l	1.9E-09	mg/kg/day	1.5E+00	mg/kg/day	3.E-09	1.1E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Barium	0.044	mg/l	NC		NC			1.1E-07	mg/kg/day	7.0E-02	mg/kg/day	2.E-06
				Chromium	0.018	mg/l	NC		NC			4.6E-08	mg/kg/day	3.0E-03	mg/kg/day	2.E-05
				Lead	0.021	mg/l	9.2E-09	mg/kg/day	--			5.3E-08	mg/kg/day			
				Manganese	0.98	mg/l	NC		NC			2.5E-06	mg/kg/day	2.4E-02	mg/kg/day	1.E-04
				Mercury	0.00000319	mg/l	NC		NC			8.1E-12	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Thallium	0.0037	mg/l	NC		NC			9.4E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.773	mg/l	NC		NC			2.0E-06	mg/kg/day	1.6E+00	mg/kg/day	1.E-06
				Nitrite-N	0.139	mg/l	NC		NC			3.5E-07	mg/kg/day	1.0E-01	mg/kg/day	4.E-06
				Toxicity Equivalency (Dioxins/Furans	0.0000011	mg/l	4.8E-13	mg/kg/day	1.5E+05	mg/kg/day	7.E-08	2.8E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								8.E-08					4.E-04
			DERMAL	Tetrachloroethene	0.0007	mg/l	4.9E-08	mg/kg/day	5.4E-01	mg/kg/day	3.E-08	2.9E-07	mg/kg/day	1.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	1.8E-07	mg/kg/day	1.4E-02	mg/kg/day	3.E-09	1.1E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-05
				Aldrin	0.000011	mg/l	1.2E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-09	6.8E-10	mg/kg/day	3.0E-05	mg/kg/day	2.E-05
				alpha-Chlordane	0.00000069	mg/l	1.7E-10	mg/kg/day	3.5E-01	mg/kg/day	6.E-11	1.0E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.0006	mg/l	--		2.0E+00	mg/kg/day		--		2.0E-05	mg/kg/day	
				delta-BHC	0.0000096	mg/l	NC		NC			2.6E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06

US EPA ARCHIVE DOCUMENT

TABLE 7.13.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.4E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				gamma-Chlordane	0.000025	mg/l	6.2E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.6E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Arsenic	0.0044	mg/l	3.3E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	1.9E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Barium	0.044	mg/l	NC		NC			1.9E-07	mg/kg/day	4.9E-03	mg/kg/day	4.E-05
				Chromium	0.018	mg/l	NC		NC			1.6E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.021	mg/l	--		--			--				
				Manganese	0.98	mg/l	NC		NC			4.3E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000319	mg/l	NC		NC			1.4E-11	mg/kg/day	2.1E-05	mg/kg/day	7.E-07
				Thallium	0.0037	mg/l	NC		NC			1.6E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Nitrate	0.773	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.139	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans	0.0000011	mg/l	2.7E-09	mg/kg/day	1.5E+05	mg/kg/day	4.E-04	1.6E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					7.E-03
		EXPOSURE POINT TOTAL									4.E-04					8.E-03
	EXPOSURE MEDIUM TOTAL										4.E-04					8.E-03
SURFACE WATER TOTAL											**4.E-04**					**8.E-03**
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.0014	mg/kg	4.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.7E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(a)pyrene	0.0015	mg/kg	4.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	5.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.0128	mg/kg	4.2E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0249	mg/kg	8.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.8E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.6E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				alpha-Chlordane	0.0214	mg/kg	7.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	4.1E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	1.8853	mg/kg	6.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	3.6E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.02673	mg/kg	8.8E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	5.1E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0005	mg/kg	1.6E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	3.E-08	9.6E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Dieldrin	0.00889	mg/kg	2.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-06	1.7E-06	mg/kg/day	5.0E-05	mg/kg/day	3.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			1.9E-07	mg/kg/day	6.0E-03	mg/kg/day	3.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			9.6E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				gamma-Chlordane	0.008	mg/kg	2.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor	0.0005	mg/kg	1.6E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	7.E-08	9.6E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Heptachlor Epoxide	0.0011	mg/kg	3.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	2.1E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.468	mg/kg	1.5E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-06	9.0E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.2E-05	mg/kg/day	1.0E-03	mg/kg/day	1.E-02
				Chromium	0.103	mg/kg	NC		NC			2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	7.E-03
				Lead	0.464	mg/kg	1.5E-05	mg/kg/day	--			8.9E-05	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.144	mg/kg	NC		NC			2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.208	mg/kg	NC		NC			4.0E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congener	0.000032	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.1E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans	0.000301	mg/kg	9.9E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	5.8E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					1.9.E+01
		EXPOSURE POINT TOTAL									2.E-03					1.9.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					1.9.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**1.9.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-03**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**1.9.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.14.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	ALLENDALE POND	INGESTION	2,3,7,8-TCDD	0.00027	mg/kg	1.8E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-07	1.1E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-07					--
			DERMAL	2,3,7,8-TCDD	0.00027	mg/kg	1.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	6.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					--
		EXPOSURE POINT TOTAL									4.E-07					0.E+00
	EXPOSURE MEDIUM TOTAL										4.E-07					0.E+00
SOIL TOTAL											**4.E-07**					**0.E+00**
SEDIMENT	SEDIMENT	ALLENDALE POND	INGESTION	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			5.4E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				Acenaphthylene	0.97	mg/kg	NC		NC			3.8E-08	mg/kg/day	6.0E-02	mg/kg/day	6.E-07
				Benzo(a)anthracene	3.4	mg/kg	2.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(a)pyrene	4	mg/kg	2.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(b)fluoranthene	4.4	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(k)fluoranthene	3.9	mg/kg	2.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-09	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	2.2E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-10	1.3E-07	mg/kg/day	2.0E-02	mg/kg/day	6.E-06
				Dibenzo(a,h)anthracene	2	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	2.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Pentachlorophenol	6.5	mg/kg	4.4E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	5.E-09	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Phenanthrene	4.8	mg/kg	NC		NC			1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				alpha-Chlordane	0.0113	mg/kg	7.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	4.5E-10	mg/kg/day	5.0E-04	mg/kg/day	9.E-07
				Aroclor-1254	2.4	mg/kg	1.6E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	9.5E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Aroclor-1260	0.2	mg/kg	1.4E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	7.9E-09	mg/kg/day	2.0E-05	mg/kg/day	4.E-04
				Aroclor-1268	0.079	mg/kg	5.4E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	3.1E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			5.5E-11	mg/kg/day	3.0E-04	mg/kg/day	2.E-07
				Dieldrin	0.009	mg/kg	6.1E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-09	3.6E-10	mg/kg/day	5.0E-05	mg/kg/day	7.E-06
				Endosulfan II	0.037	mg/kg	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			1.1E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			1.1E-10	mg/kg/day	3.0E-04	mg/kg/day	4.E-07
				Endrin Ketone	0.0038	mg/kg	NC		NC			1.5E-10	mg/kg/day	3.0E-04	mg/kg/day	5.E-07
				gamma-Chlordane	0.017	mg/kg	1.2E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	6.7E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				Technical Chlordane	0.65	mg/kg	4.4E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-09	2.6E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Antimony	4.8	mg/kg	NC		NC			1.9E-07	mg/kg/day	4.0E-04	mg/kg/day	5.E-04
				Arsenic	5.8	mg/kg	3.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-08	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Cadmium	1.2	mg/kg	NC		NC			4.7E-08	mg/kg/day	1.0E-03	mg/kg/day	5.E-05
				Chromium	238	mg/kg	NC		NC			9.4E-06	mg/kg/day	3.0E-03	mg/kg/day	3.E-03
				Lead	488	mg/kg	3.3E-06	mg/kg/day	--			1.9E-05	mg/kg/day			
				Manganese	531	mg/kg	NC		NC			2.1E-05	mg/kg/day	7.1E-02	mg/kg/day	3.E-04
				Mercury	0.97	mg/kg	NC		NC			3.8E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Nickel	26.7	mg/kg	NC		NC			1.1E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-05
				Thallium	6.8	mg/kg	NC		NC			2.7E-07	mg/kg/day	8.0E-05	mg/kg/day	3.E-03
				Vanadium	45.9	mg/kg	NC		NC			1.8E-06	mg/kg/day	7.0E-03	mg/kg/day	3.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	3.9E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-06	2.3E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	7.6E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-10	4.4E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					1.E-02
			DERMAL	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			1.0E-08	mg/kg/day	2.0E-02	mg/kg/day	5.E-07
				Acenaphthylene	0.97	mg/kg	NC		NC			7.1E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	3.4	mg/kg	4.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.5E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(a)pyrene	4	mg/kg	5.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	4.4	mg/kg	5.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(k)fluoranthene	3.9	mg/kg	4.9E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-09	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	3.1E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-10	1.8E-07	mg/kg/day	2.0E-02	mg/kg/day	9.E-06
				Dibenzo(a,h)anthracene	2	mg/kg	2.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	4.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Pentachlorophenol	6.5	mg/kg	1.6E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	2.E-08	9.2E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			3.5E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.14.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				alpha-Chlordane	0.0113	mg/kg	4.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	2.6E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				Aroclor-1254	2.4	mg/kg	3.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-08	1.9E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				Aroclor-1260	0.2	mg/kg	2.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.6E-08	mg/kg/day	2.0E-05	mg/kg/day	8.E-04
				Aroclor-1268	0.079	mg/kg	1.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.3E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			7.9E-11	mg/kg/day	3.0E-04	mg/kg/day	3.E-07
				Dieldrin	0.009	mg/kg	8.7E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-09	5.1E-10	mg/kg/day	5.0E-05	mg/kg/day	1.E-05
				Endosulfan II	0.037	mg/kg	NC		NC			2.1E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			1.5E-10	mg/kg/day	6.0E-03	mg/kg/day	3.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			1.6E-10	mg/kg/day	3.0E-04	mg/kg/day	5.E-07
				Endrin Ketone	0.0038	mg/kg	NC		NC			2.1E-10	mg/kg/day	3.0E-04	mg/kg/day	7.E-07
				gamma-Chlordane	0.017	mg/kg	6.6E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.8E-10	mg/kg/day	5.0E-04	mg/kg/day	8.E-07
				Technical Chlordane	0.65	mg/kg	2.5E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-10	1.5E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Antimony	4.8	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	5.8	mg/kg	1.7E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-08	9.8E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	1.2	mg/kg	NC		NC			6.8E-10	mg/kg/day	2.5E-05	mg/kg/day	3.E-05
				Chromium	238	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	488	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	531	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.97	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	26.7	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	6.8	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	45.9	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	1.7E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-06	9.7E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	3.3E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-11	1.9E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					1.E-02
		EXPOSURE POINT TOTAL									1.E-05					3.E-02
	EXPOSURE MEDIUM TOTAL										1.E-05					3.E-02
SEDIMENT TOTAL											**1.E-05**					**3.E-02**
SURFACE WATER	SURFACE WATER	ALLENDALE POND	INGESTION	Tetrachloroethene	0.0007	mg/l	4.7E-10	mg/kg/day	5.4E-01	mg/kg/day	3.E-10	2.8E-09	mg/kg/day	1.0E-02	mg/kg/day	3.E-07
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	6.8E-10	mg/kg/day	1.4E-02	mg/kg/day	9.E-12	4.0E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Aldrin	0.000011	mg/l	7.5E-12	mg/kg/day	1.7E+01	mg/kg/day	1.E-10	4.4E-11	mg/kg/day	3.0E-05	mg/kg/day	1.E-06
				alpha-Chlordane	0.00000069	mg/l	4.7E-13	mg/kg/day	3.5E-01	mg/kg/day	2.E-13	2.7E-12	mg/kg/day	5.0E-04	mg/kg/day	5.E-09
				Aroclor-1254	0.0006	mg/l	4.1E-10	mg/kg/day	2.0E+00	mg/kg/day	8.E-10	2.4E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				delta-BHC	0.0000096	mg/l	NC		NC			3.8E-11	mg/kg/day	3.0E-04	mg/kg/day	1.E-07
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			1.7E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.1E-11	mg/kg/day	3.0E-04	mg/kg/day	4.E-08
				gamma-Chlordane	0.000025	mg/l	1.7E-11	mg/kg/day	3.5E-01	mg/kg/day	6.E-12	9.9E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.0044	mg/l	3.0E-09	mg/kg/day	1.5E+00	mg/kg/day	4.E-09	1.7E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Barium	0.044	mg/l	NC		NC			1.7E-07	mg/kg/day	7.0E-02	mg/kg/day	2.E-06
				Chromium	0.018	mg/l	NC		NC			7.1E-08	mg/kg/day	3.0E-03	mg/kg/day	2.E-05
				Lead	0.021	mg/l	1.4E-08	mg/kg/day	--			8.3E-08	mg/kg/day			
				Manganese	0.98	mg/l	NC		NC			3.9E-06	mg/kg/day	2.4E-02	mg/kg/day	2.E-04
				Mercury	0.00000319	mg/l	NC		NC			1.3E-11	mg/kg/day	3.0E-04	mg/kg/day	4.E-08
				Thallium	0.0037	mg/l	NC		NC			1.5E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Nitrate	0.773	mg/l	NC		NC			3.1E-06	mg/kg/day	1.6E+00	mg/kg/day	2.E-06
				Nitrite-N	0.139	mg/l	NC		NC			5.5E-07	mg/kg/day	1.0E-01	mg/kg/day	6.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	7.5E-13	mg/kg/day	1.5E+05	mg/kg/day	1.E-07	4.4E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-07					6.E-04
			DERMAL	Tetrachloroethene	0.0007	mg/l	5.5E-08	mg/kg/day	5.4E-01	mg/kg/day	3.E-08	3.2E-07	mg/kg/day	1.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	2.1E-07	mg/kg/day	1.4E-02	mg/kg/day	3.E-09	1.2E-06	mg/kg/day	2.0E-02	mg/kg/day	6.E-05
				Aldrin	0.000011	mg/l	1.3E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-09	7.6E-10	mg/kg/day	3.0E-05	mg/kg/day	3.E-05
				alpha-Chlordane	0.00000069	mg/l	1.9E-10	mg/kg/day	3.5E-01	mg/kg/day	7.E-11	1.1E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.0006	mg/l	--		2.0E+00	mg/kg/day		--		2.0E-05	mg/kg/day	
				delta-BHC	0.0000096	mg/l	NC		NC			2.9E-09	mg/kg/day	3.0E-04	mg/kg/day	1.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.14.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.5E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				gamma-Chlordane	0.000025	mg/l	6.9E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	4.0E-08	mg/kg/day	5.0E-04	mg/kg/day	8.E-05
				Arsenic	0.0044	mg/l	3.7E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.2E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Barium	0.044	mg/l	NC		NC			2.2E-07	mg/kg/day	4.9E-03	mg/kg/day	4.E-05
				Chromium	0.018	mg/l	NC		NC			1.8E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.021	mg/l	--		--			--				
				Manganese	0.98	mg/l	NC		NC			4.9E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000319	mg/l	NC		NC			1.6E-11	mg/kg/day	2.1E-05	mg/kg/day	8.E-07
				Thallium	0.0037	mg/l	NC		NC			1.8E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Nitrate	0.773	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.139	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	3.0E-09	mg/kg/day	1.5E+05	mg/kg/day	4.E-04	1.7E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					8.E-03
		EXPOSURE POINT TOTAL									4.E-04					9.E-03
	EXPOSURE MEDIUM TOTAL										4.E-04					9.E-03
SURFACE WATER TOTAL											**4.E-04**					**9.E-03**
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			4.0E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)anthracene	0.0014	mg/kg	4.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(a)pyrene	0.0015	mg/kg	5.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	5.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	2.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.0128	mg/kg	4.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0249	mg/kg	8.5E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.9E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.7E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	9.E-08	1.6E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				alpha-Chlordane	0.0214	mg/kg	7.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-07	4.2E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	1.8853	mg/kg	6.4E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	3.7E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.02673	mg/kg	9.1E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	5.3E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0005	mg/kg	1.7E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	3.E-08	9.9E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Dieldrin	0.00889	mg/kg	3.0E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-06	1.8E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			2.0E-07	mg/kg/day	6.0E-03	mg/kg/day	3.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			9.9E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				gamma-Chlordane	0.008	mg/kg	2.7E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	1.6E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor	0.0005	mg/kg	1.7E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	8.E-08	9.9E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Heptachlor Epoxide	0.0011	mg/kg	3.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	2.2E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.468	mg/kg	1.6E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-06	9.3E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.3E-05	mg/kg/day	1.0E-03	mg/kg/day	1.E-02
				Chromium	0.103	mg/kg	NC		NC			2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	7.E-03
				Lead	0.464	mg/kg	1.6E-05	mg/kg/day	--			9.2E-05	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.144	mg/kg	NC		NC			2.9E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.208	mg/kg	NC		NC			4.1E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congeners)	0.000032	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.3E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.000301	mg/kg	1.0E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	6.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.0.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.0.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.0.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**2.0.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-03**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**2.0.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.15.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			6.0E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	0.0014	mg/kg	3.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	0.0015	mg/kg	3.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	4.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	4.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			2.9E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4'-DDD	0.0128	mg/kg	3.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	8.E-08	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				4,4'-DDE	0.0249	mg/kg	6.4E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	7.5E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	7.E-08	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.0214	mg/kg	5.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	6.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	1.8853	mg/kg	4.9E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	5.7E-04	mg/kg/day	2.0E-05	mg/kg/day	3.E+01
				Aroclor-1268	0.02673	mg/kg	6.9E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	8.0E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				beta-BHC	0.0005	mg/kg	1.3E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.00889	mg/kg	2.3E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-06	2.7E-06	mg/kg/day	5.0E-05	mg/kg/day	5.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			3.0E-07	mg/kg/day	6.0E-03	mg/kg/day	5.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				gamma-Chlordane	0.008	mg/kg	2.1E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor	0.0005	mg/kg	1.3E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	6.E-08	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Heptachlor Epoxide	0.0011	mg/kg	2.8E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	3.3E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.468	mg/kg	1.2E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-06	1.4E-04	mg/kg/day	5.0E-04	mg/kg/day	3.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.9E-05	mg/kg/day	1.0E-03	mg/kg/day	2.E-02
				Chromium	0.103	mg/kg	NC		NC			3.1E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.464	mg/kg	1.2E-05	mg/kg/day	--			1.4E-04	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			2.0E-03	mg/kg/day	1.4E-01	mg/kg/day	1.E-02
				Mercury	0.144	mg/kg	NC		NC			4.3E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.208	mg/kg	NC		NC			6.2E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Toxicity Equivalency (PCB Congeners)	0.000032	mg/kg	8.2E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	9.6E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.000301	mg/kg	7.8E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	9.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-03					3.0.E+01
		EXPOSURE POINT TOTAL									1.E-03					3.0.E+01
	EXPOSURE MEDIUM TOTAL										1.E-03					3.0.E+01
COMBINED FISH DIET TOTAL											**1.E-03**					**3.0.E+01**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**1.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**3.0.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.16.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	ALLENDALE POND	INGESTION	2,3,7,8-TCDD	0.00027	mg/kg	1.4E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-06	8.2E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					--
			DERMAL	2,3,7,8-TCDD	0.00027	mg/kg	1.7E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-07	9.9E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-07					--
		EXPOSURE POINT TOTAL									2.E-06					0.E+00
	EXPOSURE MEDIUM TOTAL										2.E-06					0.E+00
SOIL TOTAL											**2.E-06**					**0.E+00**
SEDIMENT	SEDIMENT	ALLENDALE POND	INGESTION	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			2.1E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Acenaphthylene	0.97	mg/kg	NC		NC			1.5E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Benzo(a)anthracene	3.4	mg/kg	8.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	4	mg/kg	1.0E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4.4	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	3.9	mg/kg	1.0E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	7.E-09	6.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	8.4E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-09	4.9E-07	mg/kg/day	2.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	2	mg/kg	5.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	8.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Pentachlorophenol	6.5	mg/kg	1.7E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	2.E-08	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			7.3E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.0113	mg/kg	3.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	1.7E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	2.4	mg/kg	6.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	3.7E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Aroclor-1260	0.2	mg/kg	5.2E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.1E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.079	mg/kg	2.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	1.2E-08	mg/kg/day	2.0E-05	mg/kg/day	6.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			2.1E-10	mg/kg/day	3.0E-04	mg/kg/day	7.E-07
				Dieldrin	0.009	mg/kg	2.4E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-09	1.4E-09	mg/kg/day	5.0E-05	mg/kg/day	3.E-05
				Endosulfan II	0.037	mg/kg	NC		NC			5.6E-09	mg/kg/day	6.0E-03	mg/kg/day	9.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			4.1E-10	mg/kg/day	6.0E-03	mg/kg/day	7.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			4.4E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Endrin Ketone	0.0038	mg/kg	NC		NC			5.8E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.017	mg/kg	4.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	2.6E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Technical Chlordane	0.65	mg/kg	1.7E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-09	9.9E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Antimony	4.8	mg/kg	NC		NC			7.3E-07	mg/kg/day	4.0E-04	mg/kg/day	2.E-03
				Arsenic	5.8	mg/kg	1.5E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	8.9E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	1.2	mg/kg	NC		NC			1.8E-07	mg/kg/day	1.0E-03	mg/kg/day	2.E-04
				Chromium	238	mg/kg	NC		NC			3.6E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	488	mg/kg	1.3E-05	mg/kg/day	--			7.4E-05	mg/kg/day			
				Manganese	531	mg/kg	NC		NC			8.1E-05	mg/kg/day	7.1E-02	mg/kg/day	1.E-03
				Mercury	0.97	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Nickel	26.7	mg/kg	NC		NC			4.1E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Thallium	6.8	mg/kg	NC		NC			1.0E-06	mg/kg/day	8.0E-05	mg/kg/day	1.E-02
				Vanadium	45.9	mg/kg	NC		NC			7.0E-06	mg/kg/day	7.0E-03	mg/kg/day	1.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	1.5E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-05	8.7E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	2.9E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-10	1.7E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					5.E-02
			DERMAL	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			9.2E-09	mg/kg/day	2.0E-02	mg/kg/day	5.E-07
				Acenaphthylene	0.97	mg/kg	NC		NC			6.5E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	3.4	mg/kg	3.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(a)pyrene	4	mg/kg	4.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.7E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(b)fluoranthene	4.4	mg/kg	5.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(k)fluoranthene	3.9	mg/kg	4.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-09	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	2.8E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-10	1.7E-07	mg/kg/day	2.0E-02	mg/kg/day	8.E-06
				Dibenzo(a,h)anthracene	2	mg/kg	2.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	3.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Pentachlorophenol	6.5	mg/kg	1.4E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	2.E-08	8.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.16.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				alpha-Chlordane	0.0113	mg/kg	4.0E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.3E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				Aroclor-1254	2.4	mg/kg	3.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-08	1.7E-07	mg/kg/day	2.0E-05	mg/kg/day	9.E-03
				Aroclor-1260	0.2	mg/kg	2.5E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-09	1.5E-08	mg/kg/day	2.0E-05	mg/kg/day	7.E-04
				Aroclor-1268	0.079	mg/kg	9.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	5.7E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			7.3E-11	mg/kg/day	3.0E-04	mg/kg/day	2.E-07
				Dieldrin	0.009	mg/kg	8.0E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-09	4.7E-10	mg/kg/day	5.0E-05	mg/kg/day	9.E-06
				Endosulfan II	0.037	mg/kg	NC		NC			1.9E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			1.4E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			1.5E-10	mg/kg/day	3.0E-04	mg/kg/day	5.E-07
				Endrin Ketone	0.0038	mg/kg	NC		NC			2.0E-10	mg/kg/day	3.0E-04	mg/kg/day	7.E-07
				gamma-Chlordane	0.017	mg/kg	6.1E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.5E-10	mg/kg/day	5.0E-04	mg/kg/day	7.E-07
				Technical Chlordane	0.65	mg/kg	2.3E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-10	1.4E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Antimony	4.8	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	5.8	mg/kg	1.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	9.0E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	1.2	mg/kg	NC		NC			6.2E-10	mg/kg/day	2.5E-05	mg/kg/day	2.E-05
				Chromium	238	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	488	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	531	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.97	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	26.7	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	6.8	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	45.9	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	1.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-06	8.9E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	3.0E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-11	1.7E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					1.E-02
		EXPOSURE POINT TOTAL									3.E-05					6.E-02
	EXPOSURE MEDIUM TOTAL										3.E-05					6.E-02
SEDIMENT TOTAL											**3.E-05**					**6.E-02**
SURFACE WATER	SURFACE WATER	ALLENDALE POND	INGESTION	Tetrachloroethene	0.0007	mg/l	1.2E-08	mg/kg/day	5.4E-01	mg/kg/day	7.E-09	7.1E-08	mg/kg/day	1.0E-02	mg/kg/day	7.E-06
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	1.7E-08	mg/kg/day	1.4E-02	mg/kg/day	2.E-10	1.0E-07	mg/kg/day	2.0E-02	mg/kg/day	5.E-06
				Aldrin	0.000011	mg/l	1.9E-10	mg/kg/day	1.7E+01	mg/kg/day	3.E-09	1.1E-09	mg/kg/day	3.0E-05	mg/kg/day	4.E-05
				alpha-Chlordane	0.00000069	mg/l	1.2E-11	mg/kg/day	3.5E-01	mg/kg/day	4.E-12	7.0E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Aroclor-1254	0.0006	mg/l	1.0E-08	mg/kg/day	2.0E+00	mg/kg/day	2.E-08	6.1E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				delta-BHC	0.0000096	mg/l	NC		NC			9.8E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			4.4E-08	mg/kg/day	6.0E-03	mg/kg/day	7.E-06
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			2.8E-10	mg/kg/day	3.0E-04	mg/kg/day	9.E-07
				gamma-Chlordane	0.000025	mg/l	4.4E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	2.5E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Arsenic	0.0044	mg/l	7.7E-08	mg/kg/day	1.5E+00	mg/kg/day	1.E-07	4.5E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Barium	0.044	mg/l	NC		NC			4.5E-06	mg/kg/day	7.0E-02	mg/kg/day	6.E-05
				Chromium	0.018	mg/l	NC		NC			1.8E-06	mg/kg/day	3.0E-03	mg/kg/day	6.E-04
				Lead	0.021	mg/l	3.7E-07	mg/kg/day	--			2.1E-06	mg/kg/day			
				Manganese	0.98	mg/l	NC		NC			1.0E-04	mg/kg/day	2.4E-02	mg/kg/day	4.E-03
				Mercury	0.00000319	mg/l	NC		NC			3.2E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Thallium	0.0037	mg/l	NC		NC			3.8E-07	mg/kg/day	8.0E-05	mg/kg/day	5.E-03
				Nitrate	0.773	mg/l	NC		NC			7.9E-05	mg/kg/day	1.6E+00	mg/kg/day	5.E-05
				Nitrite-N	0.139	mg/l	NC		NC			1.4E-05	mg/kg/day	1.0E-01	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	1.9E-11	mg/kg/day	1.5E+05	mg/kg/day	3.E-06	1.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					1.E-02
			DERMAL	Tetrachloroethene	0.0007	mg/l	4.1E-07	mg/kg/day	5.4E-01	mg/kg/day	2.E-07	2.4E-06	mg/kg/day	1.0E-02	mg/kg/day	2.E-04
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	1.5E-06	mg/kg/day	1.4E-02	mg/kg/day	2.E-08	8.9E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				Aldrin	0.000011	mg/l	9.7E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-08	5.7E-09	mg/kg/day	3.0E-05	mg/kg/day	2.E-04
				alpha-Chlordane	0.00000069	mg/l	1.4E-09	mg/kg/day	3.5E-01	mg/kg/day	5.E-10	8.3E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.0006	mg/l	--		2.0E+00	mg/kg/day		--		2.0E-05	mg/kg/day	
				delta-BHC	0.0000096	mg/l	NC		NC			2.1E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.16.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.1E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				gamma-Chlordane	0.000025	mg/l	5.1E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	3.0E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Arsenic	0.0044	mg/l	2.8E-08	mg/kg/day	1.5E+00	mg/kg/day	4.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Barium	0.044	mg/l	NC		NC			1.6E-06	mg/kg/day	4.9E-03	mg/kg/day	3.E-04
				Chromium	0.018	mg/l	NC		NC			1.3E-06	mg/kg/day	7.5E-05	mg/kg/day	2.E-02
				Lead	0.021	mg/l	--		--			--				
				Manganese	0.98	mg/l	NC		NC			3.6E-05	mg/kg/day	9.6E-04	mg/kg/day	4.E-02
				Mercury	0.00000319	mg/l	NC		NC			1.2E-10	mg/kg/day	2.1E-05	mg/kg/day	6.E-06
				Thallium	0.0037	mg/l	NC		NC			1.4E-07	mg/kg/day	8.0E-05	mg/kg/day	2.E-03
				Nitrate	0.773	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.139	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	2.2E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.3E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					6.E-02
		EXPOSURE POINT TOTAL									3.E-03					7.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					7.E-02
SURFACE WATER TOTAL											**3.E-03**					**7.E-02**
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.0014	mg/kg	4.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.7E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(a)pyrene	0.0015	mg/kg	4.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	5.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.0128	mg/kg	4.2E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0249	mg/kg	8.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.8E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.6E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				alpha-Chlordane	0.0214	mg/kg	7.0E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	4.1E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	1.8853	mg/kg	6.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	3.6E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.02673	mg/kg	8.8E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	5.1E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0005	mg/kg	1.6E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	3.E-08	9.6E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Dieldrin	0.00889	mg/kg	2.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-06	1.7E-06	mg/kg/day	5.0E-05	mg/kg/day	3.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			1.9E-07	mg/kg/day	6.0E-03	mg/kg/day	3.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			9.6E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				gamma-Chlordane	0.008	mg/kg	2.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor	0.0005	mg/kg	1.6E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	7.E-08	9.6E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Heptachlor Epoxide	0.0011	mg/kg	3.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	2.1E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.468	mg/kg	1.5E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-06	9.0E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.2E-05	mg/kg/day	1.0E-03	mg/kg/day	1.E-02
				Chromium	0.103	mg/kg	NC		NC			2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	7.E-03
				Lead	0.464	mg/kg	1.5E-05	mg/kg/day	--			8.9E-05	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.144	mg/kg	NC		NC			2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.208	mg/kg	NC		NC			4.0E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congeners)	0.000032	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.1E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.000301	mg/kg	9.9E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	5.8E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					1.9.E+01
		EXPOSURE POINT TOTAL									2.E-03					1.9.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					1.9.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**1.9.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**5.E-03**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**1.9.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.17.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	ALLENDALE POND	INGESTION	2,3,7,8-TCDD	0.00027	mg/kg	2.2E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-06	1.3E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-06					--
			DERMAL	2,3,7,8-TCDD	0.00027	mg/kg	6.3E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-07	3.7E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-07					--
		EXPOSURE POINT TOTAL									4.E-06					0.E+00
	EXPOSURE MEDIUM TOTAL										4.E-06					0.E+00
SOIL TOTAL											**4.E-06**					**0.E+00**
SEDIMENT	SEDIMENT	ALLENDALE POND	INGESTION	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			3.2E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Acenaphthylene	0.97	mg/kg	NC		NC			2.3E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	3.4	mg/kg	1.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.1E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	4	mg/kg	1.6E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	9.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	4.4	mg/kg	1.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	3.9	mg/kg	1.6E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-08	9.3E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	1.3E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-09	7.6E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	2	mg/kg	8.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	7.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Pentachlorophenol	6.5	mg/kg	2.6E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	3.E-08	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				alpha-Chlordane	0.0113	mg/kg	4.6E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	2.7E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Aroclor-1254	2.4	mg/kg	9.8E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	5.7E-07	mg/kg/day	2.0E-05	mg/kg/day	3.E-02
				Aroclor-1260	0.2	mg/kg	8.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	4.7E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.079	mg/kg	3.2E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-09	1.9E-08	mg/kg/day	2.0E-05	mg/kg/day	9.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			3.3E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Dieldrin	0.009	mg/kg	3.7E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-09	2.1E-09	mg/kg/day	5.0E-05	mg/kg/day	4.E-05
				Endosulfan II	0.037	mg/kg	NC		NC			8.8E-09	mg/kg/day	6.0E-03	mg/kg/day	1.E-06
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			6.4E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Endrin aldehyde	0.0029	mg/kg	NC		NC			6.9E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Endrin Ketone	0.0038	mg/kg	NC		NC			9.0E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				gamma-Chlordane	0.017	mg/kg	6.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	4.0E-09	mg/kg/day	5.0E-04	mg/kg/day	8.E-06
				Technical Chlordane	0.65	mg/kg	2.6E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Antimony	4.8	mg/kg	NC		NC			1.1E-06	mg/kg/day	4.0E-04	mg/kg/day	3.E-03
				Arsenic	5.8	mg/kg	2.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Cadmium	1.2	mg/kg	NC		NC			2.8E-07	mg/kg/day	1.0E-03	mg/kg/day	3.E-04
				Chromium	238	mg/kg	NC		NC			5.7E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Lead	488	mg/kg	2.0E-05	mg/kg/day	--			1.2E-04	mg/kg/day			
				Manganese	531	mg/kg	NC		NC			1.3E-04	mg/kg/day	7.1E-02	mg/kg/day	2.E-03
				Mercury	0.97	mg/kg	NC		NC			2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Nickel	26.7	mg/kg	NC		NC			6.3E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Thallium	6.8	mg/kg	NC		NC			1.6E-06	mg/kg/day	8.0E-05	mg/kg/day	2.E-02
				Vanadium	45.9	mg/kg	NC		NC			1.1E-05	mg/kg/day	7.0E-03	mg/kg/day	2.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	2.3E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	1.4E-09	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	4.6E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-10	2.7E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-05					8.E-02
			DERMAL	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			3.0E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Acenaphthylene	0.97	mg/kg	NC		NC			2.1E-07	mg/kg/day	6.0E-02	mg/kg/day	4.E-06
				Benzo(a)anthracene	3.4	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	7.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	4	mg/kg	1.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	8.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	4.4	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	3.9	mg/kg	1.5E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-08	8.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	9.3E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-09	5.4E-07	mg/kg/day	2.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	2	mg/kg	7.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	7.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Pentachlorophenol	6.5	mg/kg	4.7E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	6.E-08	2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Phenanthrene	4.8	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.17.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				alpha-Chlordane	0.0113	mg/kg	1.3E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-11	7.7E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	2.4	mg/kg	9.8E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	5.7E-07	mg/kg/day	2.0E-05	mg/kg/day	3.E-02
				Aroclor-1260	0.2	mg/kg	8.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	4.8E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1268	0.079	mg/kg	3.2E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-09	1.9E-08	mg/kg/day	2.0E-05	mg/kg/day	9.E-04
				delta-BHC	0.0014	mg/kg	NC		NC			2.4E-10	mg/kg/day	3.0E-04	mg/kg/day	8.E-07
				Dieldrin	0.009	mg/kg	2.6E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-09	1.5E-09	mg/kg/day	5.0E-05	mg/kg/day	3.E-05
				Endosulfan II	0.037	mg/kg	NC		NC			6.3E-09	mg/kg/day	6.0E-03	mg/kg/day	1.E-06
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			4.6E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08
				Endrin aldehyde	0.0029	mg/kg	NC		NC			4.9E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Endrin Ketone	0.0038	mg/kg	NC		NC			6.4E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.017	mg/kg	2.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	1.2E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	0.65	mg/kg	7.6E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	4.4E-08	mg/kg/day	5.0E-04	mg/kg/day	9.E-05
				Antimony	4.8	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	5.8	mg/kg	5.1E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-08	3.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Cadmium	1.2	mg/kg	NC		NC			2.0E-09	mg/kg/day	2.5E-05	mg/kg/day	8.E-05
				Chromium	238	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	488	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	531	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.97	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	26.7	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	6.8	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	45.9	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	5.0E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.9E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	9.8E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-10	5.7E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					3.E-02
		EXPOSURE POINT TOTAL									5.E-05					1.E-01
	EXPOSURE MEDIUM TOTAL										5.E-05					1.E-01
SEDIMENT TOTAL											**5.E-05**					**1.E-01**
SURFACE WATER	SURFACE WATER	ALLENDALE POND	INGESTION	Tetrachloroethene	0.0007	mg/l	1.9E-08	mg/kg/day	5.4E-01	mg/kg/day	1.E-08	1.1E-07	mg/kg/day	1.0E-02	mg/kg/day	1.E-05
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	2.7E-08	mg/kg/day	1.4E-02	mg/kg/day	4.E-10	1.6E-07	mg/kg/day	2.0E-02	mg/kg/day	8.E-06
				Aldrin	0.000011	mg/l	3.0E-10	mg/kg/day	1.7E+01	mg/kg/day	5.E-09	1.7E-09	mg/kg/day	3.0E-05	mg/kg/day	6.E-05
				alpha-Chlordane	0.00000069	mg/l	1.9E-11	mg/kg/day	3.5E-01	mg/kg/day	7.E-12	1.1E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Aroclor-1254	0.0006	mg/l	1.6E-08	mg/kg/day	2.0E+00	mg/kg/day	3.E-08	9.5E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				delta-BHC	0.0000096	mg/l	NC		NC			1.5E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			6.8E-08	mg/kg/day	6.0E-03	mg/kg/day	1.E-05
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			4.4E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				gamma-Chlordane	0.000025	mg/l	6.8E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	4.0E-09	mg/kg/day	5.0E-04	mg/kg/day	8.E-06
				Arsenic	0.0044	mg/l	1.2E-07	mg/kg/day	1.5E+00	mg/kg/day	2.E-07	7.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.044	mg/l	NC		NC			7.0E-06	mg/kg/day	7.0E-02	mg/kg/day	1.E-04
				Chromium	0.018	mg/l	NC		NC			2.8E-06	mg/kg/day	3.0E-03	mg/kg/day	9.E-04
				Lead	0.021	mg/l	5.7E-07	mg/kg/day	--			3.3E-06	mg/kg/day			
				Manganese	0.98	mg/l	NC		NC			1.6E-04	mg/kg/day	2.4E-02	mg/kg/day	6.E-03
				Mercury	0.00000319	mg/l	NC		NC			5.0E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Thallium	0.0037	mg/l	NC		NC			5.9E-07	mg/kg/day	8.0E-05	mg/kg/day	7.E-03
				Nitrate	0.773	mg/l	NC		NC			1.2E-04	mg/kg/day	1.6E+00	mg/kg/day	8.E-05
				Nitrite-N	0.139	mg/l	NC		NC			2.2E-05	mg/kg/day	1.0E-01	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	3.0E-11	mg/kg/day	1.5E+05	mg/kg/day	4.E-06	1.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-06					2.E-02
			DERMAL	Tetrachloroethene	0.0007	mg/l	5.0E-07	mg/kg/day	5.4E-01	mg/kg/day	3.E-07	2.9E-06	mg/kg/day	1.0E-02	mg/kg/day	3.E-04
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	1.9E-06	mg/kg/day	1.4E-02	mg/kg/day	3.E-08	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				Aldrin	0.000011	mg/l	1.2E-09	mg/kg/day	1.7E+01	mg/kg/day	2.E-08	6.9E-09	mg/kg/day	3.0E-05	mg/kg/day	2.E-04
				alpha-Chlordane	0.00000069	mg/l	1.7E-09	mg/kg/day	3.5E-01	mg/kg/day	6.E-10	1.0E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.0006	mg/l	--		2.0E+00	mg/kg/day		--		2.0E-05	mg/kg/day	
				delta-BHC	0.0000096	mg/l	NC		NC			2.6E-08	mg/kg/day	3.0E-04	mg/kg/day	9.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.17.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.4E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				gamma-Chlordane	0.000025	mg/l	6.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	3.7E-07	mg/kg/day	5.0E-04	mg/kg/day	7.E-04
				Arsenic	0.0044	mg/l	3.4E-08	mg/kg/day	1.5E+00	mg/kg/day	5.E-08	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Barium	0.044	mg/l	NC		NC			2.0E-06	mg/kg/day	4.9E-03	mg/kg/day	4.E-04
				Chromium	0.018	mg/l	NC		NC			1.6E-06	mg/kg/day	7.5E-05	mg/kg/day	2.E-02
				Lead	0.021	mg/l	--		--			--				
				Manganese	0.98	mg/l	NC		NC			4.4E-05	mg/kg/day	9.6E-04	mg/kg/day	5.E-02
				Mercury	0.00000319	mg/l	NC		NC			1.4E-10	mg/kg/day	2.1E-05	mg/kg/day	7.E-06
				Thallium	0.0037	mg/l	NC		NC			1.7E-07	mg/kg/day	8.0E-05	mg/kg/day	2.E-03
				Nitrate	0.773	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.139	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	2.7E-08	mg/kg/day	1.5E+05	mg/kg/day	4.E-03	1.6E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-03					7.E-02
		EXPOSURE POINT TOTAL									4.E-03					9.E-02
	EXPOSURE MEDIUM TOTAL										4.E-03					9.E-02
SURFACE WATER TOTAL											**4.E-03**					**9.E-02**
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			4.0E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)anthracene	0.0014	mg/kg	4.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.8E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(a)pyrene	0.0015	mg/kg	5.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	5.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			1.3E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	2.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.0128	mg/kg	4.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				4,4'-DDE	0.0249	mg/kg	8.5E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	4.9E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.7E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	9.E-08	1.6E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				alpha-Chlordane	0.0214	mg/kg	7.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-07	4.2E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	1.8853	mg/kg	6.4E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	3.7E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.02673	mg/kg	9.1E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	5.3E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0005	mg/kg	1.7E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	3.E-08	9.9E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Dieldrin	0.00889	mg/kg	3.0E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-06	1.8E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			2.0E-07	mg/kg/day	6.0E-03	mg/kg/day	3.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			9.9E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				gamma-Chlordane	0.008	mg/kg	2.7E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	1.6E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor	0.0005	mg/kg	1.7E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	8.E-08	9.9E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Heptachlor Epoxide	0.0011	mg/kg	3.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	2.2E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	0.468	mg/kg	1.6E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-06	9.3E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.3E-05	mg/kg/day	1.0E-03	mg/kg/day	1.E-02
				Chromium	0.103	mg/kg	NC		NC			2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	7.E-03
				Lead	0.464	mg/kg	1.6E-05	mg/kg/day	--			9.2E-05	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.144	mg/kg	NC		NC			2.9E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.208	mg/kg	NC		NC			4.1E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congeners)	0.000032	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.3E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.000301	mg/kg	1.0E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	6.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.0.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.0.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.0.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**2.0.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**6.E-03**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**2.0.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.18.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	ALLENDALE POND	INGESTION	2,3,7,8-TCDD	0.00027	mg/kg	6.6E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	7.7E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					--
			DERMAL	2,3,7,8-TCDD	0.00027	mg/kg	5.5E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-07	6.5E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								8.E-07					--
		EXPOSURE POINT TOTAL									1.E-05					0.E+00
	EXPOSURE MEDIUM TOTAL										1.E-05					0.E+00
SOIL TOTAL											**1.E-05**					**0.E+00**
SEDIMENT	SEDIMENT	ALLENDALE POND	INGESTION	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			2.6E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Acenaphthylene	0.97	mg/kg	NC		NC			1.8E-06	mg/kg/day	6.0E-02	mg/kg/day	3.E-05
				Benzo(a)anthracene	3.4	mg/kg	5.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	6.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	4	mg/kg	6.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-06	7.6E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(b)fluoranthene	4.4	mg/kg	7.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-07	8.4E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			3.8E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(k)fluoranthene	3.9	mg/kg	6.3E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	5.E-08	7.4E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	5.2E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	7.E-09	6.1E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Dibenzo(a,h)anthracene	2	mg/kg	3.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	3.8E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	5.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	6.1E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Pentachlorophenol	6.5	mg/kg	1.1E-06	mg/kg/day	1.2E-01	(mg/kg/day)-1	1.E-07	1.2E-05	mg/kg/day	3.0E-02	mg/kg/day	4.E-04
				Phenanthrene	4.8	mg/kg	NC		NC			9.1E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				alpha-Chlordane	0.0113	mg/kg	1.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-10	2.1E-08	mg/kg/day	5.0E-04	mg/kg/day	4.E-05
				Aroclor-1254	2.4	mg/kg	3.9E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-07	4.6E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				Aroclor-1260	0.2	mg/kg	3.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-08	3.8E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Aroclor-1268	0.079	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	1.5E-07	mg/kg/day	2.0E-05	mg/kg/day	8.E-03
				delta-BHC	0.0014	mg/kg	NC		NC			2.7E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06
				Dieldrin	0.009	mg/kg	1.5E-09	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-08	1.7E-08	mg/kg/day	5.0E-05	mg/kg/day	3.E-04
				Endosulfan II	0.037	mg/kg	NC		NC			7.0E-08	mg/kg/day	6.0E-03	mg/kg/day	1.E-05
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			5.1E-09	mg/kg/day	6.0E-03	mg/kg/day	9.E-07
				Endrin aldehyde	0.0029	mg/kg	NC		NC			5.5E-09	mg/kg/day	3.0E-04	mg/kg/day	2.E-05
				Endrin Ketone	0.0038	mg/kg	NC		NC			7.2E-09	mg/kg/day	3.0E-04	mg/kg/day	2.E-05
				gamma-Chlordane	0.017	mg/kg	2.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-09	3.2E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Technical Chlordane	0.65	mg/kg	1.1E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-08	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Antimony	4.8	mg/kg	NC		NC			9.1E-06	mg/kg/day	4.0E-04	mg/kg/day	2.E-02
				Arsenic	5.8	mg/kg	9.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	1.1E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Cadmium	1.2	mg/kg	NC		NC			2.3E-06	mg/kg/day	1.0E-03	mg/kg/day	2.E-03
				Chromium	238	mg/kg	NC		NC			4.5E-04	mg/kg/day	3.0E-03	mg/kg/day	2.E-01
				Lead	488	mg/kg	7.9E-05	mg/kg/day	--			9.3E-04	mg/kg/day			
				Manganese	531	mg/kg	NC		NC			1.0E-03	mg/kg/day	7.1E-02	mg/kg/day	1.E-02
				Mercury	0.97	mg/kg	NC		NC			1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.E-03
				Nickel	26.7	mg/kg	NC		NC			5.1E-05	mg/kg/day	2.0E-02	mg/kg/day	3.E-03
				Thallium	6.8	mg/kg	NC		NC			1.3E-05	mg/kg/day	8.0E-05	mg/kg/day	2.E-01
				Vanadium	45.9	mg/kg	NC		NC			8.7E-05	mg/kg/day	7.0E-03	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	9.3E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	1.1E-08	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	1.8E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-09	2.1E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					7.E-01
			DERMAL	2-Methylnaphthalene	0.13608	mg/kg	NC		NC			9.4E-08	mg/kg/day	2.0E-02	mg/kg/day	5.E-06
				Acenaphthylene	0.97	mg/kg	NC		NC			6.7E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	3.4	mg/kg	2.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				Benzo(a)pyrene	4	mg/kg	2.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Benzo(b)fluoranthene	4.4	mg/kg	2.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	3.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(g,h,i)perylene	2	mg/kg	NC		NC			1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(k)fluoranthene	3.9	mg/kg	2.3E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-08	2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				bis(2-Ethylhexyl)phthalate	3.2	mg/kg	1.5E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-09	1.7E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Dibenzo(a,h)anthracene	2	mg/kg	1.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-07	1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Indeno(1,2,3-cd)pyrene	3.2	mg/kg	1.9E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	2.2E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Pentachlorophenol	6.5	mg/kg	7.4E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	9.E-08	8.6E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Phenanthrene	4.8	mg/kg	NC		NC			3.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04

US EPA ARCHIVE DOCUMENT

TABLE 7.18.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				alpha-Chlordane	0.0113	mg/kg	2.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	2.4E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Aroclor-1254	2.4	mg/kg	1.5E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-07	1.8E-06	mg/kg/day	2.0E-05	mg/kg/day	9.E-02
				Aroclor-1260	0.2	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	1.5E-07	mg/kg/day	2.0E-05	mg/kg/day	7.E-03
				Aroclor-1268	0.079	mg/kg	5.0E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	5.9E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				delta-BHC	0.0014	mg/kg	NC		NC			7.4E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Dieldrin	0.009	mg/kg	4.1E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-09	4.8E-09	mg/kg/day	5.0E-05	mg/kg/day	1.E-04
				Endosulfan II	0.037	mg/kg	NC		NC			2.0E-08	mg/kg/day	6.0E-03	mg/kg/day	3.E-06
				Endosulfan sulfate	0.0027	mg/kg	NC		NC			1.4E-09	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Endrin aldehyde	0.0029	mg/kg	NC		NC			1.5E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				Endrin Ketone	0.0038	mg/kg	NC		NC			2.0E-09	mg/kg/day	3.0E-04	mg/kg/day	7.E-06
				gamma-Chlordane	0.017	mg/kg	3.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	3.6E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Technical Chlordane	0.65	mg/kg	1.2E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-09	1.4E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Antimony	4.8	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	5.8	mg/kg	7.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	9.3E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	1.2	mg/kg	NC		NC			6.4E-09	mg/kg/day	2.5E-05	mg/kg/day	3.E-04
				Chromium	238	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	488	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	531	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.97	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	26.7	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	6.8	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	45.9	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0057	mg/kg	7.8E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	9.1E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.000000112	mg/kg	1.5E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-10	1.8E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					1.E-01
		EXPOSURE POINT TOTAL									2.E-04					8.E-01
	EXPOSURE MEDIUM TOTAL										2.E-04					8.E-01
SEDIMENT TOTAL											**2.E-04**					**8.E-01**
SURFACE WATER	SURFACE WATER	ALLENDALE POND	INGESTION	Tetrachloroethene	0.0007	mg/l	2.8E-08	mg/kg/day	5.4E-01	mg/kg/day	2.E-08	3.3E-07	mg/kg/day	1.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	4.1E-08	mg/kg/day	1.4E-02	mg/kg/day	6.E-10	4.7E-07	mg/kg/day	2.0E-02	mg/kg/day	2.E-05
				Aldrin	0.000011	mg/l	4.5E-10	mg/kg/day	1.7E+01	mg/kg/day	8.E-09	5.2E-09	mg/kg/day	3.0E-05	mg/kg/day	2.E-04
				alpha-Chlordane	0.00000069	mg/l	2.8E-11	mg/kg/day	3.5E-01	mg/kg/day	1.E-11	3.3E-10	mg/kg/day	5.0E-04	mg/kg/day	7.E-07
				Aroclor-1254	0.0006	mg/l	2.4E-08	mg/kg/day	2.0E+00	mg/kg/day	5.E-08	2.8E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				delta-BHC	0.0000096	mg/l	NC		NC			4.6E-09	mg/kg/day	3.0E-04	mg/kg/day	2.E-05
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			2.0E-07	mg/kg/day	6.0E-03	mg/kg/day	3.E-05
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			1.3E-09	mg/kg/day	3.0E-04	mg/kg/day	4.E-06
				gamma-Chlordane	0.000025	mg/l	1.0E-09	mg/kg/day	3.5E-01	mg/kg/day	4.E-10	1.2E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Arsenic	0.0044	mg/l	1.8E-07	mg/kg/day	1.5E+00	mg/kg/day	3.E-07	2.1E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Barium	0.044	mg/l	NC		NC			2.1E-05	mg/kg/day	7.0E-02	mg/kg/day	3.E-04
				Chromium	0.018	mg/l	NC		NC			8.5E-06	mg/kg/day	3.0E-03	mg/kg/day	3.E-03
				Lead	0.021	mg/l	8.5E-07	mg/kg/day	--			1.0E-05	mg/kg/day			
				Manganese	0.98	mg/l	NC		NC			4.7E-04	mg/kg/day	2.4E-02	mg/kg/day	2.E-02
				Mercury	0.00000319	mg/l	NC		NC			1.5E-09	mg/kg/day	3.0E-04	mg/kg/day	5.E-06
				Thallium	0.0037	mg/l	NC		NC			1.8E-06	mg/kg/day	8.0E-05	mg/kg/day	2.E-02
				Nitrate	0.773	mg/l	NC		NC			3.7E-04	mg/kg/day	1.6E+00	mg/kg/day	2.E-04
				Nitrite-N	0.139	mg/l	NC		NC			6.6E-05	mg/kg/day	1.0E-01	mg/kg/day	7.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	4.5E-11	mg/kg/day	1.5E+05	mg/kg/day	7.E-06	5.2E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-06					7.E-02
			DERMAL	Tetrachloroethene	0.0007	mg/l	1.4E-07	mg/kg/day	5.4E-01	mg/kg/day	8.E-08	1.6E-06	mg/kg/day	1.0E-02	mg/kg/day	2.E-04
				bis(2-Ethylhexyl)phthalate	0.001	mg/l	5.3E-07	mg/kg/day	1.4E-02	mg/kg/day	7.E-09	6.2E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Aldrin	0.000011	mg/l	3.4E-10	mg/kg/day	1.7E+01	mg/kg/day	6.E-09	3.9E-09	mg/kg/day	3.0E-05	mg/kg/day	1.E-04
				alpha-Chlordane	0.00000069	mg/l	4.9E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	5.7E-09	mg/kg/day	5.0E-04	mg/kg/day	1.E-05
				Aroclor-1254	0.0006	mg/l	--		2.0E+00	mg/kg/day		--		2.0E-05	mg/kg/day	
				delta-BHC	0.0000096	mg/l	NC		NC			1.5E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.18.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - ALLENDALE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Endosulfan Sulfate	0.00043	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.0000028	mg/l	NC		NC			7.9E-09	mg/kg/day	3.0E-04	mg/kg/day	3.E-05
				gamma-Chlordane	0.000025	mg/l	1.8E-08	mg/kg/day	3.5E-01	mg/kg/day	6.E-09	2.1E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Arsenic	0.0044	mg/l	9.6E-09	mg/kg/day	1.5E+00	mg/kg/day	1.E-08	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Barium	0.044	mg/l	NC		NC			1.1E-06	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.018	mg/l	NC		NC			9.2E-07	mg/kg/day	7.5E-05	mg/kg/day	1.E-02
				Lead	0.021	mg/l	--		--			--				
				Manganese	0.98	mg/l	NC		NC			2.5E-05	mg/kg/day	9.6E-04	mg/kg/day	3.E-02
				Mercury	0.00000319	mg/l	NC		NC			8.1E-11	mg/kg/day	2.1E-05	mg/kg/day	4.E-06
				Thallium	0.0037	mg/l	NC		NC			9.4E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.773	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.139	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.0000011	mg/l	7.7E-09	mg/kg/day	1.5E+05	mg/kg/day	1.E-03	9.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-03					4.E-02
		EXPOSURE POINT TOTAL									1.E-03					1.E-01
	EXPOSURE MEDIUM TOTAL										1.E-03					1.E-01
SURFACE WATER TOTAL											**1.E-03**					**1.E-01**
BIOTA	COMBINED FISH DIET	ALLENDALE POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			6.0E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	0.0014	mg/kg	3.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	0.0015	mg/kg	3.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	4.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.0016	mg/kg	4.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00065	mg/kg	NC		NC			2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Dibenzo(a,h)anthracene	0.00053	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.00073	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Phenanthrene	0.00975	mg/kg	NC		NC			2.9E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4'-DDD	0.0128	mg/kg	3.3E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	8.E-08	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				4,4'-DDE	0.0249	mg/kg	6.4E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	7.5E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDT	0.00789	mg/kg	2.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	7.E-08	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.0214	mg/kg	5.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	6.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	1.8853	mg/kg	4.9E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	5.7E-04	mg/kg/day	2.0E-05	mg/kg/day	3.E+01
				Aroclor-1268	0.02673	mg/kg	6.9E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	8.0E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				beta-BHC	0.0005	mg/kg	1.3E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.00889	mg/kg	2.3E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-06	2.7E-06	mg/kg/day	5.0E-05	mg/kg/day	5.E-02
				Endosulfan Sulfate	0.001	mg/kg	NC		NC			3.0E-07	mg/kg/day	6.0E-03	mg/kg/day	5.E-05
				Endrin Aldehyde	0.0005	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				gamma-Chlordane	0.008	mg/kg	2.1E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-08	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor	0.0005	mg/kg	1.3E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	6.E-08	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Heptachlor Epoxide	0.0011	mg/kg	2.8E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	3.3E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.468	mg/kg	1.2E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-06	1.4E-04	mg/kg/day	5.0E-04	mg/kg/day	3.E-01
				Cadmium	0.0644	mg/kg	NC		NC			1.9E-05	mg/kg/day	1.0E-03	mg/kg/day	2.E-02
				Chromium	0.103	mg/kg	NC		NC			3.1E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.464	mg/kg	1.2E-05	mg/kg/day	--			1.4E-04	mg/kg/day			
				Manganese	6.7	mg/kg	NC		NC			2.0E-03	mg/kg/day	1.4E-01	mg/kg/day	1.E-02
				Mercury	0.144	mg/kg	NC		NC			4.3E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.208	mg/kg	NC		NC			6.2E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Toxicity Equivalency (PCB Congeners)	0.000032	mg/kg	8.2E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	9.6E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.000301	mg/kg	7.8E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	9.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-03					3.0.E+01
		EXPOSURE POINT TOTAL									1.E-03					3.0.E+01
	EXPOSURE MEDIUM TOTAL										1.E-03					3.0.E+01
COMBINED FISH DIET TOTAL											**1.E-03**					**3.0.E+01**
									TOTAL RECEPTOR RISK ACROSS ALL MEDIA		**3.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**3.1.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.19.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	LYMAN MILL POND	INGESTION	2-Methylnaphthalene	0.1	mg/kg	NC		NC			2.5E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			3.3E-08	mg/kg/day	5.0E-03	mg/kg/day	7.E-06
				4-Nitrophenol	2.2	mg/kg	NC		NC			5.6E-08	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			1.1E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	2.8	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	7.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	2.9	mg/kg	1.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-08	7.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	4.5	mg/kg	2.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			7.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(k)fluoranthene	2.1	mg/kg	9.2E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	7.E-10	5.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	2.3E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-10	1.3E-07	mg/kg/day	2.0E-02	mg/kg/day	7.E-06
				Dibenzo(a,h)anthracene	1.0694	mg/kg	4.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.7E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	6.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				N-Nitroso-di-n-propylamine	1.3	mg/kg	5.7E-09	mg/kg/day	7.0E+00	(mg/kg/day)-1	4.E-08	3.3E-08	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	6.1E-09	mg/kg/day	1.2E-01	(mg/kg/day)-1	7.E-10	3.6E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			7.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.032	mg/kg	1.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-11	8.1E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Aroclor-1254	0.49	mg/kg	2.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	1.2E-08	mg/kg/day	2.0E-05	mg/kg/day	6.E-04
				Aroclor-1260	0.027	mg/kg	1.2E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-10	6.9E-10	mg/kg/day	2.0E-05	mg/kg/day	3.E-05
				Aroclor-1268	0.31379	mg/kg	1.4E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	8.0E-09	mg/kg/day	2.0E-05	mg/kg/day	4.E-04
				Dieldrin	0.0044	mg/kg	1.9E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-10	1.1E-10	mg/kg/day	5.0E-05	mg/kg/day	2.E-06
				Endosulfan II	0.005	mg/kg	NC		NC			1.3E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-08
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			7.4E-11	mg/kg/day	6.0E-03	mg/kg/day	1.E-08
				gamma-Chlordane	0.015	mg/kg	6.5E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.8E-10	mg/kg/day	5.0E-04	mg/kg/day	8.E-07
				Technical Chlordane	2.21273	mg/kg	9.7E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	5.6E-08	mg/kg/day	5.0E-04	mg/kg/day	1.E-04
				Antimony	3.1	mg/kg	NC		NC			7.9E-08	mg/kg/day	4.0E-04	mg/kg/day	2.E-04
				Arsenic	6.4	mg/kg	2.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	2.1	mg/kg	NC		NC			5.3E-08	mg/kg/day	1.0E-03	mg/kg/day	5.E-05
				Chromium	200	mg/kg	NC		NC			5.1E-06	mg/kg/day	3.0E-03	mg/kg/day	2.E-03
				Lead	375	mg/kg	1.6E-06	mg/kg/day	--			9.5E-06	mg/kg/day			
				Manganese	843	mg/kg	NC		NC			2.1E-05	mg/kg/day	7.1E-02	mg/kg/day	3.E-04
				Mercury	0.62	mg/kg	NC		NC			1.6E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				Nickel	69.2	mg/kg	NC		NC			1.8E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Thallium	0.58	mg/kg	NC		NC			1.5E-08	mg/kg/day	8.0E-05	mg/kg/day	2.E-04
				Vanadium	42.4	mg/kg	NC		NC			1.1E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	3.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-06	2.0E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	2.8E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-08	1.7E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					4.E-03
			DERMAL	2-Methylnaphthalene	0.1	mg/kg	NC		NC			2.3E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			2.3E-08	mg/kg/day	5.0E-03	mg/kg/day	5.E-06
				4-Nitrophenol	2.2	mg/kg	NC		NC			3.8E-08	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			9.6E-09	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	2.8	mg/kg	1.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	2.9	mg/kg	1.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-08	6.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	4.5	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			6.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	2.1	mg/kg	8.1E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-10	4.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	1.5E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	9.0E-08	mg/kg/day	2.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	1.0694	mg/kg	4.1E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.4E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				N-Nitroso-di-n-propylamine	1.3	mg/kg	3.9E-09	mg/kg/day	7.0E+00	(mg/kg/day)-1	3.E-08	2.3E-08	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	1.0E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	1.E-09	6.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			6.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.032	mg/kg	3.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.2E-10	mg/kg/day	5.0E-04	mg/kg/day	4.E-07
				Aroclor-1254	0.49	mg/kg	2.0E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	1.2E-08	mg/kg/day	2.0E-05	mg/kg/day	6.E-04
				Aroclor-1260	0.027	mg/kg	1.1E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-10	6.5E-10	mg/kg/day	2.0E-05	mg/kg/day	3.E-05
				Aroclor-1268	0.31379	mg/kg	1.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	7.6E-09	mg/kg/day	2.0E-05	mg/kg/day	4.E-04
				Dieldrin	0.0044	mg/kg	1.3E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-10	7.6E-11	mg/kg/day	5.0E-05	mg/kg/day	2.E-06
				Endosulfan II	0.005	mg/kg	NC		NC			8.7E-11	mg/kg/day	6.0E-03	mg/kg/day	1.E-08
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			5.0E-11	mg/kg/day	6.0E-03	mg/kg/day	8.E-09
				gamma-Chlordane	0.015	mg/kg	1.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-12	1.0E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Technical Chlordane	2.21273	mg/kg	2.6E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-10	1.5E-08	mg/kg/day	5.0E-04	mg/kg/day	3.E-05
				Antimony	3.1	mg/kg	NC		NC					6.0E-05	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.19.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Arsenic	6.4	mg/kg	5.7E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-09	3.3E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Cadmium	2.1	mg/kg	NC		NC			3.6E-10	mg/kg/day	2.5E-05	mg/kg/day	1.E-05
				Chromium	200	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	375	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	843	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.62	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	69.2	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	0.58	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	42.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	7.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-06	4.2E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	5.8E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-09	3.4E-13	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					1.E-03
		EXPOSURE POINT TOTAL									7.E-06					6.E-03
	EXPOSURE MEDIUM TOTAL										7.E-06					6.E-03
SEDIMENT TOTAL											**7.E-06**					**6.E-03**
SURFACE WATER	SURFACE WATER	LYMAN MILL POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			3.4E-12	mg/kg/day	6.0E-02	mg/kg/day	6.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	7.4E-09	mg/kg/day	1.4E-02	mg/kg/day	1.E-10	4.3E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Aldrin	0.000023	mg/l	1.0E-11	mg/kg/day	1.7E+01	mg/kg/day	2.E-10	5.9E-11	mg/kg/day	3.0E-05	mg/kg/day	2.E-06
				alpha-Chlordane	0.000019	mg/l	8.3E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	4.8E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			8.1E-12	mg/kg/day	6.0E-03	mg/kg/day	1.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.3E-11	mg/kg/day	3.0E-04	mg/kg/day	4.E-08
				gamma-Chlordane	0.000021	mg/l	9.2E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	5.3E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Arsenic	0.0046	mg/l	2.0E-09	mg/kg/day	1.5E+00	mg/kg/day	3.E-09	1.2E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Barium	0.021	mg/l	NC		NC			5.3E-08	mg/kg/day	7.0E-02	mg/kg/day	8.E-07
				Chromium	0.0023	mg/l	NC		NC			5.9E-09	mg/kg/day	3.0E-03	mg/kg/day	2.E-06
				Lead	0.0044	mg/l	1.9E-09	mg/kg/day	--			1.1E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			3.3E-07	mg/kg/day	2.4E-02	mg/kg/day	1.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.0E-11	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Thallium	0.0022	mg/l	NC		NC			5.6E-09	mg/kg/day	8.0E-05	mg/kg/day	7.E-05
				Nitrate	0.765	mg/l	NC		NC			1.9E-06	mg/kg/day	1.6E+00	mg/kg/day	1.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			2.2E-07	mg/kg/day	1.0E-01	mg/kg/day	2.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.8E-13	mg/kg/day	1.5E+05	mg/kg/day	6.E-08	2.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-08					1.E-04
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.1E-06	mg/kg/day	1.4E-02	mg/kg/day	4.E-08	1.8E-05	mg/kg/day	2.0E-02	mg/kg/day	9.E-04
				Aldrin	0.000023	mg/l	2.4E-10	mg/kg/day	1.7E+01	mg/kg/day	4.E-09	1.4E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	4.7E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	2.7E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	5.2E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.0E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Arsenic	0.0046	mg/l	3.5E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Barium	0.021	mg/l	NC		NC			9.3E-08	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.0E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-07	mg/kg/day	9.6E-04	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			1.7E-11	mg/kg/day	2.1E-05	mg/kg/day	8.E-07
				Thallium	0.0022	mg/l	NC		NC			9.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-09	mg/kg/day	1.5E+05	mg/kg/day	3.E-04	1.2E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-04					2.E-03
		EXPOSURE POINT TOTAL									3.E-04					2.E-03
	EXPOSURE MEDIUM TOTAL										3.E-04					2.E-03
SURFACE WATER TOTAL											**3.E-04**					**2.E-03**

US EPA ARCHIVE DOCUMENT

TABLE 7.19.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.00443	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	9.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			8.2E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	3.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				4,4'-DDD	0.027	mg/kg	8.9E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	5.2E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDE	0.08941	mg/kg	2.9E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-06	1.7E-05	mg/kg/day	5.0E-04	mg/kg/day	3.E-02
				4,4'-DDT	0.003	mg/kg	9.9E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.8E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.02	mg/kg	6.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	2.13	mg/kg	7.0E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	4.1E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.0215	mg/kg	7.1E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	4.1E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				beta-BHC	0.0008	mg/kg	2.6E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	5.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.0057	mg/kg	1.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-06	1.1E-06	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.013	mg/kg	4.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor Epoxide	0.0014	mg/kg	4.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	4.E-07	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	1.02	mg/kg	3.4E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-05	2.0E-04	mg/kg/day	5.0E-04	mg/kg/day	4.E-01
				Arsenic	0.024	mg/kg	7.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			3.3E-06	mg/kg/day	1.0E-03	mg/kg/day	3.E-03
				Chromium	0.197	mg/kg	NC		NC			3.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.33	mg/kg	1.1E-05	mg/kg/day	--			6.3E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			8.3E-04	mg/kg/day	1.4E-01	mg/kg/day	6.E-03
				Mercury	0.141	mg/kg	NC		NC			2.7E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.127	mg/kg	NC		NC			2.4E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.3E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	7.8E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	1.2E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	7.1E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.1.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.1.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.1.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**2.1.E+01**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**2.2.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.20.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	LYMAN MILL POND	INGESTION	2-Methylnaphthalene	0.1	mg/kg	NC		NC			4.0E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			5.1E-08	mg/kg/day	5.0E-03	mg/kg/day	1.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			8.7E-08	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			1.7E-08	mg/kg/day	6.0E-02	mg/kg/day	3.E-07
				Benzo(a)anthracene	2.8	mg/kg	1.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(a)pyrene	2.9	mg/kg	2.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(b)fluoranthene	4.5	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(k)fluoranthene	2.1	mg/kg	1.4E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	8.3E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	3.5E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	5.E-10	2.1E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	7.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	4.2E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				N-Nitroso-di-n-propylamine	1.3	mg/kg	8.8E-09	mg/kg/day	7.0E+00	(mg/kg/day)-1	6.E-08	5.1E-08	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	9.5E-09	mg/kg/day	1.2E-01	(mg/kg/day)-1	1.E-09	5.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.032	mg/kg	2.2E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-11	1.3E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	0.49	mg/kg	3.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-09	1.9E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor-1260	0.027	mg/kg	1.8E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-10	1.1E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-05
				Aroclor-1268	0.31379	mg/kg	2.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	1.2E-08	mg/kg/day	2.0E-05	mg/kg/day	6.E-04
				Dieldrin	0.0044	mg/kg	3.0E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-10	1.7E-10	mg/kg/day	5.0E-05	mg/kg/day	3.E-06
				Endosulfan II	0.005	mg/kg	NC		NC			2.0E-10	mg/kg/day	6.0E-03	mg/kg/day	3.E-08
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			1.1E-10	mg/kg/day	6.0E-03	mg/kg/day	2.E-08
				gamma-Chlordane	0.015	mg/kg	1.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	5.9E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				Technical Chlordane	2.21273	mg/kg	1.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-09	8.8E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-04
				Antimony	3.1	mg/kg	NC		NC			1.2E-07	mg/kg/day	4.0E-04	mg/kg/day	3.E-04
				Arsenic	6.4	mg/kg	4.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	7.E-08	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Cadmium	2.1	mg/kg	NC		NC			8.3E-08	mg/kg/day	1.0E-03	mg/kg/day	8.E-05
				Chromium	200	mg/kg	NC		NC			7.9E-06	mg/kg/day	3.0E-03	mg/kg/day	3.E-03
				Lead	375	mg/kg	2.5E-06	mg/kg/day	--			1.5E-05	mg/kg/day			
				Manganese	843	mg/kg	NC		NC			3.3E-05	mg/kg/day	7.1E-02	mg/kg/day	5.E-04
				Mercury	0.62	mg/kg	NC		NC			2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Nickel	69.2	mg/kg	NC		NC			2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				Thallium	0.58	mg/kg	NC		NC			2.3E-08	mg/kg/day	8.0E-05	mg/kg/day	3.E-04
				Vanadium	42.4	mg/kg	NC		NC			1.7E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	5.4E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-06	3.2E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	4.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-08	2.6E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-06					7.E-03
			DERMAL	2-Methylnaphthalene	0.1	mg/kg	NC		NC			7.4E-09	mg/kg/day	2.0E-02	mg/kg/day	4.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			7.4E-08	mg/kg/day	5.0E-03	mg/kg/day	1.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			1.2E-07	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			3.2E-08	mg/kg/day	6.0E-02	mg/kg/day	5.E-07
				Benzo(a)anthracene	2.8	mg/kg	3.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	2.9	mg/kg	3.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	4.5	mg/kg	5.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(k)fluoranthene	2.1	mg/kg	2.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-09	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	5.0E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	7.E-10	2.9E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	1.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	3.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				N-Nitroso-di-n-propylamine	1.3	mg/kg	1.3E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	9.E-08	7.4E-08	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	3.4E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	4.E-09	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				alpha-Chlordane	0.032	mg/kg	1.2E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	7.2E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				Aroclor-1254	0.49	mg/kg	6.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.9E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1260	0.027	mg/kg	3.7E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-10	2.1E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				Aroclor-1268	0.31379	mg/kg	4.3E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-09	2.5E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Dieldrin	0.0044	mg/kg	4.3E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	7.E-10	2.5E-10	mg/kg/day	5.0E-05	mg/kg/day	5.E-06
				Endosulfan II	0.005	mg/kg	NC		NC			2.8E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			1.6E-10	mg/kg/day	6.0E-03	mg/kg/day	3.E-08
				gamma-Chlordane	0.015	mg/kg	5.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.4E-10	mg/kg/day	5.0E-04	mg/kg/day	7.E-07
				Technical Chlordane	2.21273	mg/kg	8.6E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	5.0E-08	mg/kg/day	5.0E-04	mg/kg/day	1.E-04
				Antimony	3.1	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	6.4	mg/kg	1.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-08	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Cadmium	2.1	mg/kg	NC		NC			1.2E-09	mg/kg/day	2.5E-05	mg/kg/day	5.E-05

US EPA ARCHIVE DOCUMENT

TABLE 7.20.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Chromium	200	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	375	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	843	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.62	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	69.2	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	0.58	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	42.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	2.3E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-06	1.4E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	1.9E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	1.1E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					4.E-03
		EXPOSURE POINT TOTAL									1.E-05					1.E-02
	EXPOSURE MEDIUM TOTAL										1.E-05					1.E-02
SEDIMENT TOTAL											**1.E-05**					**1.E-02**
SURFACE WATER	SURFACE WATER	LYMAN MILL POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			5.2E-12	mg/kg/day	6.0E-02	mg/kg/day	9.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	1.2E-08	mg/kg/day	1.4E-02	mg/kg/day	2.E-10	6.7E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Aldrin	0.000023	mg/l	1.6E-11	mg/kg/day	1.7E+01	mg/kg/day	3.E-10	9.1E-11	mg/kg/day	3.0E-05	mg/kg/day	3.E-06
				alpha-Chlordane	0.000019	mg/l	1.3E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	7.5E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.3E-11	mg/kg/day	6.0E-03	mg/kg/day	2.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-11	mg/kg/day	3.0E-04	mg/kg/day	7.E-08
				gamma-Chlordane	0.000021	mg/l	1.4E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	8.3E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.0046	mg/l	3.1E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	1.8E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Barium	0.021	mg/l	NC		NC			8.3E-08	mg/kg/day	7.0E-02	mg/kg/day	1.E-06
				Chromium	0.0023	mg/l	NC		NC			9.1E-09	mg/kg/day	3.0E-03	mg/kg/day	3.E-06
				Lead	0.0044	mg/l	3.0E-09	mg/kg/day	--			1.7E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			5.1E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.6E-11	mg/kg/day	3.0E-04	mg/kg/day	5.E-08
				Thallium	0.0022	mg/l	NC		NC			8.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			3.0E-06	mg/kg/day	1.6E+00	mg/kg/day	2.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			3.4E-07	mg/kg/day	1.0E-01	mg/kg/day	3.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	5.8E-13	mg/kg/day	1.5E+05	mg/kg/day	9.E-08	3.4E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-08					2.E-04
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.5E-06	mg/kg/day	1.4E-02	mg/kg/day	5.E-08	2.0E-05	mg/kg/day	2.0E-02	mg/kg/day	1.E-03
				Aldrin	0.000023	mg/l	2.7E-10	mg/kg/day	1.7E+01	mg/kg/day	5.E-09	1.6E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	5.3E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.1E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.7E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06
				gamma-Chlordane	0.000021	mg/l	5.8E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.4E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Arsenic	0.0046	mg/l	3.9E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.3E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Barium	0.021	mg/l	NC		NC			1.0E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			6.4E-07	mg/kg/day	9.6E-04	mg/kg/day	7.E-04
				Mercury	0.00000394	mg/l	NC		NC			2.0E-11	mg/kg/day	2.1E-05	mg/kg/day	9.E-07
				Thallium	0.0022	mg/l	NC		NC			1.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-09	mg/kg/day	1.5E+05	mg/kg/day	4.E-04	1.4E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					2.E-03
		EXPOSURE POINT TOTAL									4.E-04					3.E-03
	EXPOSURE MEDIUM TOTAL										4.E-04					3.E-03
SURFACE WATER TOTAL											**4.E-04**					**3.E-03**

US EPA ARCHIVE DOCUMENT

TABLE 7.20.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			4.0E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)anthracene	0.00443	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.9E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			8.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	4.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				4,4'-DDD	0.027	mg/kg	9.2E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	5.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDE	0.08941	mg/kg	3.0E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-06	1.8E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				4,4'-DDT	0.003	mg/kg	1.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.9E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.02	mg/kg	6.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	4.0E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	2.13	mg/kg	7.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	4.2E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.0215	mg/kg	7.3E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	4.3E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				beta-BHC	0.0008	mg/kg	2.7E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	5.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.0057	mg/kg	1.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-06	1.1E-06	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.013	mg/kg	4.4E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.6E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor Epoxide	0.0014	mg/kg	4.8E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	4.E-07	2.8E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	1.02	mg/kg	3.5E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-05	2.0E-04	mg/kg/day	5.0E-04	mg/kg/day	4.E-01
				Arsenic	0.024	mg/kg	8.2E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	4.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			3.4E-06	mg/kg/day	1.0E-03	mg/kg/day	3.E-03
				Chromium	0.197	mg/kg	NC		NC			3.9E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.33	mg/kg	1.1E-05	mg/kg/day	--			6.5E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			8.5E-04	mg/kg/day	1.4E-01	mg/kg/day	6.E-03
				Mercury	0.141	mg/kg	NC		NC			2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.127	mg/kg	NC		NC			2.5E-05	mg/kg/day	1.0E-04	mg/kg/day	3.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.4E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	8.0E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	1.3E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	7.3E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.2.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.2.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.2.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**2.2.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-03**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**2.2.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.21.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			6.0E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	0.00443	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	7.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	9.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	3.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	3.6E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			4.2E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4'-DDD	0.027	mg/kg	7.0E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	8.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.08941	mg/kg	2.3E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	8.E-07	2.7E-05	mg/kg/day	5.0E-04	mg/kg/day	5.E-02
				4,4'-DDT	0.003	mg/kg	7.7E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	9.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				alpha-Chlordane	0.02	mg/kg	5.2E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	6.0E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	2.13	mg/kg	5.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	6.4E-04	mg/kg/day	2.0E-05	mg/kg/day	3.E+01
				Aroclor-1268	0.0215	mg/kg	5.5E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	6.5E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0008	mg/kg	2.1E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	4.E-08	2.4E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Dieldrin	0.0057	mg/kg	1.5E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-06	1.7E-06	mg/kg/day	5.0E-05	mg/kg/day	3.E-02
				gamma-Chlordane	0.013	mg/kg	3.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	3.9E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Heptachlor Epoxide	0.0014	mg/kg	3.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	4.2E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	1.02	mg/kg	2.6E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-06	3.1E-04	mg/kg/day	5.0E-04	mg/kg/day	6.E-01
				Arsenic	0.024	mg/kg	6.2E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-07	7.2E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			5.1E-06	mg/kg/day	1.0E-03	mg/kg/day	5.E-03
				Chromium	0.197	mg/kg	NC		NC			5.9E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Lead	0.33	mg/kg	8.5E-06	mg/kg/day	--			9.9E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.141	mg/kg	NC		NC			4.2E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.127	mg/kg	NC		NC			3.8E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.0E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	1.2E-08	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	9.5E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	1.1E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					3.4.E+01
		EXPOSURE POINT TOTAL									2.E-03					3.4.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					3.4.E+01
MBINED FISH DIET TOTAL											**2.E-03**					**3.4.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											2.E-03					**3.4.E+01**

TES:
Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
- Not carcinogenic by this exposure route.
- Not applicable; exposure route not applicable for this chemical/exposure medium.
Not calculated; dose-response data and/or dermal absorption values are not available.

ared by: KJA
cked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.22.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
EDIMENT	SEDIMENT	LYMAN MILL POND	INGESTION	2-Methylnaphthalene	0.1	mg/kg	NC		NC			1.5E-08	mg/kg/day	2.0E-02	mg/kg/day	8.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			2.0E-07	mg/kg/day	5.0E-03	mg/kg/day	4.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			3.4E-07	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			6.5E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	2.8	mg/kg	7.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	4.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	2.9	mg/kg	7.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	4.5	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	6.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			4.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	2.1	mg/kg	5.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-09	3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	1.4E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-09	7.9E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	2.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	7.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	4.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				N-Nitroso-di-n-propylamine	1.3	mg/kg	3.4E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	2.E-07	2.0E-07	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	3.7E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	4.E-09	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			4.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				alpha-Chlordane	0.032	mg/kg	8.4E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	4.9E-09	mg/kg/day	5.0E-04	mg/kg/day	1.E-05
				Aroclor-1254	0.49	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	7.5E-08	mg/kg/day	2.0E-05	mg/kg/day	4.E-03
				Aroclor-1260	0.027	mg/kg	7.1E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	4.1E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Aroclor-1268	0.31379	mg/kg	8.2E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	4.8E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Dieldrin	0.0044	mg/kg	1.2E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-09	6.7E-10	mg/kg/day	5.0E-05	mg/kg/day	1.E-05
				Endosulfan II	0.005	mg/kg	NC		NC			7.6E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			4.4E-10	mg/kg/day	6.0E-03	mg/kg/day	7.E-08
				gamma-Chlordane	0.015	mg/kg	3.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	2.3E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Technical Chlordane	2.21273	mg/kg	5.8E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	3.4E-07	mg/kg/day	5.0E-04	mg/kg/day	7.E-04
				Antimony	3.1	mg/kg	NC		NC			4.7E-07	mg/kg/day	4.0E-04	mg/kg/day	1.E-03
				Arsenic	6.4	mg/kg	1.7E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-07	9.8E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	2.1	mg/kg	NC		NC			3.2E-07	mg/kg/day	1.0E-03	mg/kg/day	3.E-04
				Chromium	200	mg/kg	NC		NC			3.1E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	375	mg/kg	9.8E-06	mg/kg/day	--			5.7E-05	mg/kg/day			
				Manganese	843	mg/kg	NC		NC			1.3E-04	mg/kg/day	7.1E-02	mg/kg/day	2.E-03
				Mercury	0.62	mg/kg	NC		NC			9.5E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Nickel	69.2	mg/kg	NC		NC			1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				Thallium	0.58	mg/kg	NC		NC			8.9E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Vanadium	42.4	mg/kg	NC		NC			6.5E-06	mg/kg/day	7.0E-03	mg/kg/day	9.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	2.1E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	1.2E-09	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	1.7E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-07	9.9E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.E-02
			DERMAL	2-Methylnaphthalene	0.1	mg/kg	NC		NC			6.8E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			6.8E-08	mg/kg/day	5.0E-03	mg/kg/day	1.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			1.1E-07	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			2.9E-08	mg/kg/day	6.0E-02	mg/kg/day	5.E-07
				Benzo(a)anthracene	2.8	mg/kg	3.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(a)pyrene	2.9	mg/kg	3.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	4.5	mg/kg	5.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(k)fluoranthene	2.1	mg/kg	2.4E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-09	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	4.6E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	6.E-10	2.7E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	1.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-08	7.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	3.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				N-Nitroso-di-n-propylamine	1.3	mg/kg	1.2E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	8.E-08	6.8E-08	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	3.1E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	4.E-09	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Phenanthrene	2.8	mg/kg	NC		NC			1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				alpha-Chlordane	0.032	mg/kg	1.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	6.6E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				Aroclor-1254	0.49	mg/kg	6.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.6E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor-1260	0.027	mg/kg	3.4E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-10	2.0E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				Aroclor-1268	0.31379	mg/kg	3.9E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-09	2.3E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Dieldrin	0.0044	mg/kg	3.9E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-10	2.3E-10	mg/kg/day	5.0E-05	mg/kg/day	5.E-06
				Endosulfan II	0.005	mg/kg	NC		NC			2.6E-10	mg/kg/day	6.0E-03	mg/kg/day	4.E-08
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			1.5E-10	mg/kg/day	6.0E-03	mg/kg/day	3.E-08

US EPA ARCHIVE DOCUMENT

TABLE 7.22.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				gamma-Chlordane	0.015	mg/kg	5.3E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.1E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Technical Chlordane	2.21273	mg/kg	7.9E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-09	4.6E-08	mg/kg/day	5.0E-04	mg/kg/day	9.E-05
				Antimony	3.1	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	6.4	mg/kg	1.7E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-08	1.0E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	2.1	mg/kg	NC		NC			1.1E-09	mg/kg/day	2.5E-05	mg/kg/day	4.E-05
				Chromium	200	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	375	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	843	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.62	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	69.2	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	0.58	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	42.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	2.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-06	1.3E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	1.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	1.0E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					4.E-03
		EXPOSURE POINT TOTAL									4.E-05					3.E-02
	EXPOSURE MEDIUM TOTAL										4.E-05					3.E-02
IMENT TOTAL											**4.E-05**					**3.E-02**
URFACE WATER	SURFACE WATER	LYMAN MILL POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			1.3E-10	mg/kg/day	6.0E-02	mg/kg/day	2.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.0E-07	mg/kg/day	1.4E-02	mg/kg/day	4.E-09	1.7E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Aldrin	0.000023	mg/l	4.0E-10	mg/kg/day	1.7E+01	mg/kg/day	7.E-09	2.3E-09	mg/kg/day	3.0E-05	mg/kg/day	8.E-05
				alpha-Chlordane	0.000019	mg/l	3.3E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	1.9E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			3.3E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Endrin Aldehyde	0.000005	mg/l	NC		NC			5.1E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.000021	mg/l	3.7E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	2.1E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Arsenic	0.0046	mg/l	8.0E-08	mg/kg/day	1.5E+00	mg/kg/day	1.E-07	4.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			2.1E-06	mg/kg/day	7.0E-02	mg/kg/day	3.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	8.E-05
				Lead	0.0044	mg/l	7.7E-08	mg/kg/day	--			4.5E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			1.3E-05	mg/kg/day	2.4E-02	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			4.0E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Thallium	0.0022	mg/l	NC		NC			2.2E-07	mg/kg/day	8.0E-05	mg/kg/day	3.E-03
				Nitrate	0.765	mg/l	NC		NC			7.8E-05	mg/kg/day	1.6E+00	mg/kg/day	5.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			8.8E-06	mg/kg/day	1.0E-01	mg/kg/day	9.E-05
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.5E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	8.8E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					5.E-03
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	2.6E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.5E-04	mg/kg/day	2.0E-02	mg/kg/day	8.E-03
				Aldrin	0.000023	mg/l	2.0E-09	mg/kg/day	1.7E+01	mg/kg/day	3.E-08	1.2E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	3.9E-08	mg/kg/day	3.5E-01	mg/kg/day	1.E-08	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				gamma-Chlordane	0.000021	mg/l	4.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.5E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Arsenic	0.0046	mg/l	2.9E-08	mg/kg/day	1.5E+00	mg/kg/day	4.E-08	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	6.E-04
				Barium	0.021	mg/l	NC		NC			7.7E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			1.7E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			4.8E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.4E-10	mg/kg/day	2.1E-05	mg/kg/day	7.E-06
				Thallium	0.0022	mg/l	NC		NC			8.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.7E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.0E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					2.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					2.E-02
RFACE WATER TOTAL											**3.E-03**					**2.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.22.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-02	mg/kg/day	6.E-06
				Benzo(a)anthracene	0.00443	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	9.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.8E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			8.2E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	3.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				4,4'-DDD	0.027	mg/kg	8.9E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	5.2E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDE	0.08941	mg/kg	2.9E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-06	1.7E-05	mg/kg/day	5.0E-04	mg/kg/day	3.E-02
				4,4'-DDT	0.003	mg/kg	9.9E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.8E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.02	mg/kg	6.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	2.13	mg/kg	7.0E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	4.1E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.0215	mg/kg	7.1E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	4.1E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				beta-BHC	0.0008	mg/kg	2.6E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	5.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.0057	mg/kg	1.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-06	1.1E-06	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.013	mg/kg	4.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	2.5E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor Epoxide	0.0014	mg/kg	4.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	4.E-07	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	1.02	mg/kg	3.4E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-05	2.0E-04	mg/kg/day	5.0E-04	mg/kg/day	4.E-01
				Arsenic	0.024	mg/kg	7.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			3.3E-06	mg/kg/day	1.0E-03	mg/kg/day	3.E-03
				Chromium	0.197	mg/kg	NC		NC			3.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.33	mg/kg	1.1E-05	mg/kg/day	--			6.3E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			8.3E-04	mg/kg/day	1.4E-01	mg/kg/day	6.E-03
				Mercury	0.141	mg/kg	NC		NC			2.7E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.127	mg/kg	NC		NC			2.4E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.3E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	7.8E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	1.2E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	7.1E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.1.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.1.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.1.E+01
MBINED FISH DIET TOTAL											**2.E-03**					**2.1.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											5.E-03					**2.2.E+01**

TES:
Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
- Not carcinogenic by this exposure route.
- Not applicable; exposure route not applicable for this chemical/exposure medium.
Not calculated; dose-response data and/or dermal absorption values are not available.

ared by: KJA
cked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.23.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
EDIMENT	SEDIMENT	LYMAN MILL POND	INGESTION	2-Methylnaphthalene	0.1	mg/kg	NC		NC			2.4E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			3.1E-07	mg/kg/day	5.0E-03	mg/kg/day	6.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			5.2E-07	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			1.0E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Benzo(a)anthracene	2.8	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	2.9	mg/kg	1.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-07	6.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4.5	mg/kg	1.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			7.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	2.1	mg/kg	8.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-09	5.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	2.1E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-09	1.2E-06	mg/kg/day	2.0E-02	mg/kg/day	6.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	4.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.5E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				N-Nitroso-di-n-propylamine	1.3	mg/kg	5.3E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	4.E-07	3.1E-07	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	5.7E-08	mg/kg/day	1.2E-01	(mg/kg/day)-1	7.E-09	3.3E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	2.8	mg/kg	NC		NC			6.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.032	mg/kg	1.3E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-10	7.6E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Aroclor-1254	0.49	mg/kg	2.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-08	1.2E-07	mg/kg/day	2.0E-05	mg/kg/day	6.E-03
				Aroclor-1260	0.027	mg/kg	1.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.4E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				Aroclor-1268	0.31379	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	7.5E-08	mg/kg/day	2.0E-05	mg/kg/day	4.E-03
				Dieldrin	0.0044	mg/kg	1.8E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-09	1.0E-09	mg/kg/day	5.0E-05	mg/kg/day	2.E-05
				Endosulfan II	0.005	mg/kg	NC		NC			1.2E-09	mg/kg/day	6.0E-03	mg/kg/day	2.E-07
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			6.9E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				gamma-Chlordane	0.015	mg/kg	6.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	3.6E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Technical Chlordane	2.21273	mg/kg	9.0E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.3E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Antimony	3.1	mg/kg	NC		NC			7.4E-07	mg/kg/day	4.0E-04	mg/kg/day	2.E-03
				Arsenic	6.4	mg/kg	2.6E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-07	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Cadmium	2.1	mg/kg	NC		NC			5.0E-07	mg/kg/day	1.0E-03	mg/kg/day	5.E-04
				Chromium	200	mg/kg	NC		NC			4.7E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Lead	375	mg/kg	1.5E-05	mg/kg/day	--			8.9E-05	mg/kg/day			
				Manganese	843	mg/kg	NC		NC			2.0E-04	mg/kg/day	7.1E-02	mg/kg/day	3.E-03
				Mercury	0.62	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Nickel	69.2	mg/kg	NC		NC			1.6E-05	mg/kg/day	2.0E-02	mg/kg/day	8.E-04
				Thallium	0.58	mg/kg	NC		NC			1.4E-07	mg/kg/day	8.0E-05	mg/kg/day	2.E-03
				Vanadium	42.4	mg/kg	NC		NC			1.0E-05	mg/kg/day	7.0E-03	mg/kg/day	1.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	3.3E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-05	1.9E-09	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	2.6E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-07	1.5E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-05					4.E-02
			DERMAL	2-Methylnaphthalene	0.1	mg/kg	NC		NC			2.2E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			2.2E-07	mg/kg/day	5.0E-03	mg/kg/day	4.E-05
				4-Nitrophenol	2.2	mg/kg	NC		NC			3.7E-07	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			9.5E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Benzo(a)anthracene	2.8	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	2.9	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-07	6.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4.5	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			6.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	2.1	mg/kg	7.9E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-09	4.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	1.5E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-09	8.8E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	1.0694	mg/kg	4.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	6.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				N-Nitroso-di-n-propylamine	1.3	mg/kg	3.8E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	3.E-07	2.2E-07	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	1.0E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	1.E-08	5.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	2.8	mg/kg	NC		NC			6.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.032	mg/kg	3.7E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	2.2E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Aroclor-1254	0.49	mg/kg	2.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-08	1.2E-07	mg/kg/day	2.0E-05	mg/kg/day	6.E-03
				Aroclor-1260	0.027	mg/kg	1.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	6.4E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				Aroclor-1268	0.31379	mg/kg	1.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	7.5E-08	mg/kg/day	2.0E-05	mg/kg/day	4.E-03
				Dieldrin	0.0044	mg/kg	1.3E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-09	7.5E-10	mg/kg/day	5.0E-05	mg/kg/day	1.E-05
				Endosulfan II	0.005	mg/kg	NC		NC			8.5E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			4.9E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08

US EPA ARCHIVE DOCUMENT

TABLE 7.23.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				gamma-Chlordane	0.015	mg/kg	1.7E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-11	1.0E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Technical Chlordane	2.21273	mg/kg	2.6E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Antimony	3.1	mg/kg	NC		NC					6.0E-05	mg/kg/day	
				Arsenic	6.4	mg/kg	5.6E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-08	3.3E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Cadmium	2.1	mg/kg	NC		NC			3.6E-09	mg/kg/day	2.5E-05	mg/kg/day	1.E-04
				Chromium	200	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	375	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	843	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.62	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	69.2	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	0.58	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	42.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	7.0E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.1E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	5.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	8.E-08	3.3E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-05					1.E-02
		EXPOSURE POINT TOTAL									6.E-05					5.E-02
	EXPOSURE MEDIUM TOTAL										6.E-05					5.E-02
DIMENT TOTAL											**6.E-05**					**5.E-02**
URFACE WATER	SURFACE WATER	LYMAN MILL POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			2.1E-10	mg/kg/day	6.0E-02	mg/kg/day	3.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	4.6E-07	mg/kg/day	1.4E-02	mg/kg/day	6.E-09	2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				Aldrin	0.000023	mg/l	6.2E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	3.6E-09	mg/kg/day	3.0E-05	mg/kg/day	1.E-04
				alpha-Chlordane	0.000019	mg/l	5.2E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.0E-09	mg/kg/day	5.0E-04	mg/kg/day	6.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			5.1E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08
				Endrin Aldehyde	0.000005	mg/l	NC		NC			7.9E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				gamma-Chlordane	0.000021	mg/l	5.7E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.3E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Arsenic	0.0046	mg/l	1.2E-07	mg/kg/day	1.5E+00	mg/kg/day	2.E-07	7.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			3.3E-06	mg/kg/day	7.0E-02	mg/kg/day	5.E-05
				Chromium	0.0023	mg/l	NC		NC			3.6E-07	mg/kg/day	3.0E-03	mg/kg/day	1.E-04
				Lead	0.0044	mg/l	1.2E-07	mg/kg/day	--			7.0E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			2.1E-05	mg/kg/day	2.4E-02	mg/kg/day	9.E-04
				Mercury	0.00000394	mg/l	NC		NC			6.2E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Thallium	0.0022	mg/l	NC		NC			3.5E-07	mg/kg/day	8.0E-05	mg/kg/day	4.E-03
				Nitrate	0.765	mg/l	NC		NC			1.2E-04	mg/kg/day	1.6E+00	mg/kg/day	8.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			1.4E-05	mg/kg/day	1.0E-01	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-11	mg/kg/day	1.5E+05	mg/kg/day	4.E-06	1.4E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					8.E-03
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.2E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.9E-04	mg/kg/day	2.0E-02	mg/kg/day	9.E-03
				Aldrin	0.000023	mg/l	2.5E-09	mg/kg/day	1.7E+01	mg/kg/day	4.E-08	1.5E-08	mg/kg/day	3.0E-05	mg/kg/day	5.E-04
				alpha-Chlordane	0.000019	mg/l	4.8E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.8E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				gamma-Chlordane	0.000021	mg/l	5.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	3.1E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Arsenic	0.0046	mg/l	3.5E-08	mg/kg/day	1.5E+00	mg/kg/day	5.E-08	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Barium	0.021	mg/l	NC		NC			9.4E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			2.1E-07	mg/kg/day	7.5E-05	mg/kg/day	3.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-06	mg/kg/day	9.6E-04	mg/kg/day	6.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.8E-10	mg/kg/day	2.1E-05	mg/kg/day	8.E-06
				Thallium	0.0022	mg/l	NC		NC			9.9E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.2E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					3.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					3.E-02
RFACE WATER TOTAL											**3.E-03**					**3.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.23.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			4.0E-07	mg/kg/day	6.0E-02	mg/kg/day	7.E-06
				Benzo(a)anthracene	0.00443	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.9E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			8.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	4.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-07	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				4,4'-DDD	0.027	mg/kg	9.2E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	5.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				4,4'-DDE	0.08941	mg/kg	3.0E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-06	1.8E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				4,4'-DDT	0.003	mg/kg	1.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	5.9E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				alpha-Chlordane	0.02	mg/kg	6.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	4.0E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	2.13	mg/kg	7.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	4.2E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	0.0215	mg/kg	7.3E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	4.3E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				beta-BHC	0.0008	mg/kg	2.7E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	5.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Dieldrin	0.0057	mg/kg	1.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-06	1.1E-06	mg/kg/day	5.0E-05	mg/kg/day	2.E-02
				gamma-Chlordane	0.013	mg/kg	4.4E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	2.6E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				Heptachlor Epoxide	0.0014	mg/kg	4.8E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	4.E-07	2.8E-07	mg/kg/day	1.3E-05	mg/kg/day	2.E-02
				Technical Chlordane	1.02	mg/kg	3.5E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-05	2.0E-04	mg/kg/day	5.0E-04	mg/kg/day	4.E-01
				Arsenic	0.024	mg/kg	8.2E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	4.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			3.4E-06	mg/kg/day	1.0E-03	mg/kg/day	3.E-03
				Chromium	0.197	mg/kg	NC		NC			3.9E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	0.33	mg/kg	1.1E-05	mg/kg/day	--			6.5E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			8.5E-04	mg/kg/day	1.4E-01	mg/kg/day	6.E-03
				Mercury	0.141	mg/kg	NC		NC			2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Mercury (methyl)	0.127	mg/kg	NC		NC			2.5E-05	mg/kg/day	1.0E-04	mg/kg/day	3.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.4E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	8.0E-09	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	1.3E-08	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-03	7.3E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					2.2.E+01
		EXPOSURE POINT TOTAL									2.E-03					2.2.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					2.2.E+01
MBINED FISH DIET TOTAL											**2.E-03**					**2.2.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											6.E-03					**2.2.E+01**

TES:
Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
- Not carcinogenic by this exposure route.
- Not applicable; exposure route not applicable for this chemical/exposure medium.
Not calculated; dose-response data and/or dermal absorption values are not available.

ared by: KJA
cked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.24.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	LYMAN MILL POND	INGESTION	2-Methylnaphthalene	0.1	mg/kg	NC		NC			1.9E-07	mg/kg/day	2.0E-02	mg/kg/day	9.E-06
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			2.5E-06	mg/kg/day	5.0E-03	mg/kg/day	5.E-04
				4-Nitrophenol	2.2	mg/kg	NC		NC			4.2E-06	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			8.1E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	2.8	mg/kg	4.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	5.3E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	2.9	mg/kg	4.7E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-06	5.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(b)fluoranthene	4.5	mg/kg	7.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-07	8.5E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			5.7E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(k)fluoranthene	2.1	mg/kg	3.4E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-08	4.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	8.5E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-08	9.9E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				Dibenzo(a,h)anthracene	1.0694	mg/kg	1.7E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	2.0E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	4.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	5.1E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				N-Nitroso-di-n-propylamine	1.3	mg/kg	2.1E-07	mg/kg/day	7.0E+00	(mg/kg/day)-1	1.E-06	2.5E-06	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	2.3E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	3.E-08	2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Phenanthrene	2.8	mg/kg	NC		NC			5.3E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				alpha-Chlordane	0.032	mg/kg	5.2E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-09	6.1E-08	mg/kg/day	5.0E-04	mg/kg/day	1.E-04
				Aroclor-1254	0.49	mg/kg	8.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	9.3E-07	mg/kg/day	2.0E-05	mg/kg/day	5.E-02
				Aroclor-1260	0.027	mg/kg	4.4E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-09	5.1E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Aroclor-1268	0.31379	mg/kg	5.1E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	6.0E-07	mg/kg/day	2.0E-05	mg/kg/day	3.E-02
				Dieldrin	0.0044	mg/kg	7.2E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-08	8.4E-09	mg/kg/day	5.0E-05	mg/kg/day	2.E-04
				Endosulfan II	0.005	mg/kg	NC		NC			9.5E-09	mg/kg/day	6.0E-03	mg/kg/day	2.E-06
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			5.5E-09	mg/kg/day	6.0E-03	mg/kg/day	9.E-07
				gamma-Chlordane	0.015	mg/kg	2.4E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-10	2.8E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Technical Chlordane	2.21273	mg/kg	3.6E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	4.2E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Antimony	3.1	mg/kg	NC		NC			5.9E-06	mg/kg/day	4.0E-04	mg/kg/day	1.E-02
				Arsenic	6.4	mg/kg	1.0E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-06	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Cadmium	2.1	mg/kg	NC		NC			4.0E-06	mg/kg/day	1.0E-03	mg/kg/day	4.E-03
				Chromium	200	mg/kg	NC		NC			3.8E-04	mg/kg/day	3.0E-03	mg/kg/day	1.E-01
				Lead	375	mg/kg	6.1E-05	mg/kg/day	--			7.1E-04	mg/kg/day			
				Manganese	843	mg/kg	NC		NC			1.6E-03	mg/kg/day	7.1E-02	mg/kg/day	2.E-02
				Mercury	0.62	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Nickel	69.2	mg/kg	NC		NC			1.3E-04	mg/kg/day	2.0E-02	mg/kg/day	7.E-03
				Thallium	0.58	mg/kg	NC		NC			1.1E-06	mg/kg/day	8.0E-05	mg/kg/day	1.E-02
				Vanadium	42.4	mg/kg	NC		NC			8.1E-05	mg/kg/day	7.0E-03	mg/kg/day	1.E-02
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	1.3E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	1.5E-08	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	1.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-06	1.2E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					3.E-01
			DERMAL	2-Methylnaphthalene	0.1	mg/kg	NC		NC			6.9E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				4-Chloro-3-methylphenol	1.3	mg/kg	NC		NC			6.9E-07	mg/kg/day	5.0E-03	mg/kg/day	1.E-04
				4-Nitrophenol	2.2	mg/kg	NC		NC			1.2E-06	mg/kg/day			
				Acenaphthylene	0.42856	mg/kg	NC		NC			3.0E-07	mg/kg/day	6.0E-02	mg/kg/day	5.E-06
				Benzo(a)anthracene	2.8	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Benzo(a)pyrene	2.9	mg/kg	1.7E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	2.0E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Benzo(b)fluoranthene	4.5	mg/kg	2.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	3.1E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(g,h,i)perylene	3	mg/kg	NC		NC			2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Benzo(k)fluoranthene	2.1	mg/kg	1.2E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	9.E-09	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				bis(2-Ethylhexyl)phthalate	5.2	mg/kg	2.4E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-09	2.8E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				Dibenzo(a,h)anthracene	1.0694	mg/kg	6.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-07	7.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Indeno(1,2,3-cd)pyrene	2.7	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				N-Nitroso-di-n-propylamine	1.3	mg/kg	5.9E-08	mg/kg/day	7.0E+00	(mg/kg/day)-1	4.E-07	6.9E-07	mg/kg/day			
				Pentachlorophenol	1.4	mg/kg	1.6E-07	mg/kg/day	1.2E-01	(mg/kg/day)-1	2.E-08	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Phenanthrene	2.8	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				alpha-Chlordane	0.032	mg/kg	5.8E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	6.8E-09	mg/kg/day	5.0E-04	mg/kg/day	1.E-05
				Aroclor-1254	0.49	mg/kg	3.1E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-08	3.6E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Aroclor-1260	0.027	mg/kg	1.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-09	2.0E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor-1268	0.31379	mg/kg	2.0E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-08	2.3E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				Dieldrin	0.0044	mg/kg	2.0E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-09	2.3E-09	mg/kg/day	5.0E-05	mg/kg/day	5.E-05
				Endosulfan II	0.005	mg/kg	NC		NC			2.7E-09	mg/kg/day	6.0E-03	mg/kg/day	4.E-07
				Endosulfan sulfate	0.0029	mg/kg	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				gamma-Chlordane	0.015	mg/kg	2.7E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	3.2E-09	mg/kg/day	5.0E-04	mg/kg/day	6.E-06
				Technical Chlordane	2.21273	mg/kg	4.0E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	4.7E-07	mg/kg/day	5.0E-04	mg/kg/day	9.E-04
				Antimony	3.1	mg/kg	NC		NC					6.0E-05	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.24.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Arsenic	6.4	mg/kg	8.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	2.1	mg/kg	NC		NC			1.1E-08	mg/kg/day	2.5E-05	mg/kg/day	4.E-04
				Chromium	200	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	375	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	843	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	0.62	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	69.2	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Thallium	0.58	mg/kg	NC		NC					8.0E-05	mg/kg/day	
				Vanadium	42.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.00803	mg/kg	1.1E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-05	1.3E-09	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	0.0000649	mg/kg	8.9E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	1.0E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-05					4.E-02
		EXPOSURE POINT TOTAL									2.E-04					4.E-01
	EXPOSURE MEDIUM TOTAL										2.E-04					4.E-01
SEDIMENT TOTAL											**2.E-04**					**4.E-01**
SURFACE WATER	SURFACE WATER	LYMAN MILL POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			6.3E-10	mg/kg/day	6.0E-02	mg/kg/day	1.E-08
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	6.9E-07	mg/kg/day	1.4E-02	mg/kg/day	1.E-08	8.1E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				Aldrin	0.000023	mg/l	9.4E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-08	1.1E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	7.7E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	9.0E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	8.5E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	1.0E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Arsenic	0.0046	mg/l	1.9E-07	mg/kg/day	1.5E+00	mg/kg/day	3.E-07	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Barium	0.021	mg/l	NC		NC			1.0E-05	mg/kg/day	7.0E-02	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.1E-06	mg/kg/day	3.0E-03	mg/kg/day	4.E-04
				Lead	0.0044	mg/l	1.8E-07	mg/kg/day	--			2.1E-06	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			6.2E-05	mg/kg/day	2.4E-02	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.9E-09	mg/kg/day	3.0E-04	mg/kg/day	6.E-06
				Thallium	0.0022	mg/l	NC		NC			1.0E-06	mg/kg/day	8.0E-05	mg/kg/day	1.E-02
				Nitrate	0.765	mg/l	NC		NC			3.6E-04	mg/kg/day	1.6E+00	mg/kg/day	2.E-04
				Nitrite-N	0.0865	mg/l	NC		NC			4.1E-05	mg/kg/day	1.0E-01	mg/kg/day	4.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.5E-11	mg/kg/day	1.5E+05	mg/kg/day	5.E-06	4.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					2.E-02
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	9.0E-06	mg/kg/day	1.4E-02	mg/kg/day	1.E-07	1.0E-04	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				Aldrin	0.000023	mg/l	7.0E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	8.2E-09	mg/kg/day	3.0E-05	mg/kg/day	3.E-04
				alpha-Chlordane	0.000019	mg/l	1.4E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.6E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.4E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				gamma-Chlordane	0.000021	mg/l	1.5E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.7E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Arsenic	0.0046	mg/l	1.0E-08	mg/kg/day	1.5E+00	mg/kg/day	2.E-08	1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Barium	0.021	mg/l	NC		NC			5.3E-07	mg/kg/day	4.9E-03	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.2E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			3.3E-06	mg/kg/day	9.6E-04	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.0E-10	mg/kg/day	2.1E-05	mg/kg/day	5.E-06
				Thallium	0.0022	mg/l	NC		NC			5.6E-08	mg/kg/day	8.0E-05	mg/kg/day	7.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	6.0E-09	mg/kg/day	1.5E+05	mg/kg/day	9.E-04	7.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-04					1.E-02
		EXPOSURE POINT TOTAL									9.E-04					4.E-02
	EXPOSURE MEDIUM TOTAL										9.E-04					4.E-02
SURFACE WATER TOTAL											**9.E-04**					**4.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.24.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - LYMAN MILL
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	LYMAN MILL POND	INGESTION	Acenaphthylene	0.002	mg/kg	NC		NC			6.0E-07	mg/kg/day	6.0E-02	mg/kg/day	1.E-05
				Benzo(a)anthracene	0.00443	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(a)pyrene	0.00545	mg/kg	1.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.6E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(b)fluoranthene	0.003	mg/kg	7.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	9.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	0.00426	mg/kg	NC		NC			1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	0.0012	mg/kg	3.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	3.6E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	0.00499	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Phenanthrene	0.014	mg/kg	NC		NC			4.2E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4'-DDD	0.027	mg/kg	7.0E-07	mg/kg/day	2.4E-01	(mg/kg/day)-1	2.E-07	8.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.08941	mg/kg	2.3E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	8.E-07	2.7E-05	mg/kg/day	5.0E-04	mg/kg/day	5.E-02
				4,4'-DDT	0.003	mg/kg	7.7E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-08	9.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				alpha-Chlordane	0.02	mg/kg	5.2E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	6.0E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	2.13	mg/kg	5.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	6.4E-04	mg/kg/day	2.0E-05	mg/kg/day	3.E+01
				Aroclor-1268	0.0215	mg/kg	5.5E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	6.5E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				beta-BHC	0.0008	mg/kg	2.1E-08	mg/kg/day	1.8E+00	(mg/kg/day)-1	4.E-08	2.4E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Dieldrin	0.0057	mg/kg	1.5E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-06	1.7E-06	mg/kg/day	5.0E-05	mg/kg/day	3.E-02
				gamma-Chlordane	0.013	mg/kg	3.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-07	3.9E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Heptachlor Epoxide	0.0014	mg/kg	3.6E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	3.E-07	4.2E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	1.02	mg/kg	2.6E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-06	3.1E-04	mg/kg/day	5.0E-04	mg/kg/day	6.E-01
				Arsenic	0.024	mg/kg	6.2E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-07	7.2E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	0.017	mg/kg	NC		NC			5.1E-06	mg/kg/day	1.0E-03	mg/kg/day	5.E-03
				Chromium	0.197	mg/kg	NC		NC			5.9E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Lead	0.33	mg/kg	8.5E-06	mg/kg/day	--			9.9E-05	mg/kg/day			
				Manganese	4.31	mg/kg	NC		NC			1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	9.E-03
				Mercury	0.141	mg/kg	NC		NC			4.2E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.127	mg/kg	NC		NC			3.8E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (PCB Congeners)	0.0000405	mg/kg	1.0E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	1.2E-08	mg/kg/day			
				Toxicity Equivalency (Dioxins/Furans)	0.00037	mg/kg	9.5E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	1.1E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-03					3.4.E+01
		EXPOSURE POINT TOTAL									2.E-03					3.4.E+01
	EXPOSURE MEDIUM TOTAL										2.E-03					3.4.E+01
COMBINED FISH DIET TOTAL											**2.E-03**					**3.4.E+01**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**				**3.4.E+01**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: MJM

US EPA ARCHIVE DOCUMENT

TABLE 7.25.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SEDIMENT	SEDIMENT	MANTON POND	INGESTION	Benzo(a)anthracene	0.3	mg/kg	1.3E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	7.6E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(a)pyrene	0.37	mg/kg	1.6E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	9.4E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(b)fluoranthene	0.64	mg/kg	2.8E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	1.6E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			5.6E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Benzo(k)fluoranthene	0.2	mg/kg	8.7E-10	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-11	5.1E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	1.9E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-11	1.1E-08	mg/kg/day	2.0E-02	mg/kg/day	5.E-07
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	1.3E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-10	7.4E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Phenanthrene	0.3	mg/kg	NC		NC			7.6E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				alpha-Chlordane	0.004	mg/kg	1.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-12	1.0E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				gamma-Chlordane	0.005	mg/kg	2.2E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-12	1.3E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				Arsenic	0.97	mg/kg	4.2E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-09	2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Cadmium	0.96	mg/kg	NC		NC			2.4E-08	mg/kg/day	1.0E-03	mg/kg/day	2.E-05
				Chromium	18.6	mg/kg	NC		NC			4.7E-07	mg/kg/day	3.0E-03	mg/kg/day	2.E-04
				Lead	91	mg/kg	4.0E-07	mg/kg/day	--			2.3E-06	mg/kg/day			
				Manganese	219	mg/kg	NC		NC			5.6E-06	mg/kg/day	7.1E-02	mg/kg/day	8.E-05
				Vanadium	7.1	mg/kg	NC		NC			1.8E-07	mg/kg/day	7.0E-03	mg/kg/day	3.E-05
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	4.4E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-07	2.5E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								7.E-07					4.E-04
			DERMAL	Benzo(a)anthracene	0.3	mg/kg	1.2E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-10	6.8E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Benzo(a)pyrene	0.37	mg/kg	1.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	8.3E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(b)fluoranthene	0.64	mg/kg	2.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	1.4E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			5.0E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Benzo(k)fluoranthene	0.2	mg/kg	7.7E-10	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-11	4.5E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	1.3E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-11	7.4E-09	mg/kg/day	2.0E-02	mg/kg/day	4.E-07
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	1.1E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-10	6.5E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Phenanthrene	0.3	mg/kg	NC		NC			6.8E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				alpha-Chlordane	0.004	mg/kg	4.7E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	2.8E-11	mg/kg/day	5.0E-04	mg/kg/day	6.E-08
				gamma-Chlordane	0.005	mg/kg	5.9E-12	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-12	3.5E-11	mg/kg/day	5.0E-04	mg/kg/day	7.E-08
				Arsenic	0.97	mg/kg	8.6E-10	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-09	5.0E-09	mg/kg/day	3.0E-04	mg/kg/day	2.E-05
				Cadmium	0.96	mg/kg	NC		NC			1.7E-10	mg/kg/day	2.5E-05	mg/kg/day	7.E-06
				Chromium	18.6	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	91	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	219	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Vanadium	7.1	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	8.9E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	5.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-07					3.E-05
		EXPOSURE POINT TOTAL									8.E-07					4.E-04
	EXPOSURE MEDIUM TOTAL										8.E-07					4.E-04
SEDIMENT TOTAL											**8.E-07**					**4.E-04**
SURFACE WATER	SURFACE WATER	MANTON POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			3.4E-12	mg/kg/day	6.0E-02	mg/kg/day	6.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	7.4E-09	mg/kg/day	1.4E-02	mg/kg/day	1.E-10	4.3E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Aldrin	0.000023	mg/l	1.0E-11	mg/kg/day	1.7E+01	mg/kg/day	2.E-10	5.9E-11	mg/kg/day	3.0E-05	mg/kg/day	2.E-06
				alpha-Chlordane	0.000019	mg/l	8.3E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	4.8E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			8.1E-12	mg/kg/day	6.0E-03	mg/kg/day	1.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.3E-11	mg/kg/day	3.0E-04	mg/kg/day	4.E-08
				gamma-Chlordane	0.000021	mg/l	9.2E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	5.3E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Arsenic	0.0046	mg/l	2.0E-09	mg/kg/day	1.5E+00	mg/kg/day	3.E-09	1.2E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Barium	0.021	mg/l	NC		NC			5.3E-08	mg/kg/day	7.0E-02	mg/kg/day	8.E-07
				Chromium	0.0023	mg/l	NC		NC			5.9E-09	mg/kg/day	3.0E-03	mg/kg/day	2.E-06
				Lead	0.0044	mg/l	1.9E-09	mg/kg/day	--			1.1E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			3.3E-07	mg/kg/day	2.4E-02	mg/kg/day	1.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.0E-11	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Thallium	0.0022	mg/l	NC		NC			5.6E-09	mg/kg/day	8.0E-05	mg/kg/day	7.E-05
				Nitrate	0.765	mg/l	NC		NC			1.9E-06	mg/kg/day	1.6E+00	mg/kg/day	1.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			2.2E-07	mg/kg/day	1.0E-01	mg/kg/day	2.E-06

US EPA ARCHIVE DOCUMENT

TABLE 7.25.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.8E-13	mg/kg/day	1.5E+05	mg/kg/day	6.E-08	2.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-08					1.E-04
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.1E-06	mg/kg/day	1.4E-02	mg/kg/day	4.E-08	1.8E-05	mg/kg/day	2.0E-02	mg/kg/day	9.E-04
				Aldrin	0.000023	mg/l	2.4E-10	mg/kg/day	1.7E+01	mg/kg/day	4.E-09	1.4E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	4.7E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	2.7E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	5.2E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.0E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Arsenic	0.0046	mg/l	3.5E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Barium	0.021	mg/l	NC		NC			9.3E-08	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.0E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-07	mg/kg/day	9.6E-04	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			1.7E-11	mg/kg/day	2.1E-05	mg/kg/day	8.E-07
				Thallium	0.0022	mg/l	NC		NC			9.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-09	mg/kg/day	1.5E+05	mg/kg/day	3.E-04	1.2E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-04					2.E-03
		EXPOSURE POINT TOTAL									3.E-04					2.E-03
	EXPOSURE MEDIUM TOTAL										3.E-04					2.E-03
SURFACE WATER TOTAL											**3.E-04**					**2.E-03**
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			7.9E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	7.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	4.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			9.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				4,4'-DDE	0.01235	mg/kg	4.1E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.00263	mg/kg	8.6E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.0E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.22052	mg/kg	7.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	4.2E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.06755	mg/kg	2.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	1.3E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Dieldrin	0.00057	mg/kg	1.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-07	1.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			3.6E-07	mg/kg/day	6.0E-03	mg/kg/day	6.E-05
				gamma-Chlordane	0.00096	mg/kg	3.2E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	1.8E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Technical Chlordane	0.06498	mg/kg	2.1E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-07	1.2E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Lead	0.0119	mg/kg	3.9E-07	mg/kg/day	--			2.3E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			5.0E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			5.3E-05	mg/kg/day	1.0E-04	mg/kg/day	5.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	1.0E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	5.9E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					3.E+00
		EXPOSURE POINT TOTAL									2.E-04					3.E+00
	EXPOSURE MEDIUM TOTAL										2.E-04					3.E+00
COMBINED FISH DIET TOTAL											**2.E-04**					**3.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**5.E-04**	**TOTAL RECEPTOR HAZARD ACROSS ALL MED**				**3.5.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.26.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	MANTON POND	INGESTION	Benzo(a)anthracene	0.3	mg/kg	2.0E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	1.2E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Benzo(a)pyrene	0.37	mg/kg	2.5E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.5E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(b)fluoranthene	0.64	mg/kg	4.3E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.5E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			8.7E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(k)fluoranthene	0.2	mg/kg	1.4E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-10	7.9E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	2.9E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-11	1.7E-08	mg/kg/day	2.0E-02	mg/kg/day	9.E-07
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	2.0E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	1.1E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Phenanthrene	0.3	mg/kg	NC		NC			1.2E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				alpha-Chlordane	0.004	mg/kg	2.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-12	1.6E-10	mg/kg/day	5.0E-04	mg/kg/day	3.E-07
				gamma-Chlordane	0.005	mg/kg	3.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.0E-10	mg/kg/day	5.0E-04	mg/kg/day	4.E-07
				Arsenic	0.97	mg/kg	6.6E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-08	3.8E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Cadmium	0.96	mg/kg	NC		NC			3.8E-08	mg/kg/day	1.0E-03	mg/kg/day	4.E-05
				Chromium	18.6	mg/kg	NC		NC			7.4E-07	mg/kg/day	3.0E-03	mg/kg/day	2.E-04
				Lead	91	mg/kg	6.2E-07	mg/kg/day	--			3.6E-06	mg/kg/day			
				Manganese	219	mg/kg	NC		NC			8.7E-06	mg/kg/day	7.1E-02	mg/kg/day	1.E-04
				Vanadium	7.1	mg/kg	NC		NC			2.8E-07	mg/kg/day	7.0E-03	mg/kg/day	4.E-05
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	6.8E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-06	4.0E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					6.E-04
			DERMAL	Benzo(a)anthracene	0.3	mg/kg	3.8E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.2E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Benzo(a)pyrene	0.37	mg/kg	4.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.7E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Benzo(b)fluoranthene	0.64	mg/kg	8.1E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			1.6E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(k)fluoranthene	0.2	mg/kg	2.5E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-10	1.5E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	4.2E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	6.E-11	2.4E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	3.7E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.1E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Phenanthrene	0.3	mg/kg	NC		NC			2.2E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				alpha-Chlordane	0.004	mg/kg	1.6E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-12	9.1E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				gamma-Chlordane	0.005	mg/kg	1.9E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-12	1.1E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.97	mg/kg	2.8E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-09	1.6E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				Cadmium	0.96	mg/kg	NC		NC			5.4E-10	mg/kg/day	2.5E-05	mg/kg/day	2.E-05
				Chromium	18.6	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	91	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	219	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Vanadium	7.1	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	2.9E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-07	1.7E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								5.E-07					8.E-05
		EXPOSURE POINT TOTAL									2.E-06					7.E-04
	EXPOSURE MEDIUM TOTAL										2.E-06					7.E-04
SEDIMENT TOTAL											**2.E-06**					**7.E-04**
SURFACE WATER	SURFACE WATER	MANTON POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			5.2E-12	mg/kg/day	6.0E-02	mg/kg/day	9.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	1.2E-08	mg/kg/day	1.4E-02	mg/kg/day	2.E-10	6.7E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Aldrin	0.000023	mg/l	1.6E-11	mg/kg/day	1.7E+01	mg/kg/day	3.E-10	9.1E-11	mg/kg/day	3.0E-05	mg/kg/day	3.E-06
				alpha-Chlordane	0.000019	mg/l	1.3E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	7.5E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.3E-11	mg/kg/day	6.0E-03	mg/kg/day	2.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-11	mg/kg/day	3.0E-04	mg/kg/day	7.E-08
				gamma-Chlordane	0.000021	mg/l	1.4E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	8.3E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.0046	mg/l	3.1E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	1.8E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Barium	0.021	mg/l	NC		NC			8.3E-08	mg/kg/day	7.0E-02	mg/kg/day	1.E-06
				Chromium	0.0023	mg/l	NC		NC			9.1E-09	mg/kg/day	3.0E-03	mg/kg/day	3.E-06
				Lead	0.0044	mg/l	3.0E-09	mg/kg/day	--			1.7E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			5.1E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.6E-11	mg/kg/day	3.0E-04	mg/kg/day	5.E-08
				Thallium	0.0022	mg/l	NC		NC			8.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			3.0E-06	mg/kg/day	1.6E+00	mg/kg/day	2.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			3.4E-07	mg/kg/day	1.0E-01	mg/kg/day	3.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	5.8E-13	mg/kg/day	1.5E+05	mg/kg/day	9.E-08	3.4E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-08					2.E-04

US EPA ARCHIVE DOCUMENT

TABLE 7.26.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.5E-06	mg/kg/day	1.4E-02	mg/kg/day	5.E-08	2.0E-05	mg/kg/day	2.0E-02	mg/kg/day	1.E-03
				Aldrin	0.000023	mg/l	2.7E-10	mg/kg/day	1.7E+01	mg/kg/day	5.E-09	1.6E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	5.3E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.1E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.7E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06
				gamma-Chlordane	0.000021	mg/l	5.8E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.4E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Arsenic	0.0046	mg/l	3.9E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.3E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Barium	0.021	mg/l	NC		NC			1.0E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			6.4E-07	mg/kg/day	9.6E-04	mg/kg/day	7.E-04
				Mercury	0.00000394	mg/l	NC		NC			2.0E-11	mg/kg/day	2.1E-05	mg/kg/day	9.E-07
				Thallium	0.0022	mg/l	NC		NC			1.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-09	mg/kg/day	1.5E+05	mg/kg/day	4.E-04	1.4E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					2.E-03
		EXPOSURE POINT TOTAL									4.E-04					3.E-03
	EXPOSURE MEDIUM TOTAL										4.E-04					3.E-03
SURFACE WATER TOTAL											**4.E-04**					**3.E-03**
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			8.1E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	7.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				4,4'-DDE	0.01235	mg/kg	4.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.00263	mg/kg	8.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.2E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.22052	mg/kg	7.5E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	4.4E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.06755	mg/kg	2.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-06	1.3E-05	mg/kg/day	2.0E-05	mg/kg/day	7.E-01
				Dieldrin	0.00057	mg/kg	1.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-07	1.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-03	mg/kg/day	6.E-05
				gamma-Chlordane	0.00096	mg/kg	3.3E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	1.9E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Technical Chlordane	0.06498	mg/kg	2.2E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-07	1.3E-05	mg/kg/day	5.0E-04	mg/kg/day	3.E-02
				Lead	0.0119	mg/kg	4.0E-07	mg/kg/day	--			2.4E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			5.1E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			5.5E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.1E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					4.E+00
		EXPOSURE POINT TOTAL									2.E-04					4.E+00
	EXPOSURE MEDIUM TOTAL										2.E-04					4.E+00
COMBINED FISH DIET TOTAL											**2.E-04**					**4.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**5.E-04**	**TOTAL RECEPTOR HAZARD ACROSS ALL MED**				**3.6.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by:	KJA
Checked by:	RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.27.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			1.2E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	5.8E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	6.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDE	0.01235	mg/kg	3.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	3.7E-06	mg/kg/day	5.0E-04	mg/kg/day	7.E-03
				alpha-Chlordane	0.00263	mg/kg	6.8E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	7.9E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1254	0.22052	mg/kg	5.7E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	6.6E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aroclor-1268	0.06755	mg/kg	1.7E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	2.0E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Dieldrin	0.00057	mg/kg	1.5E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-07	1.7E-07	mg/kg/day	5.0E-05	mg/kg/day	3.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			5.7E-07	mg/kg/day	6.0E-03	mg/kg/day	1.E-04
				gamma-Chlordane	0.00096	mg/kg	2.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	2.9E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Technical Chlordane	0.06498	mg/kg	1.7E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-07	2.0E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0119	mg/kg	3.1E-07	mg/kg/day	--			3.6E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			7.8E-05	mg/kg/day	3.0E-04	mg/kg/day	3.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			8.4E-05	mg/kg/day	1.0E-04	mg/kg/day	8.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	8.0E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	9.3E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-04					5.E+00
		EXPOSURE POINT TOTAL									1.E-04					5.E+00
	EXPOSURE MEDIUM TOTAL										1.E-04					5.E+00
COMBINED FISH DIET TOTAL											**1.E-04**					**5.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MED**
											1.E-04					**5.5.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by:	KJA
Checked by:	RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.28.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SEDIMENT	SEDIMENT	MANTON POND	INGESTION	Benzo(a)anthracene	0.3	mg/kg	7.9E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	0.37	mg/kg	9.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	0.64	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.8E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			3.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(k)fluoranthene	0.2	mg/kg	5.2E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-10	3.1E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	1.1E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	6.6E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	7.6E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.3	mg/kg	NC		NC			4.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.004	mg/kg	1.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	6.1E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				gamma-Chlordane	0.005	mg/kg	1.3E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-11	7.6E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Arsenic	0.97	mg/kg	2.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	0.96	mg/kg	NC		NC			1.5E-07	mg/kg/day	1.0E-03	mg/kg/day	1.E-04
				Chromium	18.6	mg/kg	NC		NC			2.8E-06	mg/kg/day	3.0E-03	mg/kg/day	9.E-04
				Lead	91	mg/kg	2.4E-06	mg/kg/day	--			1.4E-05	mg/kg/day			
				Manganese	219	mg/kg	NC		NC			3.3E-05	mg/kg/day	7.1E-02	mg/kg/day	5.E-04
				Vanadium	7.1	mg/kg	NC		NC			1.1E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	2.6E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-06	1.5E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					2.E-03
			DERMAL	Benzo(a)anthracene	0.3	mg/kg	3.5E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-09	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Benzo(a)pyrene	0.37	mg/kg	4.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.5E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Benzo(b)fluoranthene	0.64	mg/kg	7.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	4.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			1.5E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(k)fluoranthene	0.2	mg/kg	2.3E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-10	1.4E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	3.8E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	5.E-11	2.2E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	3.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Phenanthrene	0.3	mg/kg	NC		NC			2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				alpha-Chlordane	0.004	mg/kg	1.4E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-12	8.3E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				gamma-Chlordane	0.005	mg/kg	1.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-12	1.0E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.97	mg/kg	2.6E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-09	1.5E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				Cadmium	0.96	mg/kg	NC		NC			5.0E-10	mg/kg/day	2.5E-05	mg/kg/day	2.E-05
				Chromium	18.6	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	91	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	219	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Vanadium	7.1	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	2.7E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-07	1.6E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-07					8.E-05
		EXPOSURE POINT TOTAL									4.E-06					2.E-03
	EXPOSURE MEDIUM TOTAL										4.E-06					2.E-03
SEDIMENT TOTAL											**4.E-06**					**2.E-03**
SURFACE WATER	SURFACE WATER	MANTON POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			1.3E-10	mg/kg/day	6.0E-02	mg/kg/day	2.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.0E-07	mg/kg/day	1.4E-02	mg/kg/day	4.E-09	1.7E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Aldrin	0.000023	mg/l	4.0E-10	mg/kg/day	1.7E+01	mg/kg/day	7.E-09	2.3E-09	mg/kg/day	3.0E-05	mg/kg/day	8.E-05
				alpha-Chlordane	0.000019	mg/l	3.3E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	1.9E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			3.3E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Endrin Aldehyde	0.000005	mg/l	NC		NC			5.1E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.000021	mg/l	3.7E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	2.1E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Arsenic	0.0046	mg/l	8.0E-08	mg/kg/day	1.5E+00	mg/kg/day	1.E-07	4.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			2.1E-06	mg/kg/day	7.0E-02	mg/kg/day	3.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	8.E-05
				Lead	0.0044	mg/l	7.7E-08	mg/kg/day	--			4.5E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			1.3E-05	mg/kg/day	2.4E-02	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			4.0E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Thallium	0.0022	mg/l	NC		NC			2.2E-07	mg/kg/day	8.0E-05	mg/kg/day	3.E-03
				Nitrate	0.765	mg/l	NC		NC			7.8E-05	mg/kg/day	1.6E+00	mg/kg/day	5.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			8.8E-06	mg/kg/day	1.0E-01	mg/kg/day	9.E-05
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.5E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	8.8E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					5.E-03

US EPA ARCHIVE DOCUMENT

TABLE 7.28.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	2.6E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.5E-04	mg/kg/day	2.0E-02	mg/kg/day	8.E-03
				Aldrin	0.000023	mg/l	2.0E-09	mg/kg/day	1.7E+01	mg/kg/day	3.E-08	1.2E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	3.9E-08	mg/kg/day	3.5E-01	mg/kg/day	1.E-08	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				gamma-Chlordane	0.000021	mg/l	4.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.5E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Arsenic	0.0046	mg/l	2.9E-08	mg/kg/day	1.5E+00	mg/kg/day	4.E-08	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	6.E-04
				Barium	0.021	mg/l	NC		NC			7.7E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			1.7E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			4.8E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.4E-10	mg/kg/day	2.1E-05	mg/kg/day	7.E-06
				Thallium	0.0022	mg/l	NC		NC			8.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.7E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.0E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					2.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					2.E-02
SURFACE WATER TOTAL											**3.E-03**					**2.E-02**
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			7.9E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	7.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	4.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			9.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				4,4'-DDE	0.01235	mg/kg	4.1E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.00263	mg/kg	8.6E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.0E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.22052	mg/kg	7.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	4.2E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.06755	mg/kg	2.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	1.3E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Dieldrin	0.00057	mg/kg	1.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-07	1.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			3.6E-07	mg/kg/day	6.0E-03	mg/kg/day	6.E-05
				gamma-Chlordane	0.00096	mg/kg	3.2E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	1.8E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Technical Chlordane	0.06498	mg/kg	2.1E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-07	1.2E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Lead	0.0119	mg/kg	3.9E-07	mg/kg/day	--			2.3E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			5.0E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			5.3E-05	mg/kg/day	1.0E-04	mg/kg/day	5.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	1.0E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	5.9E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					3.E+00
		EXPOSURE POINT TOTAL									2.E-04					3.E+00
	EXPOSURE MEDIUM TOTAL										2.E-04					3.E+00
COMBINED FISH DIET TOTAL											**2.E-04**					**3.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MED**				**3.5.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.29.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	MANTON POND	INGESTION	Benzo(a)anthracene	0.3	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	7.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	0.37	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	8.8E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	0.64	mg/kg	2.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			5.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	0.2	mg/kg	8.1E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-10	4.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	1.8E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	1.0E-07	mg/kg/day	2.0E-02	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	6.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.3	mg/kg	NC		NC			7.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.004	mg/kg	1.6E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-11	9.5E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.005	mg/kg	2.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	1.2E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Arsenic	0.97	mg/kg	3.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-08	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Cadmium	0.96	mg/kg	NC		NC			2.3E-07	mg/kg/day	1.0E-03	mg/kg/day	2.E-04
				Chromium	18.6	mg/kg	NC		NC			4.4E-06	mg/kg/day	3.0E-03	mg/kg/day	1.E-03
				Lead	91	mg/kg	3.7E-06	mg/kg/day	--			2.2E-05	mg/kg/day			
				Manganese	219	mg/kg	NC		NC			5.2E-05	mg/kg/day	7.1E-02	mg/kg/day	7.E-04
				Vanadium	7.1	mg/kg	NC		NC			1.7E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	4.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-06	2.4E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					3.E-03
			DERMAL	Benzo(a)anthracene	0.3	mg/kg	1.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	0.37	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	8.2E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	0.64	mg/kg	2.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			4.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	0.2	mg/kg	7.6E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-10	4.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	1.3E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	7.3E-08	mg/kg/day	2.0E-02	mg/kg/day	4.E-06
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	1.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.3	mg/kg	NC		NC			6.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.004	mg/kg	4.7E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	2.7E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				gamma-Chlordane	0.005	mg/kg	5.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	3.4E-10	mg/kg/day	5.0E-04	mg/kg/day	7.E-07
				Arsenic	0.97	mg/kg	8.5E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-08	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Cadmium	0.96	mg/kg	NC		NC			1.6E-09	mg/kg/day	2.5E-05	mg/kg/day	7.E-05
				Chromium	18.6	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	91	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	219	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Vanadium	7.1	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	8.7E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-06	5.1E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					3.E-04
		EXPOSURE POINT TOTAL									8.E-06					4.E-03
	EXPOSURE MEDIUM TOTAL										8.E-06					4.E-03
SEDIMENT TOTAL											**8.E-06**					**4.E-03**
SURFACE WATER	SURFACE WATER	MANTON POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			2.1E-10	mg/kg/day	6.0E-02	mg/kg/day	3.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	4.6E-07	mg/kg/day	1.4E-02	mg/kg/day	6.E-09	2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				Aldrin	0.000023	mg/l	6.2E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	3.6E-09	mg/kg/day	3.0E-05	mg/kg/day	1.E-04
				alpha-Chlordane	0.000019	mg/l	5.2E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.0E-09	mg/kg/day	5.0E-04	mg/kg/day	6.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			5.1E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08
				Endrin Aldehyde	0.000005	mg/l	NC		NC			7.9E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				gamma-Chlordane	0.000021	mg/l	5.7E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.3E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Arsenic	0.0046	mg/l	1.2E-07	mg/kg/day	1.5E+00	mg/kg/day	2.E-07	7.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			3.3E-06	mg/kg/day	7.0E-02	mg/kg/day	5.E-05
				Chromium	0.0023	mg/l	NC		NC			3.6E-07	mg/kg/day	3.0E-03	mg/kg/day	1.E-04
				Lead	0.0044	mg/l	1.2E-07	mg/kg/day	--			7.0E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			2.1E-05	mg/kg/day	2.4E-02	mg/kg/day	9.E-04
				Mercury	0.00000394	mg/l	NC		NC			6.2E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Thallium	0.0022	mg/l	NC		NC			3.5E-07	mg/kg/day	8.0E-05	mg/kg/day	4.E-03
				Nitrate	0.765	mg/l	NC		NC			1.2E-04	mg/kg/day	1.6E+00	mg/kg/day	8.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			1.4E-05	mg/kg/day	1.0E-01	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-11	mg/kg/day	1.5E+05	mg/kg/day	4.E-06	1.4E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					8.E-03

US EPA ARCHIVE DOCUMENT

TABLE 7.29.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.2E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.9E-04	mg/kg/day	2.0E-02	mg/kg/day	9.E-03
				Aldrin	0.000023	mg/l	2.5E-09	mg/kg/day	1.7E+01	mg/kg/day	4.E-08	1.5E-08	mg/kg/day	3.0E-05	mg/kg/day	5.E-04
				alpha-Chlordane	0.000019	mg/l	4.8E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.8E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				gamma-Chlordane	0.000021	mg/l	5.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	3.1E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Arsenic	0.0046	mg/l	3.5E-08	mg/kg/day	1.5E+00	mg/kg/day	5.E-08	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Barium	0.021	mg/l	NC		NC			9.4E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			2.1E-07	mg/kg/day	7.5E-05	mg/kg/day	3.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-06	mg/kg/day	9.6E-04	mg/kg/day	6.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.8E-10	mg/kg/day	2.1E-05	mg/kg/day	8.E-06
				Thallium	0.0022	mg/l	NC		NC			9.9E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.2E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					3.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					3.E-02
SURFACE WATER TOTAL											**3.E-03**					**3.E-02**
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			8.1E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	7.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			9.9E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				4,4'-DDE	0.01235	mg/kg	4.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	5.0E-04	mg/kg/day	5.E-03
				alpha-Chlordane	0.00263	mg/kg	8.9E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-08	5.2E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1254	0.22052	mg/kg	7.5E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	4.4E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	0.06755	mg/kg	2.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-06	1.3E-05	mg/kg/day	2.0E-05	mg/kg/day	7.E-01
				Dieldrin	0.00057	mg/kg	1.9E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-07	1.1E-07	mg/kg/day	5.0E-05	mg/kg/day	2.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			3.8E-07	mg/kg/day	6.0E-03	mg/kg/day	6.E-05
				gamma-Chlordane	0.00096	mg/kg	3.3E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	1.9E-07	mg/kg/day	5.0E-04	mg/kg/day	4.E-04
				Technical Chlordane	0.06498	mg/kg	2.2E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-07	1.3E-05	mg/kg/day	5.0E-04	mg/kg/day	3.E-02
				Lead	0.0119	mg/kg	4.0E-07	mg/kg/day	--			2.4E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			5.1E-05	mg/kg/day	3.0E-04	mg/kg/day	2.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			5.5E-05	mg/kg/day	1.0E-04	mg/kg/day	6.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	1.1E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-04	6.1E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-04					4.E+00
		EXPOSURE POINT TOTAL									2.E-04					4.E+00
	EXPOSURE MEDIUM TOTAL										2.E-04					4.E+00
COMBINED FISH DIET TOTAL											**2.E-04**					**4.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MED**				**3.6.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.30.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	MANTON POND	INGESTION	Benzo(a)anthracene	0.3	mg/kg	4.9E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	0.37	mg/kg	6.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	7.0E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	0.64	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			4.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	0.2	mg/kg	3.3E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-09	3.8E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	7.0E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-09	8.2E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	4.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	5.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	0.3	mg/kg	NC		NC			5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.004	mg/kg	6.5E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	7.6E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				gamma-Chlordane	0.005	mg/kg	8.1E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-10	9.5E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Arsenic	0.97	mg/kg	1.6E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.E-03
				Cadmium	0.96	mg/kg	NC		NC			1.8E-06	mg/kg/day	1.0E-03	mg/kg/day	2.E-03
				Chromium	18.6	mg/kg	NC		NC			3.5E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Lead	91	mg/kg	1.5E-05	mg/kg/day	--			1.7E-04	mg/kg/day			
				Manganese	219	mg/kg	NC		NC			4.2E-04	mg/kg/day	7.1E-02	mg/kg/day	6.E-03
				Vanadium	7.1	mg/kg	NC		NC			1.3E-05	mg/kg/day	7.0E-03	mg/kg/day	2.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	1.6E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-05	1.9E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-05					3.E-02
			DERMAL	Benzo(a)anthracene	0.3	mg/kg	1.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(a)pyrene	0.37	mg/kg	2.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(b)fluoranthene	0.64	mg/kg	3.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	0.22	mg/kg	NC		NC			1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(k)fluoranthene	0.2	mg/kg	1.2E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	9.E-10	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				bis(2-Ethylhexyl)phthalate	0.43	mg/kg	2.0E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-10	2.3E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	0.29	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Phenanthrene	0.3	mg/kg	NC		NC			2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				alpha-Chlordane	0.004	mg/kg	7.3E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	8.5E-10	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.005	mg/kg	9.1E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	1.1E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-06
				Arsenic	0.97	mg/kg	1.3E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Cadmium	0.96	mg/kg	NC		NC			5.1E-09	mg/kg/day	2.5E-05	mg/kg/day	2.E-04
				Chromium	18.6	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	91	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	219	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Vanadium	7.1	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000999	mg/kg	1.4E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-06	1.6E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					8.E-04
		EXPOSURE POINT TOTAL									3.E-05					3.E-02
	EXPOSURE MEDIUM TOTAL										3.E-05					3.E-02
SEDIMENT TOTAL											**3.E-05**					**3.E-02**
SURFACE WATER	SURFACE WATER	MANTON POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			6.3E-10	mg/kg/day	6.0E-02	mg/kg/day	1.E-08
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	6.9E-07	mg/kg/day	1.4E-02	mg/kg/day	1.E-08	8.1E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				Aldrin	0.000023	mg/l	9.4E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-08	1.1E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	7.7E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	9.0E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	8.5E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	1.0E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Arsenic	0.0046	mg/l	1.9E-07	mg/kg/day	1.5E+00	mg/kg/day	3.E-07	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Barium	0.021	mg/l	NC		NC			1.0E-05	mg/kg/day	7.0E-02	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.1E-06	mg/kg/day	3.0E-03	mg/kg/day	4.E-04
				Lead	0.0044	mg/l	1.8E-07	mg/kg/day	--			2.1E-06	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			6.2E-05	mg/kg/day	2.4E-02	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.9E-09	mg/kg/day	3.0E-04	mg/kg/day	6.E-06
				Thallium	0.0022	mg/l	NC		NC			1.0E-06	mg/kg/day	8.0E-05	mg/kg/day	1.E-02
				Nitrate	0.765	mg/l	NC		NC			3.6E-04	mg/kg/day	1.6E+00	mg/kg/day	2.E-04
				Nitrite-N	0.0865	mg/l	NC		NC			4.1E-05	mg/kg/day	1.0E-01	mg/kg/day	4.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.5E-11	mg/kg/day	1.5E+05	mg/kg/day	5.E-06	4.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					2.E-02

US EPA ARCHIVE DOCUMENT

TABLE 7.30.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - MANTON
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	9.0E-06	mg/kg/day	1.4E-02	mg/kg/day	1.E-07	1.0E-04	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				Aldrin	0.000023	mg/l	7.0E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	8.2E-09	mg/kg/day	3.0E-05	mg/kg/day	3.E-04
				alpha-Chlordane	0.000019	mg/l	1.4E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.6E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.4E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				gamma-Chlordane	0.000021	mg/l	1.5E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.7E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Arsenic	0.0046	mg/l	1.0E-08	mg/kg/day	1.5E+00	mg/kg/day	2.E-08	1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Barium	0.021	mg/l	NC		NC			5.3E-07	mg/kg/day	4.9E-03	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.2E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			3.3E-06	mg/kg/day	9.6E-04	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.0E-10	mg/kg/day	2.1E-05	mg/kg/day	5.E-06
				Thallium	0.0022	mg/l	NC		NC			5.6E-08	mg/kg/day	8.0E-05	mg/kg/day	7.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	6.0E-09	mg/kg/day	1.5E+05	mg/kg/day	9.E-04	7.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-04					1.E-02
		EXPOSURE POINT TOTAL									9.E-04					4.E-02
	EXPOSURE MEDIUM TOTAL										9.E-04					4.E-02
SURFACE WATER TOTAL											**9.E-04**					**4.E-02**
BIOTA	COMBINED FISH DIET	MANTON POND	INGESTION	Acenaphthylene	0.00041	mg/kg	NC		NC			1.2E-07	mg/kg/day	6.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.000226	mg/kg	5.8E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	6.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.00498	mg/kg	NC		NC			1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4'-DDE	0.01235	mg/kg	3.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	3.7E-06	mg/kg/day	5.0E-04	mg/kg/day	7.E-03
				alpha-Chlordane	0.00263	mg/kg	6.8E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	7.9E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1254	0.22052	mg/kg	5.7E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	6.6E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aroclor-1268	0.06755	mg/kg	1.7E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	2.0E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Dieldrin	0.00057	mg/kg	1.5E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-07	1.7E-07	mg/kg/day	5.0E-05	mg/kg/day	3.E-03
				Endosulfan Sulfate	0.0019	mg/kg	NC		NC			5.7E-07	mg/kg/day	6.0E-03	mg/kg/day	1.E-04
				gamma-Chlordane	0.00096	mg/kg	2.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	9.E-09	2.9E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Technical Chlordane	0.06498	mg/kg	1.7E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-07	2.0E-05	mg/kg/day	5.0E-04	mg/kg/day	4.E-02
				Lead	0.0119	mg/kg	3.1E-07	mg/kg/day	--			3.6E-06	mg/kg/day			
				Mercury	0.259	mg/kg	NC		NC			7.8E-05	mg/kg/day	3.0E-04	mg/kg/day	3.E-01
				Mercury (methyl)	0.278	mg/kg	NC		NC			8.4E-05	mg/kg/day	1.0E-04	mg/kg/day	8.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.000031	mg/kg	8.0E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	9.3E-09	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-04					5.E+00
		EXPOSURE POINT TOTAL									1.E-04					5.E+00
	EXPOSURE MEDIUM TOTAL										1.E-04					5.E+00
COMBINED FISH DIET TOTAL											**1.E-04**					**5.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**1.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MED**				**5.5.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: RAR

US EPA ARCHIVE DOCUMENT

TABLE 7.31.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	DYERVILLE POND	INGESTION	2-Methylnaphthalene	0.031	mg/kg	NC		NC			7.9E-10	mg/kg/day	2.0E-02	mg/kg/day	4.E-08
				Acenaphthylene	0.27	mg/kg	NC		NC			6.9E-09	mg/kg/day	6.0E-02	mg/kg/day	1.E-07
				Benzo(a)anthracene	2.6	mg/kg	1.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	6.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	2.2	mg/kg	9.6E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	4	mg/kg	1.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			4.1E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	4.8E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-10	2.8E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	7.0E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-10	4.1E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Dibenzo(a,h)anthracene	0.32	mg/kg	1.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	8.1E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Indeno(1,2,3-cd)pyrene	2	mg/kg	8.7E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	5.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	2.9	mg/kg	NC		NC			7.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.011	mg/kg	4.8E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-11	2.8E-10	mg/kg/day	5.0E-04	mg/kg/day	6.E-07
				Aroclor-1254	1.3	mg/kg	5.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.3E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Dieldrin	0.03	mg/kg	1.3E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-09	7.6E-10	mg/kg/day	5.0E-05	mg/kg/day	2.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			2.8E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Arsenic	2.1	mg/kg	9.2E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-08	5.3E-08	mg/kg/day	3.0E-04	mg/kg/day	2.E-04
				Cadmium	4	mg/kg	NC		NC			1.0E-07	mg/kg/day	1.0E-03	mg/kg/day	1.E-04
				Chromium	385	mg/kg	NC		NC			9.8E-06	mg/kg/day	3.0E-03	mg/kg/day	3.E-03
				Lead	307	mg/kg	1.3E-06	mg/kg/day	--			7.8E-06	mg/kg/day			
				Manganese	598	mg/kg	NC		NC			1.5E-05	mg/kg/day	7.1E-02	mg/kg/day	2.E-04
				Mercury	1.06	mg/kg	NC		NC			2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	9.E-05
				Nickel	35	mg/kg	NC		NC			8.9E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Vanadium	28.4	mg/kg	NC		NC			7.2E-07	mg/kg/day	7.0E-03	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	6.6E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	3.9E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	1.1E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-11	6.4E-16	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-07					6.E-03
			DERMAL	2-Methylnaphthalene	0.031	mg/kg	NC		NC			7.0E-10	mg/kg/day	2.0E-02	mg/kg/day	3.E-08
				Acenaphthylene	0.27	mg/kg	NC		NC			6.1E-09	mg/kg/day	6.0E-02	mg/kg/day	1.E-07
				Benzo(a)anthracene	2.6	mg/kg	1.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-09	5.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	2.2	mg/kg	8.5E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	5.0E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	4	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			3.6E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	4.2E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-10	2.5E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	4.7E-09	mg/kg/day	1.4E-02	(mg/kg/day)-1	7.E-11	2.8E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Dibenzo(a,h)anthracene	0.32	mg/kg	1.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-09	7.2E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Indeno(1,2,3-cd)pyrene	2	mg/kg	7.7E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	2.9	mg/kg	NC		NC			6.5E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				alpha-Chlordane	0.011	mg/kg	1.3E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-12	7.6E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Aroclor-1254	1.3	mg/kg	5.4E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.2E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Dieldrin	0.03	mg/kg	8.9E-11	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-09	5.2E-10	mg/kg/day	5.0E-05	mg/kg/day	1.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			1.9E-10	mg/kg/day	6.0E-03	mg/kg/day	3.E-08
				Arsenic	2.1	mg/kg	1.9E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-09	1.1E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Cadmium	4	mg/kg	NC		NC			6.9E-10	mg/kg/day	2.5E-05	mg/kg/day	3.E-05
				Chromium	385	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	307	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	598	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	1.06	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	35	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Vanadium	28.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	1.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	7.9E-13	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	2.3E-17	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-12	1.3E-16	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-07					2.E-03
		EXPOSURE POINT TOTAL									4.E-07					7.E-03
	EXPOSURE MEDIUM TOTAL										4.E-07					7.E-03
SEDIMENT TOTAL											**4.E-07**					**7.E-03**

US EPA ARCHIVE DOCUMENT

TABLE 7.31.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	DYERVILLE POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			3.4E-12	mg/kg/day	6.0E-02	mg/kg/day	6.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	7.4E-09	mg/kg/day	1.4E-02	mg/kg/day	1.E-10	4.3E-08	mg/kg/day	2.0E-02	mg/kg/day	2.E-06
				Aldrin	0.000023	mg/l	1.0E-11	mg/kg/day	1.7E+01	mg/kg/day	2.E-10	5.9E-11	mg/kg/day	3.0E-05	mg/kg/day	2.E-06
				alpha-Chlordane	0.000019	mg/l	8.3E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	4.8E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			8.1E-12	mg/kg/day	6.0E-03	mg/kg/day	1.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.3E-11	mg/kg/day	3.0E-04	mg/kg/day	4.E-08
				gamma-Chlordane	0.000021	mg/l	9.2E-12	mg/kg/day	3.5E-01	mg/kg/day	3.E-12	5.3E-11	mg/kg/day	5.0E-04	mg/kg/day	1.E-07
				Arsenic	0.0046	mg/l	2.0E-09	mg/kg/day	1.5E+00	mg/kg/day	3.E-09	1.2E-08	mg/kg/day	3.0E-04	mg/kg/day	4.E-05
				Barium	0.021	mg/l	NC		NC			5.3E-08	mg/kg/day	7.0E-02	mg/kg/day	8.E-07
				Chromium	0.0023	mg/l	NC		NC			5.9E-09	mg/kg/day	3.0E-03	mg/kg/day	2.E-06
				Lead	0.0044	mg/l	1.9E-09	mg/kg/day	--			1.1E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			3.3E-07	mg/kg/day	2.4E-02	mg/kg/day	1.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.0E-11	mg/kg/day	3.0E-04	mg/kg/day	3.E-08
				Thallium	0.0022	mg/l	NC		NC			5.6E-09	mg/kg/day	8.0E-05	mg/kg/day	7.E-05
				Nitrate	0.765	mg/l	NC		NC			1.9E-06	mg/kg/day	1.6E+00	mg/kg/day	1.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			2.2E-07	mg/kg/day	1.0E-01	mg/kg/day	2.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.8E-13	mg/kg/day	1.5E+05	mg/kg/day	6.E-08	2.2E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-08					1.E-04
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.1E-06	mg/kg/day	1.4E-02	mg/kg/day	4.E-08	1.8E-05	mg/kg/day	2.0E-02	mg/kg/day	9.E-04
				Aldrin	0.000023	mg/l	2.4E-10	mg/kg/day	1.7E+01	mg/kg/day	4.E-09	1.4E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	4.7E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	2.7E-08	mg/kg/day	5.0E-04	mg/kg/day	5.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	5.2E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.0E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Arsenic	0.0046	mg/l	3.5E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				Barium	0.021	mg/l	NC		NC			9.3E-08	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.0E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-07	mg/kg/day	9.6E-04	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			1.7E-11	mg/kg/day	2.1E-05	mg/kg/day	8.E-07
				Thallium	0.0022	mg/l	NC		NC			9.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-09	mg/kg/day	1.5E+05	mg/kg/day	3.E-04	1.2E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-04					2.E-03
		EXPOSURE POINT TOTAL									3.E-04					2.E-03
	EXPOSURE MEDIUM TOTAL										3.E-04					2.E-03
SURFACE WATER TOTAL											**3.E-04**					**2.E-03**
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			1.8E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	5.6E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.04068	mg/kg	1.3E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	7.8E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	4.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				4,4'-DDT	0.01467	mg/kg	4.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				alpha-Chlordane	0.01914	mg/kg	6.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.7E-06	mg/kg/day	5.0E-04	mg/kg/day	7.E-03
				Aroclor-1254	0.4495	mg/kg	1.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-05	8.6E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Dieldrin	0.01086	mg/kg	3.6E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-06	2.1E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				gamma-Chlordane	0.0068	mg/kg	2.2E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor Epoxide	0.00228	mg/kg	7.5E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	7.E-07	4.4E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.38798	mg/kg	1.3E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-06	7.4E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Cadmium	0.261	mg/kg	NC		NC			5.0E-05	mg/kg/day	1.0E-03	mg/kg/day	5.E-02
				Lead	0.562	mg/kg	1.8E-05	mg/kg/day	--			1.1E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			4.4E-03	mg/kg/day	1.4E-01	mg/kg/day	3.E-02
				Mercury	0.113	mg/kg	NC		NC			2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.E-02
				Mercury (methyl)	0.122	mg/kg	NC		NC			2.3E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01

US EPA ARCHIVE DOCUMENT

TABLE 7.31.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	2.5E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	1.5E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					5.0.E+00
		EXPOSURE POINT TOTAL									4.E-04					5.0.E+00
	EXPOSURE MEDIUM TOTAL										4.E-04					5.0.E+00
COMBINED FISH DIET TOTAL											**4.E-04**					**5.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											7.E-04					**5.0.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.32.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	DYERVILLE POND	INGESTION	2-Methylnaphthalene	0.031	mg/kg	NC		NC			1.2E-09	mg/kg/day	2.0E-02	mg/kg/day	6.E-08
				Acenaphthylene	0.27	mg/kg	NC		NC			1.1E-08	mg/kg/day	6.0E-02	mg/kg/day	2.E-07
				Benzo(a)anthracene	2.6	mg/kg	1.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	1.0E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	2.2	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	8.7E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(b)fluoranthene	4	mg/kg	2.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			6.3E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	7.5E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	5.E-10	4.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	1.1E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	6.3E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.32	mg/kg	2.2E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.3E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Indeno(1,2,3-cd)pyrene	2	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Phenanthrene	2.9	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				alpha-Chlordane	0.011	mg/kg	7.5E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-11	4.4E-10	mg/kg/day	5.0E-04	mg/kg/day	9.E-07
				Aroclor-1254	1.3	mg/kg	8.8E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-08	5.1E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Dieldrin	0.03	mg/kg	2.0E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	3.E-09	1.2E-09	mg/kg/day	5.0E-05	mg/kg/day	2.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			4.4E-10	mg/kg/day	6.0E-03	mg/kg/day	7.E-08
				Arsenic	2.1	mg/kg	1.4E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	8.3E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Cadmium	4	mg/kg	NC		NC			1.6E-07	mg/kg/day	1.0E-03	mg/kg/day	2.E-04
				Chromium	385	mg/kg	NC		NC			1.5E-05	mg/kg/day	3.0E-03	mg/kg/day	5.E-03
				Lead	307	mg/kg	2.1E-06	mg/kg/day	--			1.2E-05	mg/kg/day			
				Manganese	598	mg/kg	NC		NC			2.4E-05	mg/kg/day	7.1E-02	mg/kg/day	3.E-04
				Mercury	1.06	mg/kg	NC		NC			4.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Nickel	35	mg/kg	NC		NC			1.4E-06	mg/kg/day	2.0E-02	mg/kg/day	7.E-05
				Vanadium	28.4	mg/kg	NC		NC			1.1E-06	mg/kg/day	7.0E-03	mg/kg/day	2.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	1.0E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	6.0E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	1.7E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-11	1.0E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-07					9.E-03
			DERMAL	2-Methylnaphthalene	0.031	mg/kg	NC		NC			2.3E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Acenaphthylene	0.27	mg/kg	NC		NC			2.0E-08	mg/kg/day	6.0E-02	mg/kg/day	3.E-07
				Benzo(a)anthracene	2.6	mg/kg	3.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(a)pyrene	2.2	mg/kg	2.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(b)fluoranthene	4	mg/kg	5.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	1.4E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	8.1E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	1.6E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	9.1E-08	mg/kg/day	2.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.32	mg/kg	4.0E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.4E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Indeno(1,2,3-cd)pyrene	2	mg/kg	2.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	2.9	mg/kg	NC		NC			2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				alpha-Chlordane	0.011	mg/kg	4.3E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.5E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				Aroclor-1254	1.3	mg/kg	1.8E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-08	1.0E-07	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Dieldrin	0.03	mg/kg	2.9E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	5.E-09	1.7E-09	mg/kg/day	5.0E-05	mg/kg/day	3.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			6.2E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Arsenic	2.1	mg/kg	6.1E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-09	3.6E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Cadmium	4	mg/kg	NC		NC			2.3E-09	mg/kg/day	2.5E-05	mg/kg/day	9.E-05
				Chromium	385	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	307	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	598	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	1.06	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	35	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Vanadium	28.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	4.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-08	2.6E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	7.4E-17	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-11	4.3E-16	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-07					5.E-03
		EXPOSURE POINT TOTAL									8.E-07					1.E-02
	EXPOSURE MEDIUM TOTAL										8.E-07					1.E-02
SEDIMENT TOTAL											**8.E-07**					**1.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.32.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	DYERVILLE POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			5.2E-12	mg/kg/day	6.0E-02	mg/kg/day	9.E-11
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	1.2E-08	mg/kg/day	1.4E-02	mg/kg/day	2.E-10	6.7E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Aldrin	0.000023	mg/l	1.6E-11	mg/kg/day	1.7E+01	mg/kg/day	3.E-10	9.1E-11	mg/kg/day	3.0E-05	mg/kg/day	3.E-06
				alpha-Chlordane	0.000019	mg/l	1.3E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	7.5E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.3E-11	mg/kg/day	6.0E-03	mg/kg/day	2.E-09
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-11	mg/kg/day	3.0E-04	mg/kg/day	7.E-08
				gamma-Chlordane	0.000021	mg/l	1.4E-11	mg/kg/day	3.5E-01	mg/kg/day	5.E-12	8.3E-11	mg/kg/day	5.0E-04	mg/kg/day	2.E-07
				Arsenic	0.0046	mg/l	3.1E-09	mg/kg/day	1.5E+00	mg/kg/day	5.E-09	1.8E-08	mg/kg/day	3.0E-04	mg/kg/day	6.E-05
				Barium	0.021	mg/l	NC		NC			8.3E-08	mg/kg/day	7.0E-02	mg/kg/day	1.E-06
				Chromium	0.0023	mg/l	NC		NC			9.1E-09	mg/kg/day	3.0E-03	mg/kg/day	3.E-06
				Lead	0.0044	mg/l	3.0E-09	mg/kg/day	--			1.7E-08	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			5.1E-07	mg/kg/day	2.4E-02	mg/kg/day	2.E-05
				Mercury	0.00000394	mg/l	NC		NC			1.6E-11	mg/kg/day	3.0E-04	mg/kg/day	5.E-08
				Thallium	0.0022	mg/l	NC		NC			8.7E-09	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			3.0E-06	mg/kg/day	1.6E+00	mg/kg/day	2.E-06
				Nitrite-N	0.0865	mg/l	NC		NC			3.4E-07	mg/kg/day	1.0E-01	mg/kg/day	3.E-06
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	5.8E-13	mg/kg/day	1.5E+05	mg/kg/day	9.E-08	3.4E-12	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-08					2.E-04
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.5E-06	mg/kg/day	1.4E-02	mg/kg/day	5.E-08	2.0E-05	mg/kg/day	2.0E-02	mg/kg/day	1.E-03
				Aldrin	0.000023	mg/l	2.7E-10	mg/kg/day	1.7E+01	mg/kg/day	5.E-09	1.6E-09	mg/kg/day	3.0E-05	mg/kg/day	5.E-05
				alpha-Chlordane	0.000019	mg/l	5.3E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.1E-08	mg/kg/day	5.0E-04	mg/kg/day	6.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.7E-09	mg/kg/day	3.0E-04	mg/kg/day	9.E-06
				gamma-Chlordane	0.000021	mg/l	5.8E-09	mg/kg/day	3.5E-01	mg/kg/day	2.E-09	3.4E-08	mg/kg/day	5.0E-04	mg/kg/day	7.E-05
				Arsenic	0.0046	mg/l	3.9E-09	mg/kg/day	1.5E+00	mg/kg/day	6.E-09	2.3E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				Barium	0.021	mg/l	NC		NC			1.0E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.E-04
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			6.4E-07	mg/kg/day	9.6E-04	mg/kg/day	7.E-04
				Mercury	0.00000394	mg/l	NC		NC			2.0E-11	mg/kg/day	2.1E-05	mg/kg/day	9.E-07
				Thallium	0.0022	mg/l	NC		NC			1.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-09	mg/kg/day	1.5E+05	mg/kg/day	4.E-04	1.4E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					2.E-03
		EXPOSURE POINT TOTAL									4.E-04					3.E-03
	EXPOSURE MEDIUM TOTAL										4.E-04					3.E-03
SURFACE WATER TOTAL											**4.E-04**					**3.E-03**
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			1.9E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	5.8E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.04068	mg/kg	1.4E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	8.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	5.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.9E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				4,4'-DDT	0.01467	mg/kg	5.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.9E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				alpha-Chlordane	0.01914	mg/kg	6.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	0.4495	mg/kg	1.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-05	8.9E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Dieldrin	0.01086	mg/kg	3.7E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-06	2.2E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				gamma-Chlordane	0.0068	mg/kg	2.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor Epoxide	0.00228	mg/kg	7.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	7.E-07	4.5E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.38798	mg/kg	1.3E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-06	7.7E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.261	mg/kg	NC		NC			5.2E-05	mg/kg/day	1.0E-03	mg/kg/day	5.E-02
				Lead	0.562	mg/kg	1.9E-05	mg/kg/day	--			1.1E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			4.6E-03	mg/kg/day	1.4E-01	mg/kg/day	3.E-02
				Mercury	0.113	mg/kg	NC		NC			2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.E-02
				Mercury (methyl)	0.122	mg/kg	NC		NC			2.4E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01

US EPA ARCHIVE DOCUMENT

TABLE 7.32.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	2.6E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	1.5E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					5.1.E+00
		EXPOSURE POINT TOTAL									4.E-04					5.1.E+00
	EXPOSURE MEDIUM TOTAL										4.E-04					5.1.E+00
COMBINED FISH DIET TOTAL											**4.E-04**					**5.1.E+00**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**8.E-04**				**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**	**5.1.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.33.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RECREATIONAL ANGLER - CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RECREATIONAL ANGLER
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			2.8E-07	mg/kg/day	6.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	4.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	5.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.04068	mg/kg	1.0E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	1.2E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	3.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	4.4E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				4,4'-DDT	0.01467	mg/kg	3.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	4.4E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.01914	mg/kg	4.9E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	5.8E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	0.4495	mg/kg	1.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	1.4E-04	mg/kg/day	2.0E-05	mg/kg/day	7.E+00
				Dieldrin	0.01086	mg/kg	2.8E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-06	3.3E-06	mg/kg/day	5.0E-05	mg/kg/day	7.E-02
				gamma-Chlordane	0.0068	mg/kg	1.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-08	2.0E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Heptachlor Epoxide	0.00228	mg/kg	5.9E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	5.E-07	6.9E-07	mg/kg/day	1.3E-05	mg/kg/day	5.E-02
				Technical Chlordane	0.38798	mg/kg	1.0E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-06	1.2E-04	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.261	mg/kg	NC		NC			7.8E-05	mg/kg/day	1.0E-03	mg/kg/day	8.E-02
				Lead	0.562	mg/kg	1.4E-05	mg/kg/day	--			1.7E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			6.9E-03	mg/kg/day	1.4E-01	mg/kg/day	5.E-02
				Mercury	0.113	mg/kg	NC		NC			3.4E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.122	mg/kg	NC		NC			3.7E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	1.9E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-04	2.3E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-04					7.8.E+00
		EXPOSURE POINT TOTAL									3.E-04					7.8.E+00
	EXPOSURE MEDIUM TOTAL										3.E-04					7.8.E+00
COMBINED FISH DIET TOTAL											**3.E-04**					**7.8.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**3.E-04**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**7.8.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.34.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	DYERVILLE POND	INGESTION	2-Methylnaphthalene	0.031	mg/kg	NC		NC			4.7E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07
				Acenaphthylene	0.27	mg/kg	NC		NC			4.1E-08	mg/kg/day	6.0E-02	mg/kg/day	7.E-07
				Benzo(a)anthracene	2.6	mg/kg	6.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	4.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	2.2	mg/kg	5.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	4	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	2.9E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-09	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	4.2E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	6.E-10	2.4E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	0.32	mg/kg	8.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-08	4.9E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	2	mg/kg	5.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	2.9	mg/kg	NC		NC			4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				alpha-Chlordane	0.011	mg/kg	2.9E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-10	1.7E-09	mg/kg/day	5.0E-04	mg/kg/day	3.E-06
				Aroclor-1254	1.3	mg/kg	3.4E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-08	2.0E-07	mg/kg/day	2.0E-05	mg/kg/day	1.E-02
				Dieldrin	0.03	mg/kg	7.9E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-08	4.6E-09	mg/kg/day	5.0E-05	mg/kg/day	9.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			1.7E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Arsenic	2.1	mg/kg	5.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-08	3.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Cadmium	4	mg/kg	NC		NC			6.1E-07	mg/kg/day	1.0E-03	mg/kg/day	6.E-04
				Chromium	385	mg/kg	NC		NC			5.9E-05	mg/kg/day	3.0E-03	mg/kg/day	2.E-02
				Lead	307	mg/kg	8.0E-06	mg/kg/day	--			4.7E-05	mg/kg/day			
				Manganese	598	mg/kg	NC		NC			9.1E-05	mg/kg/day	7.1E-02	mg/kg/day	1.E-03
				Mercury	1.06	mg/kg	NC		NC			1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Nickel	35	mg/kg	NC		NC			5.3E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Vanadium	28.4	mg/kg	NC		NC			4.3E-06	mg/kg/day	7.0E-03	mg/kg/day	6.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	4.0E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-07	2.3E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	6.6E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-10	3.9E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					3.E-02
			DERMAL	2-Methylnaphthalene	0.031	mg/kg	NC		NC			2.1E-09	mg/kg/day	2.0E-02	mg/kg/day	1.E-07
				Acenaphthylene	0.27	mg/kg	NC		NC			1.8E-08	mg/kg/day	6.0E-02	mg/kg/day	3.E-07
				Benzo(a)anthracene	2.6	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(a)pyrene	2.2	mg/kg	2.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(b)fluoranthene	4	mg/kg	4.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.7E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(k)fluoranthene	1.1	mg/kg	1.3E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	9.E-10	7.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	1.4E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-10	8.3E-08	mg/kg/day	2.0E-02	mg/kg/day	4.E-06
				Dibenzo(a,h)anthracene	0.32	mg/kg	3.7E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	2.2E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Indeno(1,2,3-cd)pyrene	2	mg/kg	2.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Phenanthrene	2.9	mg/kg	NC		NC			2.0E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				alpha-Chlordane	0.011	mg/kg	3.9E-11	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-11	2.3E-10	mg/kg/day	5.0E-04	mg/kg/day	5.E-07
				Aroclor-1254	1.3	mg/kg	1.6E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	9.5E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-03
				Dieldrin	0.03	mg/kg	2.7E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-09	1.6E-09	mg/kg/day	5.0E-05	mg/kg/day	3.E-05
				Endosulfan sulfate	0.011	mg/kg	NC		NC			5.7E-10	mg/kg/day	6.0E-03	mg/kg/day	1.E-07
				Arsenic	2.1	mg/kg	5.6E-09	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-09	3.3E-08	mg/kg/day	3.0E-04	mg/kg/day	1.E-04
				Cadmium	4	mg/kg	NC		NC			2.1E-09	mg/kg/day	2.5E-05	mg/kg/day	8.E-05
				Chromium	385	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	307	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	598	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	1.06	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	35	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Vanadium	28.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	4.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	2.4E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	6.8E-17	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-11	3.9E-16	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-07					5.E-03
		EXPOSURE POINT TOTAL									2.E-06					4.E-02
	EXPOSURE MEDIUM TOTAL										2.E-06					4.E-02
SEDIMENT TOTAL											**2.E-06**					**4.E-02**

US EPA ARCHIVE DOCUMENT

TABLE 7.34.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SURFACE WATER	SURFACE WATER	DYERVILLE POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			1.3E-10	mg/kg/day	6.0E-02	mg/kg/day	2.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.0E-07	mg/kg/day	1.4E-02	mg/kg/day	4.E-09	1.7E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Aldrin	0.000023	mg/l	4.0E-10	mg/kg/day	1.7E+01	mg/kg/day	7.E-09	2.3E-09	mg/kg/day	3.0E-05	mg/kg/day	8.E-05
				alpha-Chlordane	0.000019	mg/l	3.3E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	1.9E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			3.3E-10	mg/kg/day	6.0E-03	mg/kg/day	5.E-08
				Endrin Aldehyde	0.000005	mg/l	NC		NC			5.1E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				gamma-Chlordane	0.000021	mg/l	3.7E-10	mg/kg/day	3.5E-01	mg/kg/day	1.E-10	2.1E-09	mg/kg/day	5.0E-04	mg/kg/day	4.E-06
				Arsenic	0.0046	mg/l	8.0E-08	mg/kg/day	1.5E+00	mg/kg/day	1.E-07	4.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			2.1E-06	mg/kg/day	7.0E-02	mg/kg/day	3.E-05
				Chromium	0.0023	mg/l	NC		NC			2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	8.E-05
				Lead	0.0044	mg/l	7.7E-08	mg/kg/day	--			4.5E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			1.3E-05	mg/kg/day	2.4E-02	mg/kg/day	6.E-04
				Mercury	0.00000394	mg/l	NC		NC			4.0E-10	mg/kg/day	3.0E-04	mg/kg/day	1.E-06
				Thallium	0.0022	mg/l	NC		NC			2.2E-07	mg/kg/day	8.0E-05	mg/kg/day	3.E-03
				Nitrate	0.765	mg/l	NC		NC			7.8E-05	mg/kg/day	1.6E+00	mg/kg/day	5.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			8.8E-06	mg/kg/day	1.0E-01	mg/kg/day	9.E-05
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.5E-11	mg/kg/day	1.5E+05	mg/kg/day	2.E-06	8.8E-11	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					5.E-03
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	2.6E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.5E-04	mg/kg/day	2.0E-02	mg/kg/day	8.E-03
				Aldrin	0.000023	mg/l	2.0E-09	mg/kg/day	1.7E+01	mg/kg/day	3.E-08	1.2E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	3.9E-08	mg/kg/day	3.5E-01	mg/kg/day	1.E-08	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	7.E-05
				gamma-Chlordane	0.000021	mg/l	4.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.5E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Arsenic	0.0046	mg/l	2.9E-08	mg/kg/day	1.5E+00	mg/kg/day	4.E-08	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	6.E-04
				Barium	0.021	mg/l	NC		NC			7.7E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			1.7E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			4.8E-06	mg/kg/day	9.6E-04	mg/kg/day	5.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.4E-10	mg/kg/day	2.1E-05	mg/kg/day	7.E-06
				Thallium	0.0022	mg/l	NC		NC			8.1E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	1.7E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.0E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					2.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					2.E-02
SURFACE WATER TOTAL											**3.E-03**					**2.E-02**
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			1.8E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	5.6E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.04068	mg/kg	1.3E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	7.8E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	4.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				4,4'-DDT	0.01467	mg/kg	4.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				alpha-Chlordane	0.01914	mg/kg	6.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.7E-06	mg/kg/day	5.0E-04	mg/kg/day	7.E-03
				Aroclor-1254	0.4495	mg/kg	1.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-05	8.6E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Dieldrin	0.01086	mg/kg	3.6E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-06	2.1E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				gamma-Chlordane	0.0068	mg/kg	2.2E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor Epoxide	0.00228	mg/kg	7.5E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	7.E-07	4.4E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.38798	mg/kg	1.3E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-06	7.4E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Cadmium	0.261	mg/kg	NC		NC			5.0E-05	mg/kg/day	1.0E-03	mg/kg/day	5.E-02
				Lead	0.562	mg/kg	1.8E-05	mg/kg/day	--			1.1E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			4.4E-03	mg/kg/day	1.4E-01	mg/kg/day	3.E-02
				Mercury	0.113	mg/kg	NC		NC			2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.E-02
				Mercury (methyl)	0.122	mg/kg	NC		NC			2.3E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01

US EPA ARCHIVE DOCUMENT

TABLE 7.34.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - ADULT - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	2.5E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	1.5E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					5.0.E+00
		EXPOSURE POINT TOTAL									4.E-04					5.0.E+00
	EXPOSURE MEDIUM TOTAL										4.E-04					5.0.E+00
COMBINED FISH DIET TOTAL											**4.E-04**					**5.0.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											3.E-03					**5.0.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.35.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	DYERVILLE POND	INGESTION	2-Methylnaphthalene	0.031	mg/kg	NC		NC			7.4E-09	mg/kg/day	2.0E-02	mg/kg/day	4.E-07
				Acenaphthylene	0.27	mg/kg	NC		NC			6.4E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	2.6	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	6.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	2.2	mg/kg	9.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-07	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			3.8E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	1.1	mg/kg	4.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-09	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	6.5E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	9.E-10	3.8E-07	mg/kg/day	2.0E-02	mg/kg/day	2.E-05
				Dibenzo(a,h)anthracene	0.32	mg/kg	1.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	7.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Indeno(1,2,3-cd)pyrene	2	mg/kg	8.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Phenanthrene	2.9	mg/kg	NC		NC			6.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.011	mg/kg	4.5E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-10	2.6E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Aroclor-1254	1.3	mg/kg	5.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	3.1E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Dieldrin	0.03	mg/kg	1.2E-09	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-08	7.1E-09	mg/kg/day	5.0E-05	mg/kg/day	1.E-04
				Endosulfan sulfate	0.011	mg/kg	NC		NC			2.6E-09	mg/kg/day	6.0E-03	mg/kg/day	4.E-07
				Arsenic	2.1	mg/kg	8.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Cadmium	4	mg/kg	NC		NC			9.5E-07	mg/kg/day	1.0E-03	mg/kg/day	9.E-04
				Chromium	385	mg/kg	NC		NC			9.1E-05	mg/kg/day	3.0E-03	mg/kg/day	3.E-02
				Lead	307	mg/kg	1.2E-05	mg/kg/day	--			7.3E-05	mg/kg/day			
				Manganese	598	mg/kg	NC		NC			1.4E-04	mg/kg/day	7.1E-02	mg/kg/day	2.E-03
				Mercury	1.06	mg/kg	NC		NC			2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.E-04
				Nickel	35	mg/kg	NC		NC			8.3E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				Vanadium	28.4	mg/kg	NC		NC			6.7E-06	mg/kg/day	7.0E-03	mg/kg/day	1.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	6.2E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-07	3.6E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	1.0E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-10	6.0E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					5.E-02
			DERMAL	2-Methylnaphthalene	0.031	mg/kg	NC		NC			6.8E-09	mg/kg/day	2.0E-02	mg/kg/day	3.E-07
				Acenaphthylene	0.27	mg/kg	NC		NC			6.0E-08	mg/kg/day	6.0E-02	mg/kg/day	1.E-06
				Benzo(a)anthracene	2.6	mg/kg	9.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(a)pyrene	2.2	mg/kg	8.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	4.9E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	4	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	8.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			3.5E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	1.1	mg/kg	4.2E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-09	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	4.7E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	7.E-10	2.7E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Dibenzo(a,h)anthracene	0.32	mg/kg	1.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-08	7.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Indeno(1,2,3-cd)pyrene	2	mg/kg	7.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	4.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Phenanthrene	2.9	mg/kg	NC		NC			6.4E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				alpha-Chlordane	0.011	mg/kg	1.3E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	4.E-11	7.5E-10	mg/kg/day	5.0E-04	mg/kg/day	1.E-06
				Aroclor-1254	1.3	mg/kg	5.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	3.1E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Dieldrin	0.03	mg/kg	8.7E-10	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-08	5.1E-09	mg/kg/day	5.0E-05	mg/kg/day	1.E-04
				Endosulfan sulfate	0.011	mg/kg	NC		NC			1.9E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Arsenic	2.1	mg/kg	1.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-08	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Cadmium	4	mg/kg	NC		NC			6.8E-09	mg/kg/day	2.5E-05	mg/kg/day	3.E-04
				Chromium	385	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	307	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	598	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	1.06	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	35	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Vanadium	28.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	1.3E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	7.7E-12	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	2.2E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-11	1.3E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								1.E-06					2.E-02
		EXPOSURE POINT TOTAL									3.E-06					7.E-02
	EXPOSURE MEDIUM TOTAL										3.E-06					7.E-02
SEDIMENT TOTAL											**3.E-06**					**7.E-02**
SURFACE WATER	SURFACE WATER	DYERVILLE POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			2.1E-10	mg/kg/day	6.0E-02	mg/kg/day	3.E-09
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	4.6E-07	mg/kg/day	1.4E-02	mg/kg/day	6.E-09	2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				Aldrin	0.000023	mg/l	6.2E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	3.6E-09	mg/kg/day	3.0E-05	mg/kg/day	1.E-04
				alpha-Chlordane	0.000019	mg/l	5.2E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.0E-09	mg/kg/day	5.0E-04	mg/kg/day	6.E-06
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			5.1E-10	mg/kg/day	6.0E-03	mg/kg/day	8.E-08

US EPA ARCHIVE DOCUMENT

TABLE 7.35.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			7.9E-10	mg/kg/day	3.0E-04	mg/kg/day	3.E-06
				gamma-Chlordane	0.000021	mg/l	5.7E-10	mg/kg/day	3.5E-01	mg/kg/day	2.E-10	3.3E-09	mg/kg/day	5.0E-04	mg/kg/day	7.E-06
				Arsenic	0.0046	mg/l	1.2E-07	mg/kg/day	1.5E+00	mg/kg/day	2.E-07	7.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Barium	0.021	mg/l	NC		NC			3.3E-06	mg/kg/day	7.0E-02	mg/kg/day	5.E-05
				Chromium	0.0023	mg/l	NC		NC			3.6E-07	mg/kg/day	3.0E-03	mg/kg/day	1.E-04
				Lead	0.0044	mg/l	1.2E-07	mg/kg/day	--			7.0E-07	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			2.1E-05	mg/kg/day	2.4E-02	mg/kg/day	9.E-04
				Mercury	0.00000394	mg/l	NC		NC			6.2E-10	mg/kg/day	3.0E-04	mg/kg/day	2.E-06
				Thallium	0.0022	mg/l	NC		NC			3.5E-07	mg/kg/day	8.0E-05	mg/kg/day	4.E-03
				Nitrate	0.765	mg/l	NC		NC			1.2E-04	mg/kg/day	1.6E+00	mg/kg/day	8.E-05
				Nitrite-N	0.0865	mg/l	NC		NC			1.4E-05	mg/kg/day	1.0E-01	mg/kg/day	1.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.3E-11	mg/kg/day	1.5E+05	mg/kg/day	4.E-06	1.4E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-06					8.E-03
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	3.2E-05	mg/kg/day	1.4E-02	mg/kg/day	4.E-07	1.9E-04	mg/kg/day	2.0E-02	mg/kg/day	9.E-03
				Aldrin	0.000023	mg/l	2.5E-09	mg/kg/day	1.7E+01	mg/kg/day	4.E-08	1.5E-08	mg/kg/day	3.0E-05	mg/kg/day	5.E-04
				alpha-Chlordane	0.000019	mg/l	4.8E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	2.8E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.5E-08	mg/kg/day	3.0E-04	mg/kg/day	8.E-05
				gamma-Chlordane	0.000021	mg/l	5.3E-08	mg/kg/day	3.5E-01	mg/kg/day	2.E-08	3.1E-07	mg/kg/day	5.0E-04	mg/kg/day	6.E-04
				Arsenic	0.0046	mg/l	3.5E-08	mg/kg/day	1.5E+00	mg/kg/day	5.E-08	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04
				Barium	0.021	mg/l	NC		NC			9.4E-07	mg/kg/day	4.9E-03	mg/kg/day	2.E-04
				Chromium	0.0023	mg/l	NC		NC			2.1E-07	mg/kg/day	7.5E-05	mg/kg/day	3.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			5.8E-06	mg/kg/day	9.6E-04	mg/kg/day	6.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.8E-10	mg/kg/day	2.1E-05	mg/kg/day	8.E-06
				Thallium	0.0022	mg/l	NC		NC			9.9E-08	mg/kg/day	8.0E-05	mg/kg/day	1.E-03
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	2.1E-08	mg/kg/day	1.5E+05	mg/kg/day	3.E-03	1.2E-07	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-03					2.E-02
		EXPOSURE POINT TOTAL									3.E-03					3.E-02
	EXPOSURE MEDIUM TOTAL										3.E-03					3.E-02
SURFACE WATER TOTAL											**3.E-03**					**3.E-02**
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			1.9E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	5.8E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	3.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.3E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4'-DDD	0.04068	mg/kg	1.4E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	8.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	5.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.9E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				4,4'-DDT	0.01467	mg/kg	5.0E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	2.9E-06	mg/kg/day	5.0E-04	mg/kg/day	6.E-03
				alpha-Chlordane	0.01914	mg/kg	6.5E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	3.8E-06	mg/kg/day	5.0E-04	mg/kg/day	8.E-03
				Aroclor-1254	0.4495	mg/kg	1.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-05	8.9E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Dieldrin	0.01086	mg/kg	3.7E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	6.E-06	2.2E-06	mg/kg/day	5.0E-05	mg/kg/day	4.E-02
				gamma-Chlordane	0.0068	mg/kg	2.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	8.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Heptachlor Epoxide	0.00228	mg/kg	7.7E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	7.E-07	4.5E-07	mg/kg/day	1.3E-05	mg/kg/day	3.E-02
				Technical Chlordane	0.38798	mg/kg	1.3E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-06	7.7E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.261	mg/kg	NC		NC			5.2E-05	mg/kg/day	1.0E-03	mg/kg/day	5.E-02
				Lead	0.562	mg/kg	1.9E-05	mg/kg/day	--			1.1E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			4.6E-03	mg/kg/day	1.4E-01	mg/kg/day	3.E-02
				Mercury	0.113	mg/kg	NC		NC			2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.E-02
				Mercury (methyl)	0.122	mg/kg	NC		NC			2.4E-05	mg/kg/day	1.0E-04	mg/kg/day	2.E-01

US EPA ARCHIVE DOCUMENT

TABLE 7.35.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - OLDER CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	2.6E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	1.5E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								4.E-04					5.1.E+00
		EXPOSURE POINT TOTAL									4.E-04					5.1.E+00
	EXPOSURE MEDIUM TOTAL										4.E-04					5.1.E+00
COMBINED FISH DIET TOTAL											**4.E-04**					**5.1.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**4.E-03**	**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**			**5.2.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.36.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SEDIMENT	SEDIMENT	DYERVILLE POND	INGESTION	2-Methylnaphthalene	0.031	mg/kg	NC		NC			5.9E-08	mg/kg/day	2.0E-02	mg/kg/day	3.E-06
				Acenaphthylene	0.27	mg/kg	NC		NC			5.1E-07	mg/kg/day	6.0E-02	mg/kg/day	9.E-06
				Benzo(a)anthracene	2.6	mg/kg	4.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	4.9E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	2.2	mg/kg	3.6E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-06	4.2E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(b)fluoranthene	4	mg/kg	6.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-07	7.6E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			3.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(k)fluoranthene	1.1	mg/kg	1.8E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-08	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	2.6E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-09	3.0E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Dibenzo(a,h)anthracene	0.32	mg/kg	5.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	6.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Indeno(1,2,3-cd)pyrene	2	mg/kg	3.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	3.8E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Phenanthrene	2.9	mg/kg	NC		NC			5.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				alpha-Chlordane	0.011	mg/kg	1.8E-09	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-10	2.1E-08	mg/kg/day	5.0E-04	mg/kg/day	4.E-05
				Aroclor-1254	1.3	mg/kg	2.1E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-07	2.5E-06	mg/kg/day	2.0E-05	mg/kg/day	1.E-01
				Dieldrin	0.03	mg/kg	4.9E-09	mg/kg/day	1.6E+01	(mg/kg/day)-1	8.E-08	5.7E-08	mg/kg/day	5.0E-05	mg/kg/day	1.E-03
				Endosulfan sulfate	0.011	mg/kg	NC		NC			2.1E-08	mg/kg/day	6.0E-03	mg/kg/day	3.E-06
				Arsenic	2.1	mg/kg	3.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-07	4.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Cadmium	4	mg/kg	NC		NC			7.6E-06	mg/kg/day	1.0E-03	mg/kg/day	8.E-03
				Chromium	385	mg/kg	NC		NC			7.3E-04	mg/kg/day	3.0E-03	mg/kg/day	2.E-01
				Lead	307	mg/kg	5.0E-05	mg/kg/day	--			5.8E-04	mg/kg/day			
				Manganese	598	mg/kg	NC		NC			1.1E-03	mg/kg/day	7.1E-02	mg/kg/day	2.E-02
				Mercury	1.06	mg/kg	NC		NC			2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Nickel	35	mg/kg	NC		NC			6.6E-05	mg/kg/day	2.0E-02	mg/kg/day	3.E-03
				Vanadium	28.4	mg/kg	NC		NC			5.4E-05	mg/kg/day	7.0E-03	mg/kg/day	8.E-03
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	2.5E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-06	2.9E-10	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	4.1E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-10	4.8E-14	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-06					4.E-01
			DERMAL	2-Methylnaphthalene	0.031	mg/kg	NC		NC			2.1E-08	mg/kg/day	2.0E-02	mg/kg/day	1.E-06
				Acenaphthylene	0.27	mg/kg	NC		NC			1.9E-07	mg/kg/day	6.0E-02	mg/kg/day	3.E-06
				Benzo(a)anthracene	2.6	mg/kg	1.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	1.8E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Benzo(a)pyrene	2.2	mg/kg	1.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(b)fluoranthene	4	mg/kg	2.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Benzo(g,h,i)perylene	1.6	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Benzo(k)fluoranthene	1.1	mg/kg	6.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	5.E-09	7.6E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				bis(2-Ethylhexyl)phthalate	1.6	mg/kg	7.3E-08	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-09	8.5E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Dibenzo(a,h)anthracene	0.32	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Indeno(1,2,3-cd)pyrene	2	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Phenanthrene	2.9	mg/kg	NC		NC			2.0E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				alpha-Chlordane	0.011	mg/kg	2.0E-10	mg/kg/day	3.5E-01	(mg/kg/day)-1	7.E-11	2.3E-09	mg/kg/day	5.0E-04	mg/kg/day	5.E-06
				Aroclor-1254	1.3	mg/kg	8.3E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	9.7E-07	mg/kg/day	2.0E-05	mg/kg/day	5.E-02
				Dieldrin	0.03	mg/kg	1.4E-09	mg/kg/day	1.6E+01	(mg/kg/day)-1	2.E-08	1.6E-08	mg/kg/day	5.0E-05	mg/kg/day	3.E-04
				Endosulfan sulfate	0.011	mg/kg	NC		NC			5.9E-09	mg/kg/day	6.0E-03	mg/kg/day	1.E-06
				Arsenic	2.1	mg/kg	2.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	3.4E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Cadmium	4	mg/kg	NC		NC			2.1E-08	mg/kg/day	2.5E-05	mg/kg/day	9.E-04
				Chromium	385	mg/kg	NC		NC					7.5E-05	mg/kg/day	
				Lead	307	mg/kg	0.0E+00	mg/kg/day	--							
				Manganese	598	mg/kg	NC		NC					2.8E-03	mg/kg/day	
				Mercury	1.06	mg/kg	NC		NC					2.1E-05	mg/kg/day	
				Nickel	35	mg/kg	NC		NC					8.0E-04	mg/kg/day	
				Vanadium	28.4	mg/kg	NC		NC					1.8E-04	mg/kg/day	

US EPA ARCHIVE DOCUMENT

TABLE 7.36.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Toxicity Equivalency (Dioxins/Furans)	0.000152	mg/kg	2.1E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-07	2.4E-11	mg/kg/day			
				Toxicity Equivalency (PCB Congeners)	2.53E-08	mg/kg	3.5E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-11	4.0E-15	mg/kg/day			
			EXPOSURE ROUTE TOTAL								2.E-06					5.E-02
		EXPOSURE POINT TOTAL									1.E-05					5.E-01
	EXPOSURE MEDIUM TOTAL										1.E-05					5.E-01
SEDIMENT TOTAL											**1.E-05**					**5.E-01**
SURFACE WATER	SURFACE WATER	DYERVILLE POND	INGESTION	Acenaphthylene	0.00000132	mg/l	NC		NC			6.3E-10	mg/kg/day	6.0E-02	mg/kg/day	1.E-08
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	6.9E-07	mg/kg/day	1.4E-02	mg/kg/day	1.E-08	8.1E-06	mg/kg/day	2.0E-02	mg/kg/day	4.E-04
				Aldrin	0.000023	mg/l	9.4E-10	mg/kg/day	1.7E+01	mg/kg/day	2.E-08	1.1E-08	mg/kg/day	3.0E-05	mg/kg/day	4.E-04
				alpha-Chlordane	0.000019	mg/l	7.7E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	9.0E-09	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			1.5E-09	mg/kg/day	6.0E-03	mg/kg/day	3.E-07
				Endrin Aldehyde	0.000005	mg/l	NC		NC			2.4E-09	mg/kg/day	3.0E-04	mg/kg/day	8.E-06
				gamma-Chlordane	0.000021	mg/l	8.5E-10	mg/kg/day	3.5E-01	mg/kg/day	3.E-10	1.0E-08	mg/kg/day	5.0E-04	mg/kg/day	2.E-05
				Arsenic	0.0046	mg/l	1.9E-07	mg/kg/day	1.5E+00	mg/kg/day	3.E-07	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Barium	0.021	mg/l	NC		NC			1.0E-05	mg/kg/day	7.0E-02	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.1E-06	mg/kg/day	3.0E-03	mg/kg/day	4.E-04
				Lead	0.0044	mg/l	1.8E-07	mg/kg/day	--			2.1E-06	mg/kg/day			
				Manganese	0.13	mg/l	NC		NC			6.2E-05	mg/kg/day	2.4E-02	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.9E-09	mg/kg/day	3.0E-04	mg/kg/day	6.E-06
				Thallium	0.0022	mg/l	NC		NC			1.0E-06	mg/kg/day	8.0E-05	mg/kg/day	1.E-02
				Nitrate	0.765	mg/l	NC		NC			3.6E-04	mg/kg/day	1.6E+00	mg/kg/day	2.E-04
				Nitrite-N	0.0865	mg/l	NC		NC			4.1E-05	mg/kg/day	1.0E-01	mg/kg/day	4.E-04
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	3.5E-11	mg/kg/day	1.5E+05	mg/kg/day	5.E-06	4.1E-10	mg/kg/day			
			EXPOSURE ROUTE TOTAL								6.E-06					2.E-02
			DERMAL	Acenaphthylene	0.00000132	mg/l	NC		NC			--		6.0E-02	mg/kg/day	
				bis(2-Ethylhexyl)phthalate	0.017	mg/l	9.0E-06	mg/kg/day	1.4E-02	mg/kg/day	1.E-07	1.0E-04	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				Aldrin	0.000023	mg/l	7.0E-10	mg/kg/day	1.7E+01	mg/kg/day	1.E-08	8.2E-09	mg/kg/day	3.0E-05	mg/kg/day	3.E-04
				alpha-Chlordane	0.000019	mg/l	1.4E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.6E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Endosulfan Sulfate	0.0000032	mg/l	NC		NC			--		6.0E-03	mg/kg/day	
				Endrin Aldehyde	0.000005	mg/l	NC		NC			1.4E-08	mg/kg/day	3.0E-04	mg/kg/day	5.E-05
				gamma-Chlordane	0.000021	mg/l	1.5E-08	mg/kg/day	3.5E-01	mg/kg/day	5.E-09	1.7E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Arsenic	0.0046	mg/l	1.0E-08	mg/kg/day	1.5E+00	mg/kg/day	2.E-08	1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	4.E-04
				Barium	0.021	mg/l	NC		NC			5.3E-07	mg/kg/day	4.9E-03	mg/kg/day	1.E-04
				Chromium	0.0023	mg/l	NC		NC			1.2E-07	mg/kg/day	7.5E-05	mg/kg/day	2.E-03
				Lead	0.0044	mg/l	--		--			--				
				Manganese	0.13	mg/l	NC		NC			3.3E-06	mg/kg/day	9.6E-04	mg/kg/day	3.E-03
				Mercury	0.00000394	mg/l	NC		NC			1.0E-10	mg/kg/day	2.1E-05	mg/kg/day	5.E-06
				Thallium	0.0022	mg/l	NC		NC			5.6E-08	mg/kg/day	8.0E-05	mg/kg/day	7.E-04
				Nitrate	0.765	mg/l	NC		NC			--		1.6E+00	mg/kg/day	
				Nitrite-N	0.0865	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
				Toxicity Equivalency (Dioxins/Furans)	0.000000861	mg/l	6.0E-09	mg/kg/day	1.5E+05	mg/kg/day	9.E-04	7.0E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								9.E-04					1.E-02
		EXPOSURE POINT TOTAL									9.E-04					4.E-02
	EXPOSURE MEDIUM TOTAL										9.E-04					4.E-02
SURFACE WATER TOTAL											**9.E-04**					**4.E-02**
BIOTA	COMBINED FISH DIET	DYERVILLE POND	INGESTION	Acenaphthylene	0.00094	mg/kg	NC		NC			2.8E-07	mg/kg/day	6.0E-02	mg/kg/day	5.E-06
				Dibenzo(a,h)anthracene	0.00017	mg/kg	4.4E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-08	5.1E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Phenanthrene	0.00632	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4'-DDD	0.04068	mg/kg	1.0E-06	mg/kg/day	2.4E-01	(mg/kg/day)-1	3.E-07	1.2E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				4,4'-DDE	0.01474	mg/kg	3.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	4.4E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				4,4'-DDT	0.01467	mg/kg	3.8E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	4.4E-06	mg/kg/day	5.0E-04	mg/kg/day	9.E-03
				alpha-Chlordane	0.01914	mg/kg	4.9E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-07	5.8E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1254	0.4495	mg/kg	1.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	1.4E-04	mg/kg/day	2.0E-05	mg/kg/day	7.E+00
				Dieldrin	0.01086	mg/kg	2.8E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-06	3.3E-06	mg/kg/day	5.0E-05	mg/kg/day	7.E-02
				gamma-Chlordane	0.0068	mg/kg	1.8E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	6.E-08	2.0E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Heptachlor Epoxide	0.00228	mg/kg	5.9E-08	mg/kg/day	9.1E+00	(mg/kg/day)-1	5.E-07	6.9E-07	mg/kg/day	1.3E-05	mg/kg/day	5.E-02
				Technical Chlordane	0.38798	mg/kg	1.0E-05	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-06	1.2E-04	mg/kg/day	5.0E-04	mg/kg/day	2.E-01
				Cadmium	0.261	mg/kg	NC		NC			7.8E-05	mg/kg/day	1.0E-03	mg/kg/day	8.E-02

US EPA ARCHIVE DOCUMENT

TABLE 7.36.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT - CHILD - COMBINED FISH DIET - DYERVILLE
BASELINE HUMAN HEALTH RISK ASSESSMENT - INTERIM FINAL
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
				Lead	0.562	mg/kg	1.4E-05	mg/kg/day	--			1.7E-04	mg/kg/day			
				Manganese	23	mg/kg	NC		NC			6.9E-03	mg/kg/day	1.4E-01	mg/kg/day	5.E-02
				Mercury	0.113	mg/kg	NC		NC			3.4E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Mercury (methyl)	0.122	mg/kg	NC		NC			3.7E-05	mg/kg/day	1.0E-04	mg/kg/day	4.E-01
				Toxicity Equivalency (Dioxins/Furans)	0.0000757	mg/kg	1.9E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-04	2.3E-08	mg/kg/day			
			EXPOSURE ROUTE TOTAL								3.E-04					7.8.E+00
		EXPOSURE POINT TOTAL									3.E-04					7.8.E+00
	EXPOSURE MEDIUM TOTAL										3.E-04					7.8.E+00
COMBINED FISH DIET TOTAL											**3.E-04**					**7.8.E+00**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											1.E-03					**8.3.E+00**

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by; KJA
Checked by: AWS

US EPA ARCHIVE DOCUMENT

TABLE 7.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - PASSIVE RECREATIONAL VISITOR - CHILD (AGES 1-6)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: CHILD (AGES 1-6)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	HUMAN HEALTH CONCERN AREA	INGESTION	Benz(a)anthracene	0.033	mg/kg	3.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	9.4E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	0.056	mg/kg	5.7E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(b)fluoranthene	0.062	mg/kg	6.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(k)fluoranthene	0.019	mg/kg	1.9E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	5.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Carbazole	0.006	mg/kg	1.5E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-11	1.7E-08	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	6.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-08	1.7E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			8.5E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	4.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Arsenic	4.4	mg/kg	1.1E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-06	1.3E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Chromium	6.1	mg/kg	NC		NC			1.7E-05	mg/kg/day	3.0E-03	mg/kg/day	6.E-03
				Cobalt	1.7	mg/kg	NC		NC			4.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Lead	32	mg/kg	7.8E-06	mg/kg/day	ND			9.1E-05	mg/kg/day	ND		
				Manganese	391	mg/kg	NC		NC			1.1E-03	mg/kg/day	4.7E-02	mg/kg/day	2.E-02
				Vanadium	20	mg/kg	NC		NC			5.7E-05	mg/kg/day	4.9E-03	mg/kg/day	1.E-02
				Dioxin-TEQ Mammal	0.0000051	mg/kg	1.2E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	1.5E-11	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								2.E-06					1.E-01
			DERMAL	Benz(a)anthracene	0.033	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-09	3.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(a)pyrene	0.056	mg/kg	2.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	5.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	0.062	mg/kg	2.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	6.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(k)fluoranthene	0.019	mg/kg	7.1E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	5.E-10	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Carbazole	0.006	mg/kg	4.1E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	8.E-12	4.8E-09	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	2.3E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	6.3E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			2.4E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	4.0E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Arsenic	4.4	mg/kg	9.0E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	1.1E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Chromium	6.1	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	1.7	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	32	mg/kg	--		ND			--		ND		
				Manganese	391	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Vanadium	20	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Dioxin-TEQ Mammal	0.0000051	mg/kg	1.0E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	1.2E-12	mg/kg/day	ND		
												--				
			EXPOSURE ROUTE TOTAL								4.E-07	--				4.E-03
		EXPOSURE POINT TOTAL									3.E-06					1.E-01
	EXPOSURE MEDIUM TOTAL										3.E-06					1.E-01
OIL TOTAL											**3.E-06**					**1.E-01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**	**1.E-01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

TABLE 7.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - PASSIVE RECREATIONAL VISITOR - ADOLESCENT (AGES 7-18)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: ADOLESCENT (AGES 7-18)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	HUMAN HEALTH CONCERN AREA	INGESTION	Benz(a)anthracene	0.033	mg/kg	6.2E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	1.6E-08	mg/kg/day	3.0E-02	mg/kg/day	5.E-07
				Benzo(a)pyrene	0.056	mg/kg	1.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-08	2.7E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Benzo(b)fluoranthene	0.062	mg/kg	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-09	2.9E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(k)fluoranthene	0.019	mg/kg	3.6E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-10	9.0E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Carbazole	0.006	mg/kg	4.9E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	1.E-11	2.8E-09	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	1.1E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-09	2.9E-09	mg/kg/day	3.0E-02	mg/kg/day	1.E-07
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			1.4E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	7.3E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	1.9E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Arsenic	4.4	mg/kg	3.6E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-07	2.1E-06	mg/kg/day	3.0E-04	mg/kg/day	7.E-03
				Chromium	6.1	mg/kg	NC		NC			2.9E-06	mg/kg/day	3.0E-03	mg/kg/day	1.E-03
				Cobalt	1.7	mg/kg	NC		NC			8.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Lead	32	mg/kg	2.6E-06	mg/kg/day	ND			1.5E-05	mg/kg/day	ND		
				Manganese	391	mg/kg	NC		NC			1.9E-04	mg/kg/day	4.7E-02	mg/kg/day	4.E-03
				Vanadium	20	mg/kg	NC		NC			9.5E-06	mg/kg/day	4.9E-03	mg/kg/day	2.E-03
				Dioxin-TEQ Mammal	0.0000051	mg/kg	4.2E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	2.4E-12	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								7.E-07					2.E-02
			DERMAL	Benz(a)anthracene	0.033	mg/kg	8.4E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	7.E-07
				Benzo(a)pyrene	0.056	mg/kg	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	3.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(b)fluoranthene	0.062	mg/kg	1.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	3.7E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Benzo(k)fluoranthene	0.019	mg/kg	4.8E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-10	1.1E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Carbazole	0.006	mg/kg	4.7E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	9.E-12	2.7E-09	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	1.5E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	3.6E-09	mg/kg/day	3.0E-02	mg/kg/day	1.E-07
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			1.4E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	9.9E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-09	2.3E-08	mg/kg/day	3.0E-02	mg/kg/day	8.E-07
				Arsenic	4.4	mg/kg	1.0E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	6.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Chromium	6.1	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	1.7	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	32	mg/kg	--		ND			--		ND		
				Manganese	391	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Vanadium	20	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Dioxin-TEQ Mammal	0.0000051	mg/kg	1.2E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	7.0E-13	mg/kg/day	ND		
												--				
												--				
			EXPOSURE ROUTE TOTAL								3.E-07					2.E-03
		EXPOSURE POINT TOTAL									1.E-06					2.E-02
	EXPOSURE MEDIUM TOTAL										1.E-06					2.E-02
OIL TOTAL											**1.E-06**					**2.E-02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											1.E-06					**2.E-02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

TABLE 7.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - PASSIVE RECREATIONAL VISITOR - ADULT (AGES 19-30)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: ADULT (AGES 19-30)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	HUMAN HEALTH CONCERN AREA	INGESTION	Benz(a)anthracene	0.033	mg/kg	1.7E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	1.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(a)pyrene	0.056	mg/kg	2.9E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.7E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Benzo(b)fluoranthene	0.062	mg/kg	3.2E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-09	1.9E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Benzo(k)fluoranthene	0.019	mg/kg	9.9E-10	mg/kg/day	7.3E-02	(mg/kg/day)-1	7.E-11	5.8E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Carbazole	0.006	mg/kg	3.1E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	6.E-12	1.8E-09	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	3.2E-10	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-09	1.9E-09	mg/kg/day	3.0E-02	mg/kg/day	6.E-08
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			9.2E-09	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	2.0E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	1.2E-08	mg/kg/day	3.0E-02	mg/kg/day	4.E-07
				Arsenic	4.4	mg/kg	2.3E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-07	1.3E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Chromium	6.1	mg/kg	NC		NC			1.9E-06	mg/kg/day	3.0E-03	mg/kg/day	6.E-04
				Cobalt	1.7	mg/kg	NC		NC			5.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Lead	32	mg/kg	1.7E-06	mg/kg/day	ND			9.8E-06	mg/kg/day	ND		
				Manganese	391	mg/kg	NC		NC			1.2E-04	mg/kg/day	4.7E-02	mg/kg/day	3.E-03
				Vanadium	20	mg/kg	NC		NC			6.1E-06	mg/kg/day	4.9E-03	mg/kg/day	1.E-03
				Dioxin-TEQ Mammal	0.0000051	mg/kg	2.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-08	1.6E-12	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								4.E-07					1.E-02
			DERMAL	Benz(a)anthracene	0.033	mg/kg	9.0E-10	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-10	5.2E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Benzo(a)pyrene	0.056	mg/kg	1.5E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	8.9E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(b)fluoranthene	0.062	mg/kg	1.7E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-09	9.8E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Benzo(k)fluoranthene	0.019	mg/kg	5.2E-10	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-11	3.0E-09	mg/kg/day	3.0E-02	mg/kg/day	1.E-07
				Carbazole	0.006	mg/kg	1.3E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-12	7.3E-10	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.0061	mg/kg	1.7E-10	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-09	9.7E-10	mg/kg/day	3.0E-02	mg/kg/day	3.E-08
				Dimethyl Phthalate	0.03	mg/kg	NC		NC			3.7E-09	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.039	mg/kg	1.1E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-10	6.2E-09	mg/kg/day	3.0E-02	mg/kg/day	2.E-07
				Arsenic	4.4	mg/kg	2.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-04
				Chromium	6.1	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	1.7	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	32	mg/kg	--		ND			--		ND		
				Manganese	391	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Vanadium	20	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Dioxin-TEQ Mammal	0.0000051	mg/kg	3.2E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-09	1.9E-13	mg/kg/day	ND		
												--				
												--				
			EXPOSURE ROUTE TOTAL								6.E-08					5.E-04
		EXPOSURE POINT TOTAL									5.E-07					1.E-02
	EXPOSURE MEDIUM TOTAL										5.E-07					1.E-02
OIL TOTAL											**5.E-07**					**1.E-02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											5.E-07					**1.E-02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

TABLE 7.4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - PASSIVE RECREATIONAL VISITOR - CHILD (AGES 1-6)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: CHILD (AGES 1-6)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	GENERAL AREA	INGESTION	Benz(a)anthracene	0.88	mg/kg	3.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	8.4E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	1.1	mg/kg	3.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-06	1.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	1.6	mg/kg	5.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(k)fluoranthene	0.89	mg/kg	3.0E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-08	8.5E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Carbazole	0.14	mg/kg	1.1E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	2.E-10	1.3E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	6.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			6.9E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	2.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	7.1E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Aroclor 1254	0.18	mg/kg	1.5E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-08	1.7E-07	mg/kg/day	2.0E-05	mg/kg/day	9.E-03
				Aroclor 1268	0.026	mg/kg	2.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	2.5E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aluminum	14791	mg/kg	NC		NC			1.4E-02	mg/kg/day	1.0E+00	mg/kg/day	1.E-02
				Arsenic	7	mg/kg	5.7E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-07	6.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Chromium	32	mg/kg	NC		NC			3.0E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02
				Cobalt	6.2	mg/kg	NC		NC			5.9E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Lead	247	mg/kg	2.0E-05	mg/kg/day	ND			2.3E-04	mg/kg/day	ND		
				Manganese	1026	mg/kg	NC		NC			9.7E-04	mg/kg/day	4.7E-02	mg/kg/day	2.E-02
				Thallium	0.45	mg/kg	NC		NC			4.3E-07	mg/kg/day	1.0E-05	mg/kg/day	4.E-02
				Vanadium	33	mg/kg	NC		NC			3.1E-05	mg/kg/day	4.9E-03	mg/kg/day	6.E-03
				HCX-TEQ	0.000000052	mg/kg	4.2E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-10	4.9E-14	mg/kg/day	ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	2.3E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	2.7E-09	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								4.E-05					1.E-01
			DERMAL	Benz(a)anthracene	0.88	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(a)pyrene	1.1	mg/kg	1.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	3.8E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(b)fluoranthene	1.6	mg/kg	2.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	5.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	0.89	mg/kg	1.1E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	8.E-09	3.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Carbazole	0.14	mg/kg	3.2E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	6.E-11	3.7E-08	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	2.2E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	6.2E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			1.9E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	9.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	2.6E-07	mg/kg/day	3.0E-02	mg/kg/day	9.E-06
				Aroclor 1254	0.18	mg/kg	5.7E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	6.7E-08	mg/kg/day	2.0E-05	mg/kg/day	3.E-03
				Aroclor 1268	0.026	mg/kg	8.3E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	9.7E-09	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				Aluminum	14791	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Arsenic	7	mg/kg	4.8E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	7.E-08	5.6E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Chromium	32	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	6.2	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	247	mg/kg	--		ND			--		ND		
				Manganese	1026	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Thallium	0.45	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	33	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				HCX-TEQ	0.000000052	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
												--				
												--				
			EXPOSURE ROUTE TOTAL								2.E-06					6.E-03
		EXPOSURE POINT TOTAL									4.E-05					2.E-01
	EXPOSURE MEDIUM TOTAL										4.E-05					2.E-01
OIL TOTAL											**4.E-05**					**2.E-01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											4.E-05					**2.E-01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

TABLE 7.5
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE- CURRENT/FUTURE- PASSIVE RECREATIONAL VISITOR- ADOLESCENT (AGES 7-18)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: ADOLESCENT (AGES 7-18)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	GENERAL AREA	INGESTION	Benz(a)anthracene	0.88	mg/kg	5.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-08	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(a)pyrene	1.1	mg/kg	6.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(b)fluoranthene	1.6	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-08	2.5E-07	mg/kg/day	3.0E-02	mg/kg/day	8.E-06
				Benzo(k)fluoranthene	0.89	mg/kg	5.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-09	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Carbazole	0.14	mg/kg	3.8E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	8.E-11	2.2E-08	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	1.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-08	2.8E-08	mg/kg/day	3.0E-02	mg/kg/day	9.E-07
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			1.2E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	4.7E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	1.2E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Aroclor 1254	0.18	mg/kg	4.9E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	2.8E-08	mg/kg/day	2.0E-05	mg/kg/day	1.E-03
				Aroclor 1268	0.026	mg/kg	7.1E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-09	4.1E-09	mg/kg/day	2.0E-05	mg/kg/day	2.E-04
				Aluminum	14791	mg/kg	NC		NC			2.3E-03	mg/kg/day	1.0E+00	mg/kg/day	2.E-03
				Arsenic	7	mg/kg	1.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-07	1.1E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Chromium	32	mg/kg	NC		NC			5.1E-06	mg/kg/day	3.0E-03	mg/kg/day	2.E-03
				Cobalt	6.2	mg/kg	NC		NC			9.8E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Lead	247	mg/kg	6.7E-06	mg/kg/day	ND			3.9E-05	mg/kg/day	ND		
				Manganese	1026	mg/kg	NC		NC			1.6E-04	mg/kg/day	4.7E-02	mg/kg/day	3.E-03
				Thallium	0.45	mg/kg	NC		NC			7.1E-08	mg/kg/day	1.0E-05	mg/kg/day	7.E-03
				Vanadium	33	mg/kg	NC		NC			5.2E-06	mg/kg/day	4.9E-03	mg/kg/day	1.E-03
				HCX-TEQ	0.000000052	mg/kg	1.4E-15	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-10	8.2E-15	mg/kg/day	ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	7.6E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.4E-10	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								1.E-05					2.E-02
			DERMAL	Benz(a)anthracene	0.88	mg/kg	7.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Benzo(a)pyrene	1.1	mg/kg	9.3E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-07	2.2E-07	mg/kg/day	3.0E-02	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	1.6	mg/kg	1.4E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	3.2E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	0.89	mg/kg	7.5E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-09	1.8E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Carbazole	0.14	mg/kg	3.6E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	7.E-11	2.1E-08	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	1.5E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	3.6E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			1.1E-08	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	6.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Aroclor 1254	0.18	mg/kg	6.6E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-08	3.8E-08	mg/kg/day	2.0E-05	mg/kg/day	2.E-03
				Aroclor 1268	0.026	mg/kg	9.5E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-09	5.5E-09	mg/kg/day	2.0E-05	mg/kg/day	3.E-04
				Aluminum	14791	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Arsenic	7	mg/kg	5.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-08	3.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Chromium	32	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	6.2	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	247	mg/kg	--		ND			--		ND		
				Manganese	1026	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Thallium	0.45	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	33	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				HCX-TEQ	0.000000052	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
												--				
												--				
			EXPOSURE ROUTE TOTAL								1.E-06					3.E-03
		EXPOSURE POINT TOTAL									1.E-05					3.E-02
	EXPOSURE MEDIUM TOTAL										1.E-05					3.E-02
OIL TOTAL											**1.E-05**					**3.E-02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**1.E-05**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**3.E-02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

TABLE 7.6
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - PASSIVE RECREATIONAL VISITOR - ADULT (AGES 19-30)
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: PASSIVE RECREATIONAL VISITOR
RECEPTOR AGE: ADULT (AGES 19-30)

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	GENERAL AREA	INGESTION	Benz(a)anthracene	0.88	mg/kg	1.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.0E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(a)pyrene	1.1	mg/kg	1.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-07	mg/kg/day	3.0E-02	mg/kg/day	4.E-06
				Benzo(b)fluoranthene	1.6	mg/kg	2.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	5.E-06
				Benzo(k)fluoranthene	0.89	mg/kg	1.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	9.1E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Carbazole	0.14	mg/kg	2.4E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	5.E-11	1.4E-08	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	3.1E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-08	1.8E-08	mg/kg/day	3.0E-02	mg/kg/day	6.E-07
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			7.4E-09	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	1.3E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	7.6E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Aroclor 1254	0.18	mg/kg	3.1E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-09	1.8E-08	mg/kg/day	2.0E-05	mg/kg/day	9.E-04
				Aroclor 1268	0.026	mg/kg	4.5E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-10	2.6E-09	mg/kg/day	2.0E-05	mg/kg/day	1.E-04
				Aluminum	14791	mg/kg	NC		NC			1.5E-03	mg/kg/day	1.0E+00	mg/kg/day	2.E-03
				Arsenic	7	mg/kg	1.2E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-07	7.1E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Chromium	32	mg/kg	NC		NC			3.3E-06	mg/kg/day	3.0E-03	mg/kg/day	1.E-03
				Cobalt	6.2	mg/kg	NC		NC			6.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Lead	247	mg/kg	4.3E-06	mg/kg/day	ND			2.5E-05	mg/kg/day	ND		
				Manganese	1026	mg/kg	NC		NC			1.0E-04	mg/kg/day	4.7E-02	mg/kg/day	2.E-03
				Thallium	0.45	mg/kg	NC		NC			4.6E-08	mg/kg/day	1.0E-05	mg/kg/day	5.E-03
				Vanadium	33	mg/kg	NC		NC			3.4E-06	mg/kg/day	4.9E-03	mg/kg/day	7.E-04
				HCX-TEQ	0.000000052	mg/kg	9.1E-16	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-10	5.3E-15	mg/kg/day	ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	4.9E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-06	2.8E-10	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								8.E-06					2.E-02
			DERMAL	Benz(a)anthracene	0.88	mg/kg	8.0E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-09	4.6E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(a)pyrene	1.1	mg/kg	1.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-08	5.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Benzo(b)fluoranthene	1.6	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	8.4E-08	mg/kg/day	3.0E-02	mg/kg/day	3.E-06
				Benzo(k)fluoranthene	0.89	mg/kg	8.1E-09	mg/kg/day	7.3E-02	(mg/kg/day)-1	6.E-10	4.7E-08	mg/kg/day	3.0E-02	mg/kg/day	2.E-06
				Carbazole	0.14	mg/kg	9.7E-10	mg/kg/day	2.0E-02	(mg/kg/day)-1	2.E-11	5.7E-09	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.18	mg/kg	1.6E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-08	9.5E-09	mg/kg/day	3.0E-02	mg/kg/day	3.E-07
				Dimethyl Phthalate	0.073	mg/kg	NC		NC			3.0E-09	mg/kg/day	ND		
				Indeno(1,2,3-cd)pyrene	0.75	mg/kg	6.8E-09	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-09	4.0E-08	mg/kg/day	3.0E-02	mg/kg/day	1.E-06
				Aroclor 1254	0.18	mg/kg	1.8E-09	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-09	1.0E-08	mg/kg/day	2.0E-05	mg/kg/day	5.E-04
				Aroclor 1268	0.026	mg/kg	2.5E-10	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-10	1.5E-09	mg/kg/day	2.0E-05	mg/kg/day	7.E-05
				Aluminum	14791	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Arsenic	7	mg/kg	1.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-08	8.5E-08	mg/kg/day	3.0E-04	mg/kg/day	3.E-04
				Chromium	32	mg/kg	NC		NC			--		7.5E-05	mg/kg/day	
				Cobalt	6.2	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Lead	247	mg/kg	--		ND			--		ND		
				Manganese	1026	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Thallium	0.45	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	33	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				HCX-TEQ	0.000000052	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
				Dioxin-TEQ Mammal	0.0028	mg/kg	--		1.5E+05	(mg/kg/day)-1		--		ND		
												--				
												--				
			EXPOSURE ROUTE TOTAL								1.E-07					9.E-04
		EXPOSURE POINT TOTAL									8.E-06					2.E-02
	EXPOSURE MEDIUM TOTAL										8.E-06					2.E-02
OIL TOTAL											**8.E-06**					**2.E-02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											8.E-06					**2.E-02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: BJR 03/31/11
Checked by: KJC 04/01/11

US EPA ARCHIVE DOCUMENT

APPENDIX B

Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond and Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

Appendix B-1
Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond

Appendix B-2
Photographs Supporting the Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

US EPA ARCHIVE DOCUMENT

APPENDIX B-1

Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
Allendale Pond		CMS-SD-5001-0005-01	03-Jun-05	0-0.7 ft		No	Sample evaluated in the Source Area
Surface Soil		CMS-SD-5002-0005-01	03-Jun-05	0-0.7 ft		No	West Bank of Allendale Pond
(0-1 ft bgs)		CMS-SD-5003-0005-01	03-Jun-05	0-0.7 ft		No	West Bank of Allendale Pond
		CMS-SD-5004-0005-01	03-Jun-05	0-0.7 ft		No	West Bank of Allendale Pond
		CMS-SD-5005-0005-01	03-Jun-05	0-0.5 ft		No	West Bank of Allendale Pond
	01-DEL-100	2108338	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	01-DEL-201	2108336	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	01-DEL-202	2108340	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	01-DEL-203	2108339	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	01-DEL-300	2108337	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	02-DEL-100	2108334	22-Jul-02	0-2 ft		Yes	
	02-DEL-201	2108332	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	02-DEL-202	2108330	22-Jul-02	0-2 ft		Yes	
	02-DEL-203	2108331	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	02-DEL-300	2108333	22-Jul-02	0-2 ft		Yes	
	03/04-DEL-101	2108320	19-Jul-02	0-2 ft		Yes	
	03/04-DEL-102	2108321	19-Jul-02	0-2 ft		Yes	
	03/04-DEL-103	2108319	19-Jul-02	0-2 ft		Yes	
	03/04-DEL-104	2112412	10-Sep-02	0-2 ft		Yes	
	03/04-DEL-105	2112413	10-Sep-02	0-2 ft		Yes	
	03-DEL-101	2108328	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	03-DEL-102	2108327	22-Jul-02	0-2 ft		Yes	
	03-DEL-103	2108329	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	03-DEL-201	2108324	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	03-DEL-202	2108325	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	03-DEL-203	2108326	22-Jul-02	0-2 ft		No	Sample evaluated in the Source Area
	04-DEL-100	2108318	19-Jul-02	0-2 ft		Yes	
	04-DEL-201	2108316	19-Jul-02	0-2 ft		Yes	
	04-DEL-202	2108315	19-Jul-02	0-2 ft		Yes	
	04-DEL-203	2108313	19-Jul-02	0-2 ft		Yes	
	05-DEL-100	2108311	19-Jul-02	0-2 ft		Yes	
	05-DEL-200	2108310	19-Jul-02	0-2 ft		Yes	
	06-DEL-100	2108295	18-Jul-02	0-2 ft		Yes	
	06-DEL-200	2108294	18-Jul-02	0-2 ft		Yes	
	07-DEL-100	2108303	19-Jul-02	0-2 ft		Yes	
	07-DEL-201	2108306	18-Jul-02	0-2 ft		Yes	
	07-DEL-202	2108304	19-Jul-02	0-2 ft		Yes	
	07-DEL-203	2108305	19-Jul-02	0-2 ft		Yes	
	07-DEL-300	2108308	19-Jul-02	0-2 ft		Yes	
	07-DEL-400	2108307	19-Jul-02	0-2 ft		Yes	
	AP-DEL-01	2102243	11-Apr-02	0-1 ft		Yes	
	AP-DEL-02	2102241	11-Apr-02	0-1 ft		Yes	
	AP-DEL-03	2102239	11-Apr-02	0-1 ft		Yes	
	AP-DEL-05	2102235	11-Apr-02	0-1 ft		Yes	
	AP-DEL-06	2102233	11-Apr-02	0-1 ft	Yes	No	Inconsistent TEQ signature
	AP-DEL-07	2102231	11-Apr-02	0-1 ft		Yes	
	AP-DEL-08	2102228	11-Apr-02	0-1 ft		Yes	
	AP-DEL-09	2102226	10-Apr-02	0-1 ft		Yes	
	AP-DEL-10	2102224	10-Apr-02	0-1 ft		Yes	
	AP-DEL-11	2102222	10-Apr-02	0-1 ft		Yes	
	AP-DEL-12	2102220	10-Apr-02	0-1 ft		Yes	
	AP-DEL-13	2102218	10-Apr-02	0-1 ft		Yes	
	AP-DEL-14	2102216	10-Apr-02	0-1 ft		Yes	
	AP-DEL-15	2102214	10-Apr-02	0-1 ft		Yes	
	AP-DEL-16	2102212	10-Apr-02	0-1 ft		Yes	
	AP-DEL-17	2102211	10-Apr-02	0-1 ft		Yes	
	AP-DEL-18	2102209	10-Apr-02	0-1 ft		Yes	
	AP-DEL-19	2102207	10-Apr-02	0-1 ft		Yes	
	AP-DEL-20	2102205	10-Apr-02	0-1 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	BV01COMP	BV01-COMP	05-Nov-99	0-4 ft		Yes	
Allendale Pond	CMS-001	3428-CMS-001	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
Surface Soil	CMS-002	3428-CMS-002	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
(0-1 ft bgs)	CMS-003	3428-CMS-003	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-004	3428-CMS-004	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-005	3428-CMS-005	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-006	3428-CMS-006	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-007	3428-CMS-007	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-008	3428-CMS-008	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-009	3428-CMS-009	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-010	3428-CMS-010	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-011	3428-CMS-011	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-012	3428-CMS-012	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-013	3428-CMS-013	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-014	3428-CMS-014	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-015	3428-CMS-015	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-016	3428-CMS-016	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-017	3428-CMS-017	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-018	3428-CMS-018	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-019	3428-CMS-019	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-019	CMS-019-A	14-Jul-99	0-1 ft		No	West Bank of Allendale Pond
	CMS-026	3428-CMS-026	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-027	3428-CMS-027	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-028	3428-CMS-028	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-029	3428-CMS-029	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-030	3428-CMS-030	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-031	3428-CMS-031	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-033	3428-CMS-033	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-034	3428-CMS-034	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-035	3428-CMS-035	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-037	3428-CMS-037	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-038	3428-CMS-038	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-041	3428-CMS-041	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-044	3428-CMS-044	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-047	3428-CMS-047	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-048	3428-CMS-048	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-050	3428-CMS-050	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-051	3428-CMS-051	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-051	CMS-051-A	02-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-052	3428-CMS-052	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-053	3428-CMS-053	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-054	3428-CMS-054	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-055	3428-CMS-055	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-056	3428-CMS-056	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-057	3428-CMS-057	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-057	CMS-057-A	01-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-058	3428-CMS-058	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-059	3428-CMS-059	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-060	3428-CMS-060	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-060	CMS-060-A	30-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-061	3428-CMS-061	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-062	3428-CMS-062	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-063	3428-CMS-063	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-063	CMS-063-A	02-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-064	3428-CMS-064	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-065	3428-CMS-065	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-065	GEC-SS@CMS65	24-Jun-99	0-10 ft		No	Sample evaluated in the Source Area
	CMS-066	3428-CMS-066	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-067	3428-CMS-067	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-068	3428-CMS-068	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-069	3428-CMS-069	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-069	CMS-069-A	30-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
Surface Soil	CMS-070	3428-CMS-070	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
(0-1 ft bgs)	CMS-071	3428-CMS-071	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-072	3428-CMS-072	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-073	3428-CMS-073	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-074	3428-CMS-074	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-074	CMS-074-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-075	3428-CMS-075	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-075	CMS-075-A	30-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-076	3428-CMS-076	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-076	CMS-076-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-078	3428-CMS-078	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-079	3428-CMS-079	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-080	3428-CMS-080	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-081	3428-CMS-081	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-081	CMS-081-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-082	3428-CMS-082	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-082	CMS-082-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-084	3428-CMS-084	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-085	3428-CMS-085	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-086	3428-CMS-086	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-087	3428-CMS-087	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-088	3428-CMS-088	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-089	3428-CMS-089	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-089	CMS-089-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-090	3428-CMS-090	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-091	3428-CMS-091	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-092	3428-CMS-092	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-093	3428-CMS-093	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-093	CMS-093-A	30-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-094	3428-CMS-094	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-094	CMS-094-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-095	3428-CMS-095	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-096	3428-CMS-096	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-098	3428-CMS-098	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-098	CMS-098-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-099	3428-CMS-099	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-100	3428-CMS-100	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-101	3428-CMS-101	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-102	3428-CMS-102	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-102	CMS-102-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-103	3428-CMS-103	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-104	3428-CMS-104	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-107	3428-CMS-107	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-108	3428-CMS-108	17-Feb-99	0-0.25 ft		Yes	
	CMS-109	3428-CMS-109	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-109	CMS-109-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-110	3428-CMS-110	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-111	3428-CMS-111	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-112	3428-CMS-112	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-114	3428-CMS-114	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-115	3428-CMS-115	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-116	3428-CMS-116	17-Feb-99	0-0.25 ft		Yes	
	CMS-117	3428-CMS-117	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-117	CMS-117-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-118	3428-CMS-118	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-118	CMS-118-A	30-Jun-99	0-1 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-119	3428-CMS-119	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-121	3428-CMS-121	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-124	3428-CMS-124	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-125	3428-CMS-125	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
Surface Soil	CMS-126	3428-CMS-126	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
(0-1 ft bgs)	CMS-127	3428-CMS-127	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-128	3428-CMS-128	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-130	3428-CMS-130	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-131	3428-CMS-131	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-131	CMS-131-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-132	3428-CMS-132	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-133	3428-CMS-133	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-134	3428-CMS-134	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-134	CMS-134-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-135	3428-CMS-135	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-135	CMS-135-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-136	3428-CMS-136	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-137	3428-CMS-137	17-Feb-99	0-0.25 ft		Yes	
	CMS-138	3428-CMS-138	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-139	3428-CMS-139	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-140	3428-CMS-140	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-140	CMS-140-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-141	3428-CMS-141	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-141	CMS-141-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-142	3428-CMS-142	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-142	CMS-142-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-143	3428-CMS-143	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-144	3428-CMS-144	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-145	3428-CMS-145	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-147	3428-CMS-147	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-147	CMS-147-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-148	3428-CMS-148	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-148	CMS-148-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-149	3428-CMS-149	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-149	CMS-149-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-150	3428-CMS-150	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-150	CMS-150-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-151	3428-CMS-151	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-152	3428-CMS-152	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-152	CMS-152-A	21-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-153	3428-CMS-153	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-154	3428-CMS-154	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-154	CMS-154-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-155	3428-CMS-155	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-155	CMS-155-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-156	3428-CMS-156*	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-156	CMS-156-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-157	3428-CMS-157	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-157	CMS-157-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-158	3428-CMS-158	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-158	CMS-158-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-159	3428-CMS-159	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-159	CMS-159-A	01-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-160	3428-CMS-160	16-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-160	CMS-160-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-161	3428-CMS-161	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-161	CMS-161-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-162	3428-CMS-162	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-162	CMS-162-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-163	3428-CMS-163	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-164	3428-CMS-164	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-164	CMS-164-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-165	3428-CMS-165	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
Surface Soil	CMS-165	CMS-165-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
(0-1 ft bgs)	CMS-166	3428-CMS-166	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-166	CMS-166-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-167	3428-CMS-167	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-167	CMS-167-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-168	3428-CMS-168	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-168	CMS-168-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-169	3428-CMS-169	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-169	CMS-169-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-170	3428-CMS-170	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-170	CMS-170-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-171	3428-CMS-171	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-171	CMS-171-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-172	3428-CMS-172	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-172	CMS-172-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-173	3428-CMS-173	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-173	CMS-173-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-175	3428-CMS-175	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-175	CMS-175-A	25-Jun-99	0-1 ft		No	West Bank of Allendale Pond
	CMS-184	3428-CMS-184	17-Feb-99	0-0.25 ft		Yes	
	CMS-185	3428-CMS-185	17-Feb-99	0-0.25 ft	Yes	Yes	Consistent TEQ signature
	CMS-189	3428-CMS-189	17-Feb-99	0-0.25 ft	Yes	Yes	Consistent TEQ signature
	CMS-197	3428-CMS-197	17-Feb-99	0-0.25 ft		Yes	
	CMS-220	3428-CMS-220	16-Feb-99	0-0.25 ft		Yes	
	CMS-222	3428-CMS-222	16-Feb-99	0-0.25 ft		Yes	
	CMS-223	3428-CMS-223	16-Feb-99	0-0.25 ft		Yes	
	CMS-225	3428-CMS-225	16-Feb-99	0-0.25 ft		Yes	
	CMS-226	3428-CMS-226	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-227	3428-CMS-227	17-Feb-99	0-0.25 ft		No	West Bank of Allendale Pond
	CMS-228	3428-CMS-228	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-229	3428-CMS-229	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-230	3428-CMS-230	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-231	3428-CMS-231	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-232	3428-CMS-232	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-232	CMS-232-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-233	3428-CMS-233	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-234	3428-CMS-234	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-235	3428-CMS-235	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-236	3428-CMS-236	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-237	3428-CMS-237	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-237	CMS-237-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-238	3428-CMS-238	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-238	CMS-238-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-239	3428-CMS-239	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-239	CMS-239-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-240	3428-CMS-240	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-240	CMS-240-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-241	3428-CMS-241	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-241	CMS-241-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-242	3428-CMS-242	17-Feb-99	0-0.25 ft		No	Sample evaluated in the Source Area
	CMS-242	CMS-242-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-400	CMS-400-A	21-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-401	CMS-401-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-402	CMS-402-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-403	CMS-403-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-A	22-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-405	CMS-405-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-406	CMS-406-A	29-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-407	CMS-407-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-408	CMS-408-A	28-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
Surface Soil	CMS-409	CMS-409-A	23-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
(0-1 ft bgs)	CMS-410	CMS-410-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4102	CMS-SS-4102-0008-01	22-Nov-02	0-0.8 ft		No	Sample evaluated in the Source Area
	CMS-4103	CMS-SS-4103-0010-01	22-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4104	CMS-DU-112202A-01	22-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4104	CMS-SS-4104-0010-01	22-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4105	CMS-SS-4105-0010-01	20-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4106	CMS-DU-111902A-01	19-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4106	CMS-SS-4106-0010-01	19-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4108	CMS-SS-4108-0010-01	21-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4109	CMS-SS-4109-0010-01	18-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-411	CMS-411-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4110	CMS-SS-4110-0010-01	19-Nov-02	0-1 ft		No	Sample evaluated in the Source Area
	CMS-4111	CMS-SS-4111-0009-01	21-Nov-02	0-0.9 ft		No	Sample evaluated in the Source Area
	CMS-412	CMS-412-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-413	CMS-413-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-414	CMS-414-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-415	CMS-415-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-416	CMS-416-A	25-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-417	CMS-417-A	24-Jun-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-418	CMS-418-A	30-Jun-99	0-1 ft	Yes	Yes	Consistent TEQ signature
	CMS-419	CMS-419-A	07-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-420	CMS-420-A	02-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-A	08-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-422	CMS-422-A	02-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-A	07-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-A	02-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-A	08-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-A	07-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-A	06-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-A	20-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-A	08-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-430	CMS-430-A	09-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-431	CMS-431-A	09-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-432	CMS-432-A	09-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-433	CMS-433-A	09-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-434	CMS-434-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-435	CMS-435-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-436	CMS-436-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-437	CMS-437-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-438	CMS-438-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-439	CMS-439-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-440	CMS-440-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-441	CMS-441-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-442	CMS-442-A	13-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-443	CMS-443-A	14-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-444	CMS-444-A	14-Jul-99	0-1 ft		Yes	
	CMS-445	CMS-445-A	14-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-446	CMS-446-A	14-Jul-99	0-1 ft		No	West Bank of Allendale Pond
	CMS-447	CMS-447-A	14-Jul-99	0-1 ft		No	West Bank of Allendale Pond
	CMS-456	CMS-456-A	20-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-460	CMS-460-A	27-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-461	CMS-461-A	27-Jul-99	0-1 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-462	CMS-462-A	27-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-463	CMS-463-A	27-Jul-99	0-1 ft		Yes	
	CMS-464	CMS-464-A	27-Jul-99	0-1 ft		Yes	
	CMS-466	CMS-466-A	27-Jul-99	0-1 ft		Yes	
	CMS-469	CMS-469-A	27-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-473	CMS-473-A	29-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
Allendale Pond	CMS-474	CMS-474-A	29-Jul-99	0-1 ft		Yes	
Surface Soil	CMS-475	CMS-475-A	29-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
(0-1 ft bgs)	CMS-478	CMS-478-A	29-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-479	CMS-479-A	29-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-480	CMS-480-A	29-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-481	CMS-481-A	30-Jul-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-482	CMS-482-A	30-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-485	CMS-485-A	30-Jul-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-486	CMS-486-A	30-Jul-99	0-1 ft		Yes	
	CMS-488	CMS-488-A	30-Jul-99	0-1 ft		Yes	
	CMS-491	CMS-491-A	30-Jul-99	0-1 ft		Yes	
	CMS-492	CMS-492-A	30-Jul-99	0-1 ft		Yes	
	CMS-497	CMS-497-A	12-Aug-99	0-1 ft		Yes	
	CMS-498	CMS-498-A	12-Aug-99	0-1 ft		Yes	
	CMS-499	CMS-499-A	12-Aug-99	0-1 ft		Yes	
	CMS-500	CMS-500-A	12-Aug-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-501	CMS-501-A	12-Aug-99	0-1 ft		Yes	
	CMS-502	CMS-502-A	12-Aug-99	0-1 ft		Yes	
	CMS-503	CMS-503-A	12-Aug-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-504	CMS-504-A	12-Aug-99	0-1 ft	Yes	No	Consistent TEQ signature, below background value of 56.7 ppt
	CMS-505	CMS-505-A	12-Aug-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	CMS-506	CMS-506-A	12-Aug-99	0-1 ft		Yes	
	CMS-507	CMS-507-A	12-Aug-99	0-1 ft		Yes	
	CMS-508	CMS-508-A	12-Aug-99	0-1 ft		Yes	
	CMS-700	CMS-700-A	05-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-701	CMS-701-A	05-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-702	CMS-702-A	05-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-703	CMS-703-A	05-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	CMS-703	CMS-703-COMP	05-Nov-99	0-2 ft		No	Sample evaluated in the Source Area
	CMW-SD-2016	CMW-SD-2016-01	26-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2017	CMW-SD-2017-01	27-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2018	CMW-SD-2018-01	26-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2019	CMW-SD-2019-01	26-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2020	CMW-SD-2020-01	26-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2021	CMW-SD-2021-01	26-Oct-99	0-0.5 ft		No	Sample evaluated in the Source Area
	CMW-SD-2022	CMW-SD-2022-0.502-01	27-Oct-99	0.5-2 ft		No	Sample evaluated in the Source Area
	MW-LEA-01	1314197	31-Jan-08	0-2 ft		No	Source Area
	MW-LEA-02	1314205	31-Jan-08	0-2 ft		No	Source Area
	MW-LEA-03	1314211	05-Feb-08	0-2 ft		No	Source Area
	RES-14-210-02	RES-SS-14-210-02	16-Nov-99	0-1 ft		Yes	
	RES-14-210-03	RES-SS-14-210-03	16-Nov-99	0-1 ft		Yes	
	RES-14-271-01	RES-SS-14-271-01	15-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-271-01A	RES-SS-14-271-01A	02-Dec-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-272-01	RES-SS-14-272-01	18-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-302-01	RES-SS-14-302-01	18-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-303-01	RES-SS-14-303-01	15-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-303-02	RES-SS-14-303-02	15-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-333-01	RES-SS-14-333-01	15-Nov-99	0-1 ft		No	Sample evaluated in the Source Area
	RES-14-333-02	RES-SS-14-333-02	15-Nov-99	0-1 ft		Yes	
	RES-14-365-02	RES-SS-14-365-02	15-Nov-99	0-1 ft		Yes	
	RES-14-365-03	RES-SS-14-365-03	15-Nov-99	0-1 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	RES-14-366-03	RES-SS-14-366-03	15-Nov-99	0-1 ft		Yes	
	RES-14-399-02	RES-SS-14-399-02	17-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-14-421-01	RES-SS-14-421-01	19-Nov-99	0-1 ft	Yes	No	No Dioxin analyses
	RES-14-422-02	RES-SS-14-422-02	02-Dec-99	0-1 ft		Yes	
	RES-14-425-02	RES-SS-14-425-02	02-Dec-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-14-425-03	RES-SS-14-425-03	02-Dec-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	SD-30	SD-30	09-Sep-98	0-0.5 ft		No	Sample evaluated in the Source Area
Allendale Pond	SD-31	SD-31	09-Sep-98	0-0.5 ft		No	Sample evaluated in the Source Area
Surface Soil	SS-01	SS-01	09-Sep-98	0-0 ft		No	Sample evaluated in the Source Area
(0-1 ft bgs)	SS-02	SS-02	09-Sep-98	0-1.3 ft		No	Sample evaluated in the Source Area
	SS-04	SS-04	09-Sep-98	0-1.5 ft		No	Sample evaluated in the Source Area
	SS-05	SS-05	09-Sep-98	0-1.5 ft		No	Sample evaluated in the Source Area
	SS-06	SS-06	09-Sep-98	0-2 ft		No	Sample evaluated in the Source Area
	SS-99-00	SS-99-00	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-01	SS-99-01	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-02	SS-99-02	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-03	SS-99-03	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-04	SS-99-04	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-05	SS-99-05	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
	SS-99-06	SS-99-06	15-Jan-99	0-0.25 ft		No	Sample evaluated in the Source Area
Allendale Pond	AP-DEL-01	2102244	11-Apr-02	1-2 ft		Yes	
Subsurface Soil	AP-DEL-02	2102242	11-Apr-02	1-2 ft		Yes	
(1-10 ftbgs)	AP-DEL-03	2102240	11-Apr-02	1-2 ft		Yes	
	AP-DEL-05	2102236	11-Apr-02	1-2 ft		Yes	
	AP-DEL-06	2102234	11-Apr-02	1-2 ft	Yes	No	Inconsistent TEQ signature
	AP-DEL-07	2102232	11-Apr-02	1-2 ft		Yes	
	AP-DEL-08	2102229	11-Apr-02	1-2 ft		Yes	
	AP-DEL-09	2102227	10-Apr-02	1-2 ft		Yes	
	AP-DEL-10	2102225	10-Apr-02	1-2 ft		Yes	
	AP-DEL-11	2102223	10-Apr-02	1-2 ft		Yes	
	AP-DEL-12	2102221	10-Apr-02	1-2 ft		Yes	
	AP-DEL-13	2102219	10-Apr-02	1-2 ft		Yes	
	AP-DEL-14	2102217	10-Apr-02	1-2 ft		Yes	
	AP-DEL-15	2102215	10-Apr-02	1-2 ft		Yes	
	AP-DEL-16	2102213	10-Apr-02	1-2 ft		Yes	
	AP-DEL-18	2102210	10-Apr-02	1-2 ft		Yes	
	AP-DEL-19	2102208	10-Apr-02	1-2 ft		Yes	
	AP-DEL-20	2102206	10-Apr-02	1-2 ft		Yes	
	CMS-019	CMS-019-B	14-Jul-99	1-2 ft		No	West Bank of Allendale Pond
	CMS-019	CMS-019-C	14-Jul-99	2-3 ft		No	West Bank of Allendale Pond
	CMS-019	CMS-019-D	14-Jul-99	3-4 ft		No	West Bank of Allendale Pond
	CMS-019	CMS-019-F	14-Jul-99	5-6 ft		No	West Bank of Allendale Pond
	CMS-019	CMS-019-G	14-Jul-99	6-7 ft		No	West Bank of Allendale Pond
	CMS-051	CMS-051-B	02-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-051	CMS-051-C	02-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-057	CMS-057-B	01-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-057	CMS-057-C	01-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-057	CMS-057-D	01-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-060	CMS-060-B	30-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-060	CMS-060-C	30-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-060	CMS-060-D	30-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-060	CMS-060-E	30-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-063	CMS-063-B	02-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-B	30-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-C	30-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-D	30-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-E	30-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-F	30-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-069	CMS-069-G	30-Jun-99	6-7 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-069	CMS-069-H	30-Jun-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-074	CMS-074-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-074	CMS-074-C	29-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-075	CMS-075-B	30-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-075	CMS-075-C	30-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-075	CMS-075-D	30-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-076	CMS-076-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-076	CMS-076-C	29-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-081	CMS-081-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
Subsurface Soil	CMS-082	CMS-082-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	CMS-089	CMS-089-B	28-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-089	CMS-089-C	28-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-089	CMS-089-D	28-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-118	CMS-118-B	30-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-118	CMS-118-C	30-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-118	CMS-118-D	30-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-118	CMS-118-E	30-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-131	CMS-131-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-131	CMS-131-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-131	CMS-131-D	25-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-147	CMS-147-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-147	CMS-147-C	24-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-150	CMS-150-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-152	CMS-152-B	21-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-152	CMS-152-C	21-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-D	22-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-E	22-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-153	CMS-153-F	22-Jun-99	5-5.5 ft		No	Sample evaluated in the Source Area
	CMS-154	CMS-154-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-154	CMS-154-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-155	CMS-155-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-155	CMS-155-D	02-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-155	CMS-155-E	02-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-155	CMS-155-F	02-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-160	CMS-160-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-160	CMS-160-C	23-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-161	CMS-161-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-162	CMS-162-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-162	CMS-162-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-162	CMS-162-D	02-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-168	CMS-168-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-168	CMS-168-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-170	CMS-170-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-173	CMS-173-B	28-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-175	CMS-175-B	25-Jun-99	1-2 ft		No	West Bank of Allendale Pond
	CMS-175	CMS-175-C	25-Jun-99	2-3 ft		No	West Bank of Allendale Pond
	CMS-175	CMS-175-D	25-Jun-99	3-4 ft		No	West Bank of Allendale Pond
	CMS-232	CMS-232-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-237	CMS-237-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-237	CMS-237-C	23-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-238	CMS-238-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-239	CMS-239-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-241	CMS-241-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-242	CMS-242-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-400	CMS-400-B	21-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-400	CMS-400-C	21-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-400	CMS-400-D	21-Jun-99	3-4 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-400	CMS-400-E	21-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-400	CMS-400-F	21-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-401	CMS-401-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-401	CMS-401-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-401	CMS-401-D	22-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-402	CMS-402-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-402	CMS-402-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-402	CMS-402-D	22-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-402	CMS-402-E	22-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-402	CMS-402-F	22-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
Subsurface Soil	CMS-403	CMS-403-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	CMS-403	CMS-403-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-403	CMS-403-D	22-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-403	CMS-403-E	22-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-B	22-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-C	22-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-D	22-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-E	22-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-404	CMS-404-F	22-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-405	CMS-405-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-405	CMS-405-C	23-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-405	CMS-405-D	23-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-405	CMS-405-E	23-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-406	CMS-406-B	29-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-406	CMS-406-C	29-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-406	CMS-406-D	29-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-407	CMS-407-B	28-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-407	CMS-407-C	28-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-407	CMS-407-D	28-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-408	CMS-408-B	28-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-408	CMS-408-C	28-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-409	CMS-409-B	23-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-409	CMS-409-C	23-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-409	CMS-409-D	23-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-409	CMS-409-E	23-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-409	CMS-409-F	23-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-410	CMS-410-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-410	CMS-410-C	24-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-410	CMS-410-D	24-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-410	CMS-410-E	24-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-410	CMS-410-F	24-Jun-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-4101	CMS-SS-4101-1019-01	22-Nov-02	1-1.9 ft		No	Sample evaluated in the Source Area
	CMS-4101	CMS-SS-4101-3042-01	22-Nov-02	3-4.2 ft		No	Sample evaluated in the Source Area
	CMS-4101	CMS-SS-4101-5062-01	22-Nov-02	5-6.2 ft		No	Sample evaluated in the Source Area
	CMS-4102	CMS-SS-4102-1019-01	22-Nov-02	1-1.9 ft		No	Sample evaluated in the Source Area
	CMS-4102	CMS-SS-4102-3038-01	22-Nov-02	3-3.8 ft		No	Sample evaluated in the Source Area
	CMS-4105	CMS-SS-4105-1015-01	20-Nov-02	1-1.5 ft		No	Sample evaluated in the Source Area
	CMS-4105	CMS-SS-4105-3040-01	20-Nov-02	3-4 ft		No	Sample evaluated in the Source Area
	CMS-4106	CMS-SS-4106-1016-01	19-Nov-02	1-1.6 ft		No	Sample evaluated in the Source Area
	CMS-4106	CMS-SS-4106-3036-01	19-Nov-02	3-3.6 ft		No	Sample evaluated in the Source Area
	CMS-4107	CMS-SS-4107-1030-01	21-Nov-02	1-3 ft		No	Sample evaluated in the Source Area
	CMS-4107	CMS-SS-4107-3040-01	21-Nov-02	3-4 ft		No	Sample evaluated in the Source Area
	CMS-4108	CMS-SS-4108-1030-01	21-Nov-02	1-3 ft		No	Sample evaluated in the Source Area
	CMS-4108	CMS-SS-4108-3040-01	21-Nov-02	3-4 ft		No	Sample evaluated in the Source Area
	CMS-4109	CMS-SS-4109-1014-01	18-Nov-02	1-1.4 ft		No	Sample evaluated in the Source Area
	CMS-4109	CMS-SS-4109-3038-01	18-Nov-02	3-3.8 ft		No	Sample evaluated in the Source Area
	CMS-411	CMS-411-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-411	CMS-411-C	24-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-411	CMS-411-D	24-Jun-99	3-4 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-411	CMS-411-E	24-Jun-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-4110	CMS-SS-4110-1014-01	18-Nov-02	1-1.4 ft		No	Sample evaluated in the Source Area
	CMS-4110	CMS-SS-4110-1015-01	19-Nov-02	1-1.5 ft		No	Sample evaluated in the Source Area
	CMS-4110	CMS-SS-4110-3739-01	19-Nov-02	3.7-3.9 ft		No	Sample evaluated in the Source Area
	CMS-4111	CMS-SS-4111-1028-01	21-Nov-02	1-2.8 ft		No	Sample evaluated in the Source Area
	CMS-4111	CMS-SS-4111-3046-01	21-Nov-02	3-4.5 ft		No	Sample evaluated in the Source Area
	CMS-412	CMS-412-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-412	CMS-412-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-412	CMS-412-D	25-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-413	CMS-413-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-413	CMS-413-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
Subsurface Soil	CMS-414	CMS-414-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	CMS-414	CMS-414-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-414	CMS-414-D	25-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-415	CMS-415-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-415	CMS-415-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-415	CMS-415-D	25-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-416	CMS-416-B	25-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-416	CMS-416-C	25-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-416	CMS-416-D	25-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-417	CMS-417-B	24-Jun-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-417	CMS-417-C	24-Jun-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-417	CMS-417-D	24-Jun-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-418	CMS-418-B	30-Jun-99	1-2 ft	Yes	Yes	Consistent TEQ signature
	CMS-419	CMS-419-B	07-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-C	07-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-D	07-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-E	07-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-F	07-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-G	07-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-419	CMS-419-H	07-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-420	CMS-420-B	02-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-420	CMS-420-C	02-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-420	CMS-420-D	02-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-B	08-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-C	08-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-D	08-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-E	08-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-F	08-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-G	08-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-421	CMS-421-H	08-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-422	CMS-422-B	02-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-422	CMS-422-C	02-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-422	CMS-422-D	02-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-B	07-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-C	07-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-D	07-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-E	07-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-F	07-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-G	07-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-423	CMS-423-H	07-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-B	02-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-C	02-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-D	02-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-E	02-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-F	02-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-G	02-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-424	CMS-424-H	02-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-B	08-Jul-99	1-2 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-425	CMS-425-C	08-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-D	08-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-E	08-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-F	08-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-G	08-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-425	CMS-425-H	08-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-B	07-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-C	07-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-D	07-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-E	07-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-426	CMS-426-F	07-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-426	CMS-426-G	07-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
Subsurface Soil	CMS-426	CMS-426-H	07-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	CMS-427	CMS-427-B	06-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-C	06-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-D	06-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-E	06-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-F	06-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-G	06-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-427	CMS-427-H	06-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-B	20-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-C	20-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-D	20-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-E	20-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-428	CMS-428-F	20-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-B	08-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-C	08-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-D	08-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-E	08-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-F	07-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-G	07-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-429	CMS-429-H	08-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-430	CMS-430-B	09-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-430	CMS-430-C	09-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-431	CMS-431-B	09-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-431	CMS-431-C	09-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-432	CMS-432-B	09-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-432	CMS-432-C	09-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-432	CMS-432-D	09-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-432	CMS-432-E	09-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-433	CMS-433-B	09-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-433	CMS-433-C	09-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-433	CMS-433-D	09-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-436	CMS-436-B	13-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-437	CMS-437-B	13-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-437	CMS-437-C	13-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-437	CMS-437-D	13-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-438	CMS-438-B	13-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-439	CMS-439-B	13-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-441	CMS-441-B	13-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-D	20-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-E	20-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-F	20-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-G	20-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-H	20-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-I	20-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-448	CMS-448-J	20-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-449	CMS-449-E	20-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-449	CMS-449-F	20-Jul-99	5-6 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	CMS-449	CMS-449-G	20-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-449	CMS-449-H	20-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-449	CMS-449-I	20-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-449	CMS-449-J	20-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-D	21-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-E	21-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-F	21-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-G	21-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-H	21-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-I	21-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-450	CMS-450-J	21-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-451	CMS-451-E	20-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
Allendale Pond	CMS-451	CMS-451-F	20-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
Subsurface Soil	CMS-451	CMS-451-G	20-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	CMS-451	CMS-451-H	20-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-451	CMS-451-I	20-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-451	CMS-451-J	20-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-E	21-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-F	21-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-G	21-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-H	21-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-I	21-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-452	CMS-452-J	21-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-D	21-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-E	21-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-F	21-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-G	21-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-H	21-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-I	21-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-453	CMS-453-J	21-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-454	CMS-454-B	21-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-454	CMS-454-C	21-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-454	CMS-454-D	21-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-454	CMS-454-E	21-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-454	CMS-454-F	21-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-C	19-Jul-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-D	19-Jul-99	3-4 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-E	19-Jul-99	4-5 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-F	19-Jul-99	5-6 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-G	19-Jul-99	6-7 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-H	19-Jul-99	7-8 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-I	19-Jul-99	8-9 ft		No	Sample evaluated in the Source Area
	CMS-455	CMS-455-J	19-Jul-99	9-10 ft		No	Sample evaluated in the Source Area
	CMS-456	CMS-456-B	20-Jul-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-474	CMS-474-B	29-Jul-99	1-2 ft		Yes	
	CMS-474	CMS-474-C	29-Jul-99	2-3 ft		Yes	
	CMS-700	CMS-700-B	05-Nov-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-701	CMS-701-B	05-Nov-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-701	CMS-701-C	05-Nov-99	2-3 ft		No	Sample evaluated in the Source Area
	CMS-702	CMS-702-B	05-Nov-99	1-2 ft		No	Sample evaluated in the Source Area
	CMS-703	CMS-703-B	05-Nov-99	1-2 ft		No	Sample evaluated in the Source Area
	CMW-SD-2022	CMW-SD-2022-022.5-01	27-Oct-99	2-2.5 ft		No	Sample evaluated in the Source Area
	GEC-1	B-1, S-3	12-Mar-99	8.5-10.5 ft		No	Sample evaluated in the Source Area
	GEC-2	B-2, S-2	11-Mar-99	5-7 ft		No	Sample evaluated in the Source Area
	GEC-3	B-3, S-3	11-Mar-99	8-10 ft		No	Sample evaluated in the Source Area
	GEC-4	B-4, S-2	11-Mar-99	5-7 ft		No	Sample evaluated in the Source Area
	GEC-5	B-5, S-2	11-Mar-99	5-7 ft		No	Sample evaluated in the Source Area
	GEC-5	B-5, S-3	11-Mar-99	8-10 ft		No	Sample evaluated in the Source Area

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	GEC-6	B-6, S-2	12-Mar-99	2.5-4.5 ft		No	Sample evaluated in the Source Area
	GEC-7	B-7, S-2	12-Mar-99	2.5-4.5 ft		No	Sample evaluated in the Source Area
	MW01S	CM-SO-MW01-0102	28-Dec-00	1-2 ft		No	Sample evaluated in the Source Area
	MW01S	CM-SO-MW01-0204	28-Dec-00	2-4 ft		No	Sample evaluated in the Source Area
	MW01S	CM-SO-MW01-0406	28-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW01S	CM-SO-MW01-0608	28-Dec-00	6-8 ft		No	Sample evaluated in the Source Area
	MW02S	CM-SO-MW02-0204	05-Jan-01	2-4 ft		No	Sample evaluated in the Source Area
	MW02S	CM-SO-MW02-0406	05-Jan-01	4-6 ft		No	Sample evaluated in the Source Area
	MW02S	CM-SO-MW02-0608	05-Jan-01	6-8 ft		No	Sample evaluated in the Source Area
	MW02S	CM-SO-MW02-0810	05-Jan-01	8-10 ft		No	Sample evaluated in the Source Area
	MW03S	CM-SO-MW03-0406	27-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW03S	CM-SO-MW03-0608	27-Dec-00	6-8 ft		No	Sample evaluated in the Source Area
	MW04D	CM-SO-MW04-0204	12-Jun-01	2-4 ft		No	Sample evaluated in the Source Area
Allendale Pond	MW04D	CM-SO-MW04-0406	12-Jun-01	4-6 ft		No	Sample evaluated in the Source Area
Subsurface Soil	MW04D	CM-SO-MW04-0608	12-Jun-01	6-8 ft		No	Sample evaluated in the Source Area
(1-10 ftbgs)	MW05S	CM-SO-MW05-0102	18-Jun-01	1-2 ft		No	Sample evaluated in the Source Area
	MW05S	CM-SO-MW05-0204	18-Jun-01	2-4 ft		No	Sample evaluated in the Source Area
	MW05S	CM-SO-MW05-0406	19-Jun-01	4-6 ft		No	Sample evaluated in the Source Area
	MW05S	CM-SO-MW05-0408	19-Jun-01	4-8 ft		No	Sample evaluated in the Source Area
	MW05S	CM-SO-MW05-0810	19-Jun-01	8-10 ft		No	Sample evaluated in the Source Area
	MW06S	CM-SO-MW06-0204	19-Dec-00	2-4 ft		No	Sample evaluated in the Source Area
	MW06S	CM-SO-MW06-0406	19-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW06S	CM-SO-MW06-0608	19-Dec-00	6-8 ft		No	Sample evaluated in the Source Area
	MW07S	CM-SO-MW07-0304	21-Dec-00	3-4 ft		No	Sample evaluated in the Source Area
	MW07S	CM-SO-MW07-0406	21-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW07S	CM-SO-MW07-0608	21-Dec-00	6-8 ft		No	Sample evaluated in the Source Area
	MW08S	CM-SO-MW08-0102	26-Dec-00	1-2 ft		No	Sample evaluated in the Source Area
	MW08S	CM-SO-MW08-0204	26-Dec-00	2-4 ft		No	Sample evaluated in the Source Area
	MW08S	CM-SO-MW08-0406	26-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW08S	CM-SO-MW08-0608	26-Dec-00	6-8 ft		No	Sample evaluated in the Source Area
	MW09S	CM-SO-MW09-0406	18-Dec-00	4-6 ft		No	Sample evaluated in the Source Area
	MW14M	CM-SO-MW14-0102	13-Jul-01	1-2 ft		No	Sample evaluated in the Source Area
	MW14M	CM-SO-MW14-0204	13-Jul-01	2-4 ft		No	Sample evaluated in the Source Area
	MW14M	CM-SO-MW14-0607	13-Jul-01	6-7 ft		No	Sample evaluated in the Source Area
	MW14M	CM-SO-MW14-0608	13-Jul-01	6-8 ft		No	Sample evaluated in the Source Area
	MW14M	CM-SO-MW14-0708	13-Jul-01	7-8 ft		No	Sample evaluated in the Source Area
	MW15D	CM-SO-MW15D-0204	07-Aug-01	2-4 ft		No	Sample evaluated in the Source Area
	MW15D	CM-SO-MW15D-0406	07-Aug-01	4-6 ft		No	Sample evaluated in the Source Area
	MW15D	CM-SO-MW15D-0608	07-Aug-01	6-8 ft		No	Sample evaluated in the Source Area
	MW-LEA-01	1314198	31-Jan-08	2-4 ft		No	Source Area
	MW-LEA-01	1314199	31-Jan-08	4-6 ft		No	Source Area
	MW-LEA-01	1314200	31-Jan-08	6-8 ft		No	Source Area
	MW-LEA-01	1314201	31-Jan-08	8-10 ft		No	Source Area
	MW-LEA-01	1314202	31-Jan-08	8-10 ft		No	Source Area
	MW-LEA-02	1314206	31-Jan-08	2-4 ft		No	Source Area
	MW-LEA-02	1314207	31-Jan-08	4-6 ft		No	Source Area
	MW-LEA-02	1314208	31-Jan-08	6-8 ft		No	Source Area
	MW-LEA-02	1314209	31-Jan-08	8-10 ft		No	Source Area
	MW-LEA-03	1314212	05-Feb-08	2-4 ft		No	Source Area
	MW-LEA-03	1314213	05-Feb-08	4-6 ft		No	Source Area
	MW-LEA-03	1314214	05-Feb-08	6-8 ft		No	Source Area
	MW-LEA-03	1314215	05-Feb-08	8-10 ft		No	Source Area
	SB02	CM-SO-SB02-0204	03-Jan-01	2-4 ft		No	Sample evaluated in the Source Area
	SB02	CM-SO-SB02-0406	03-Jan-01	4-6 ft		No	Sample evaluated in the Source Area
	SB02	CM-SO-SB02-0608	03-Jan-01	6-8 ft		No	Sample evaluated in the Source Area
	SB03	CM-SO-SB03-0204	09-Jan-01	2-4 ft		No	Sample evaluated in the Source Area
	SB03	CM-SO-SB03-0406	09-Jan-01	4-6 ft		No	Sample evaluated in the Source Area
	SB03	CM-SO-SB03-0608	09-Jan-01	6-8 ft		No	Sample evaluated in the Source Area
	SB-14-271	CM-SO-SB-14-271-0102	21-Jun-01	1-2 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	SB-14-271	CM-SO-SB-14-271-0204	21-Jun-01	2-4 ft		Yes	
	SB-14-271	CM-SO-SB-14-271-0406	21-Jun-01	4-6 ft		Yes	
	SB-14-271	CM-SO-SB-14-271-0608	21-Jun-01	6-8 ft		Yes	
	SS-03	SS-03	09-Sep-98	2.5-3.5 ft		No	Sample evaluated in the Source Area
Lyman Mill Pond	10-DEL-100	2108299	18-Jul-02	0-2 ft		Yes	
Surface Soil	10-DEL-200	2108300	18-Jul-02	0-2 ft		Yes	
(0-1 ft bgs)	10-DEL-301	2108297	18-Jul-02	0-2 ft		Yes	
	10-DEL-302	2108296	18-Jul-02	0-2 ft		Yes	
	10-DEL-303	2108301	18-Jul-02	0-2 ft		Yes	
	10-DEL-304	2112410	10-Sep-02	0-2 ft		Yes	
	11-DEL-100	2108286	17-Jul-02	0-2 ft		Yes	
	12-DEL-101	2108282	17-Jul-02	0-1 ft		No	Samples evaluated for Fogarty Center
	12-DEL-102	2108283	17-Jul-02	0-2 ft		No	Samples evaluated for Fogarty Center
Lyman Mill Pond	12-DEL-103	2108284	17-Jul-02	0-1 ft		No	Samples evaluated for Fogarty Center
Surface Soil	12-DEL-200	2108287	17-Jul-02	0-1.5 ft		No	Samples evaluated for Fogarty Center
(0-1 ft bgs)	9-DEL-100	2108289	17-Jul-02	0-2 ft		Yes	
	9-DEL-201	2108293	17-Jul-02	0-2 ft		Yes	
	9-DEL-202	2108290	17-Jul-02	0-2 ft		Yes	
	9-DEL-203	2108292	17-Jul-02	0-2 ft		Yes	
	9-DEL-300	2108288	17-Jul-02	0-2 ft		Yes	
	LPX-4112	LPX-SS-4112-0005-01	22-Nov-02	0-0.5 ft		No	Samples evaluated for Fogarty Center
	LPX-4113	LPX-SS-4113-0005-01	22-Nov-02	0-0.5 ft		No	Samples evaluated for Fogarty Center
	LPX-4114	LPX-SS-4114-0005-01	22-Nov-02	0-0.5 ft		No	Samples evaluated for Fogarty Center
	LPX-FP-4004	LPX-FP-4004-0000-01	19-Jul-01	0-0.5 ft		No	Sample evaluated in the Oxbow Area
	LPX-FP-4006	LPX-FP-4006-0000-01	19-Jul-01	0-0.5 ft		Yes	
	LPX-FP-4007	LPX-FP-4007-0000-01	19-Jul-01	0-0.5 ft		Yes	
	RES-10-004-01	RES-SS-10-004-01	18-Nov-99	0-1 ft		Yes	
	RES-10-004-02	RES-SS-10-004-02	18-Nov-99	0-1 ft		Yes	
	RES-10-004-03	RES-SS-10-004-03	18-Nov-99	0-1 ft		Yes	
	RES-10-005-01	RES-SS-10-005-01	18-Nov-99	0-1 ft		Yes	
	RES-10-005-02	RES-SS-10-005-02	18-Nov-99	0-1 ft		Yes	
	RES-10-005-03	RES-SS-10-005-03	18-Nov-99	0-1 ft		Yes	
	RES-10-042-01	RES-SS-10-042-01	18-Nov-99	0-1 ft		Yes	
	RES-10-042-02	RES-SS-10-042-02	18-Nov-99	0-1 ft		Yes	
	RES-10-042-03	RES-SS-10-042-03	18-Nov-99	0-1 ft		Yes	
	RES-10-044-01	RES-SS-10-044-01	19-Nov-99	0-1 ft		Yes	
	RES-10-044-02	RES-SS-10-044-02	19-Nov-99	0-1 ft		Yes	
	RES-10-044-03	RES-SS-10-044-03	19-Nov-99	0-1 ft		Yes	
	RES-10-053-01	RES-SS-10-053-01	02-Dec-99	0-1 ft		Yes	
	RES-10-053-02	RES-SS-10-053-02	02-Dec-99	0-1 ft		Yes	
	RES-10-053-03	RES-SS-10-053-03	02-Dec-99	0-1 ft		Yes	
	RES-10-068-01	RES-SS-10-068-01	19-Nov-99	0-1 ft		Yes	
	RES-10-068-02	RES-SS-10-068-02	19-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-10-068-03	RES-SS-10-068-03	19-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-10-074-01	RES-SS-10-074-01	19-Nov-99	0-1 ft		Yes	
	RES-10-074-02	RES-SS-10-074-02	19-Nov-99	0-1 ft		Yes	
	RES-10-074-03	RES-SS-10-074-03	19-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-10-075-01	RES-SS-10-075-01	19-Nov-99	0-1 ft		Yes	
	RES-10-075-02	RES-SS-10-075-02	19-Nov-99	0-1 ft		Yes	
	RES-10-075-03	RES-SS-10-075-03	19-Nov-99	0-1 ft		Yes	
	RES-10-076-01	RES-SS-10-076-01	19-Nov-99	0-1 ft		Yes	
	RES-10-076-02	RES-SS-10-076-02	19-Nov-99	0-1 ft		Yes	
	RES-10-076-03	RES-SS-10-076-03	19-Nov-99	0-1 ft		Yes	
	RES-10-604-01	RES-SS-10-604-01	18-Nov-99	0-1 ft		Yes	
	RES-10-604-02	RES-SS-10-604-02	18-Nov-99	0-1 ft		Yes	
	RES-10-604-03	RES-SS-10-604-03	18-Nov-99	0-1 ft		Yes	
	RES-11-011	RES-SS-11-011-AVG	02-Dec-99	0-1 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	RES-11-011-01	RES-SS-11-011-01	02-Dec-99	0-1 ft		Yes	
	RES-11-011-02	RES-SS-11-011-02	02-Dec-99	0-1 ft		Yes	
	RES-11-011-03	RES-SS-11-011-03	02-Dec-99	0-1 ft		Yes	
	RES-11-012	RES-SS-11-012-AVG	02-Dec-99	0-1 ft		Yes	
	RES-11-012-01	RES-SS-11-012-01	02-Dec-99	0-1 ft		Yes	
	RES-11-012-02	RES-SS-11-012-02	02-Dec-99	0-1 ft		Yes	
	RES-11-012-03	RES-SS-11-012-03	02-Dec-99	0-1 ft		Yes	
	RES-11-328-01	RES-SS-11-328-01	18-Nov-99	0-1 ft		Yes	
	RES-11-328-02	RES-SS-11-328-02	18-Nov-99	0-1 ft		Yes	
	RES-11-328-03	RES-SS-11-328-03	18-Nov-99	0-1 ft		Yes	
	RES-11-396-02	RES-SS-11-396-02	17-Nov-99	0-1 ft		Yes	
	RES-11-396-03	RES-SS-11-396-03	17-Nov-99	0-1 ft		Yes	
	RES-11-419-01	RES-SS-11-419-01	19-Nov-99	0-1 ft		Yes	
	RES-11-419-02	RES-SS-11-419-02	19-Nov-99	0-1 ft		No	Sample evaluated in the Oxbow Area
	RES-11-419-03	RES-SS-11-419-03	19-Nov-99	0-1 ft		Yes	
Lyman Mill Pond	RES-11-420-01	RES-SS-11-420-01	17-Nov-99	0-1 ft		Yes	
Surface Soil	RES-11-420-02	RES-SS-11-420-02	17-Nov-99	0-1 ft		Yes	
(0-1 ft bgs)	RES-11-420-03	RES-SS-11-420-03	17-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-11-420-04	RES-SS-11-420-04	17-Nov-99	0-1 ft		Yes	
	RES-11-422-01	RES-SS-11-422-01	17-Nov-99	0-1 ft		Yes	
	RES-11-422-02	RES-SS-11-422-02	17-Nov-99	0-1 ft		Yes	
	RES-11-422-03	RES-SS-11-422-03	17-Nov-99	0-1 ft		Yes	
	RES-11-423-01	RES-SS-11-423-01	16-Nov-99	0-1 ft		Yes	
	RES-11-423-02	RES-SS-11-423-02	16-Nov-99	0-1 ft		Yes	
	RES-11-423-03	RES-SS-11-423-03	16-Nov-99	0-1 ft		Yes	
	RES-11-424-01	RES-SS-11-424-01	16-Nov-99	0-1 ft		Yes	
	RES-11-424-02	RES-SS-11-424-02	16-Nov-99	0-1 ft		Yes	
	RES-11-424-03	RES-SS-11-424-03	16-Nov-99	0-1 ft		Yes	
	RES-11-425-02	RES-SS-11-425-02	17-Nov-99	0-1 ft		Yes	
	RES-11-425-03	RES-SS-11-425-03	17-Nov-99	0-1 ft		Yes	
	RES-11-426-01	RES-SS-11-426-01	17-Nov-99	0-1 ft		Yes	
	RES-11-426-02	RES-SS-11-426-02	17-Nov-99	0-1 ft		Yes	
	RES-11-426-03	RES-SS-11-426-03	17-Nov-99	0-1 ft		Yes	
	RES-11-427-01	RES-SS-11-427-01	16-Nov-99	0-1 ft		Yes	
	RES-11-427-02	RES-SS-11-427-02	16-Nov-99	0-1 ft		Yes	
	RES-11-427-03	RES-SS-11-427-03	16-Nov-99	0-1 ft		Yes	
	RES-11-428-01	RES-SS-11-428-01	17-Nov-99	0-1 ft		Yes	
	RES-11-428-02	RES-SS-11-428-02	17-Nov-99	0-1 ft		Yes	
	RES-11-428-03	RES-SS-11-428-03	17-Nov-99	0-1 ft		Yes	
	RES-11-428-G	RES-SS-11-428-G	17-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-11-429-01	RES-SS-11-429-01	17-Nov-99	0-1 ft		Yes	
	RES-11-429-02	RES-SS-11-429-02	17-Nov-99	0-1 ft		Yes	
	RES-11-430-01	RES-SS-11-430-01	17-Nov-99	0-1 ft		Yes	
	RES-11-430-02	RES-SS-11-430-02	17-Nov-99	0-1 ft		Yes	
	RES-11-430-03	RES-SS-11-430-03	17-Nov-99	0-1 ft	Yes	No	Inconsistent TEQ signature
	RES-11-431-01	RES-SS-11-431-01	17-Nov-99	0-1 ft		Yes	
	RES-11-431-02	RES-SS-11-431-02	17-Nov-99	0-1 ft		Yes	
	RES-11-431-03	RES-SS-11-431-03	17-Nov-99	0-1 ft		Yes	
	RES-11-432-01	RES-SS-11-432-01	18-Nov-99	0-1 ft		Yes	
	RES-11-432-02	RES-SS-11-432-02	18-Nov-99	0-1 ft		Yes	
	RES-11-432-03	RES-SS-11-432-03	18-Nov-99	0-1 ft		Yes	
	RES-11-433-01	RES-SS-11-433-01	18-Nov-99	0-1 ft		Yes	
	RES-11-433-02	RES-SS-11-433-02	18-Nov-99	0-1 ft		Yes	
	RES-11-433-03	RES-SS-11-433-03	18-Nov-99	0-1 ft		Yes	
	RES-11-486-01	RES-SS-11-486-01	18-Nov-99	0-1 ft		Yes	
	RES-11-486-02	RES-SS-11-486-02	18-Nov-99	0-1 ft		Yes	
	RES-11-486-03	RES-SS-11-486-03	18-Nov-99	0-1 ft		Yes	
	RES-11-497-01	RES-SS-11-497-01	02-Dec-99	0-1 ft		Yes	

Table B-1-1.
Soil Samples Considered for Evaluation in the Eastern Shore of Allendale Pond and Lyman Mill Pond Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Evaluation Area	Sampling Location	Field Sample ID	Date Sampled	Sample Depth	Outside 100 Year Floodplain	Retained for Evaluation	Comment
	RES-11-497-02	RES-SS-11-497-02	02-Dec-99	0-1 ft		Yes	
	RES-11-497-03	RES-SS-11-497-03	02-Dec-99	0-1 ft		Yes	
	RES-11-577-01	RES-SS-11-577-01	18-Nov-99	0-1 ft		Yes	
	RES-11-577-02	RES-SS-11-577-02	18-Nov-99	0-1 ft		Yes	
	RES-11-577-03	RES-SS-11-577-03	18-Nov-99	0-1 ft		Yes	
	RES-12-556-01	RES-SS-12-556-01	16-Nov-99	0-1 ft	Yes	No	Sample collected from the Old Mill Raceway considered inaccessible
	RES-12-556-02	RES-SS-12-556-02	16-Nov-99	0-1 ft	Yes	No	Sample collected from the Old Mill Raceway considered inaccessible
	RES-12-560-01	RES-SS-12-560-01	16-Nov-99	0-1 ft		No	Sample collected from the Old Mill Raceway considered inaccessible
	RES-12-560-02	RES-SS-12-560-02	16-Nov-99	0-1 ft		No	Sample collected from the Old Mill Raceway considered inaccessible
	SS-99-07	SS-99-07	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
Lyman Mill Pond	SS-99-08	SS-99-08	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
Surface Soil	SS-99-09	SS-99-09	15-Jan-99	0-0.25 ft		No	Samples collected in the vicinity of the ballfield
(0-1 ft bgs)	SS-99-10	SS-99-10	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-11	SS-99-11	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-12	SS-99-12	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-13	SS-99-13	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-14	SS-99-14	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-15	SS-99-15	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-16	SS-99-16	15-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-21	SS-99-21	27-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-22	SS-99-22	27-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-23	SS-99-23	27-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-24	SS-99-24	27-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield
	SS-99-25	SS-99-25	27-Jan-99	0-0.25 ft	Yes	No	Samples collected in the vicinity of the ballfield

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-2.
Soil Samples and Analyses - Eastern Shore of Allendale Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sampling Location	Field Sample ID	Date Sampled	Sample Depth	VOCs	SVOCs	Pesticides/ PCBs	Herbicides	Metals	Dioxins/ Furans
02-DEL-202	2108330	22-Jul-02	0-2 ft						27
03/04-DEL-102	2108321	19-Jul-02	0-2 ft						27
03/04-DEL-104	2112412	10-Sep-02	0-2 ft						27
03/04-DEL-105	2112413	10-Sep-02	0-2 ft						27
03-DEL-102	2108327	22-Jul-02	0-2 ft						27
04-DEL-201	2108316	19-Jul-02	0-2 ft						27
04-DEL-202	2108315	19-Jul-02	0-2 ft						27
04-DEL-203	2108313	19-Jul-02	0-2 ft						27
05-DEL-100	2108311	19-Jul-02	0-2 ft						27
06-DEL-100	2108295	18-Jul-02	0-2 ft						27
06-DEL-200	2108294	18-Jul-02	0-2 ft						27
07-DEL-201	2108306	18-Jul-02	0-2 ft						27
07-DEL-202	2108304	19-Jul-02	0-2 ft						27
07-DEL-203	2108305	19-Jul-02	0-2 ft						27
AP-DEL-01	2102243	11-Apr-02	0-1 ft						27
AP-DEL-02	2102241	11-Apr-02	0-1 ft						27
AP-DEL-03	2102239	11-Apr-02	0-1 ft						27
AP-DEL-05	2102235	11-Apr-02	0-1 ft						27
AP-DEL-07	2102231	11-Apr-02	0-1 ft						27
AP-DEL-08	2102228	11-Apr-02	0-1 ft						27
AP-DEL-09	2102226	10-Apr-02	0-1 ft						27
AP-DEL-10	2102224	10-Apr-02	0-1 ft						27
AP-DEL-11	2102222	10-Apr-02	0-1 ft						27
AP-DEL-12	2102220	10-Apr-02	0-1 ft						27
AP-DEL-13	2102218	10-Apr-02	0-1 ft						27
AP-DEL-14	2102216	10-Apr-02	0-1 ft						27
AP-DEL-15	2102214	10-Apr-02	0-1 ft						27
AP-DEL-16	2102212	10-Apr-02	0-1 ft						27
AP-DEL-17	2102211	10-Apr-02	0-1 ft						27
AP-DEL-18	2102209	10-Apr-02	0-1 ft						27
AP-DEL-19	2102207	10-Apr-02	0-1 ft						27
AP-DEL-20	2102205	10-Apr-02	0-1 ft						27
CMS-108	3428-CMS-108	17-Feb-99	0-0.25 ft						5
CMS-116	3428-CMS-116	17-Feb-99	0-0.25 ft						5
CMS-137	3428-CMS-137	17-Feb-99	0-0.25 ft						5
CMS-184	3428-CMS-184	17-Feb-99	0-0.25 ft						5
CMS-185	3428-CMS-185	17-Feb-99	0-0.25 ft						5
CMS-189	3428-CMS-189	17-Feb-99	0-0.25 ft						5
CMS-197	3428-CMS-197	17-Feb-99	0-0.25 ft						5
CMS-220	3428-CMS-220	16-Feb-99	0-0.25 ft						5
CMS-222	3428-CMS-222	16-Feb-99	0-0.25 ft						5
CMS-223	3428-CMS-223	16-Feb-99	0-0.25 ft						5
CMS-225	3428-CMS-225	16-Feb-99	0-0.25 ft						5
CMS-418	CMS-418-A	30-Jun-99	0-1 ft	61	71	27	10	24	5
CMS-461	CMS-461-A	27-Jul-99	0-1 ft						30
CMS-463	CMS-463-A	27-Jul-99	0-1 ft						30
CMS-464	CMS-464-A	27-Jul-99	0-1 ft						30
CMS-466	CMS-466-A	27-Jul-99	0-1 ft						30
CMS-474	CMS-474-A	29-Jul-99	0-1 ft						30
CMS-486	CMS-486-A	30-Jul-99	0-1 ft						30
CMS-488	CMS-488-A	30-Jul-99	0-1 ft						30
CMS-491	CMS-491-A	30-Jul-99	0-1 ft						30
CMS-492	CMS-492-A	30-Jul-99	0-1 ft						30
CMS-497	CMS-497-A	12-Aug-99	0-1 ft						30
CMS-498	CMS-498-A	12-Aug-99	0-1 ft						30
CMS-499	CMS-499-A	12-Aug-99	0-1 ft						30
CMS-501	CMS-501-A	12-Aug-99	0-1 ft						30
CMS-502	CMS-502-A	12-Aug-99	0-1 ft						30

Table B-1-2.
Soil Samples and Analyses - Eastern Shore of Allendale Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sampling Location	Field Sample ID	Date Sampled	Sample Depth	VOCs	SVOCs	Pesticides/ PCBs	Herbicides	Metals	Dioxins/ Furans
CMS-506	CMS-506-A	12-Aug-99	0-1 ft						30
CMS-507	CMS-507-A	12-Aug-99	0-1 ft						30
CMS-508	CMS-508-A	12-Aug-99	0-1 ft						30
RES-14-210-02	RES-SS-14-210-02	16-Nov-99	0-1 ft						31
RES-14-210-03	RES-SS-14-210-03	16-Nov-99	0-1 ft						31
RES-14-333-02	RES-SS-14-333-02	15-Nov-99	0-1 ft						31
RES-14-365-02	RES-SS-14-365-02	15-Nov-99	0-1 ft						31
RES-14-365-03	RES-SS-14-365-03	15-Nov-99	0-1 ft						31
RES-14-366-03	RES-SS-14-366-03	15-Nov-99	0-1 ft						31
RES-14-422-02	RES-SS-14-422-02	02-Dec-99	0-1 ft						31

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-3.
Subsurface Soil Samples and Analyses - Eastern Shore of Allendale Pond
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sampling Location	Field Sample ID	Date Sampled	Sample Depth	VOCs	SVOCs	Pesticides/ PCBs	Herbicides	Metals	Dioxins/ Furans
AP-DEL-01	2102244	11-Apr-02	1-2 ft						27
AP-DEL-02	2102242	11-Apr-02	1-2 ft						27
AP-DEL-03	2102240	11-Apr-02	1-2 ft						27
AP-DEL-05	2102236	11-Apr-02	1-2 ft						27
AP-DEL-07	2102232	11-Apr-02	1-2 ft						27
AP-DEL-08	2102229	11-Apr-02	1-2 ft						27
AP-DEL-09	2102227	10-Apr-02	1-2 ft						27
AP-DEL-10	2102225	10-Apr-02	1-2 ft						27
AP-DEL-11	2102223	10-Apr-02	1-2 ft						27
AP-DEL-12	2102221	10-Apr-02	1-2 ft						27
AP-DEL-13	2102219	10-Apr-02	1-2 ft						27
AP-DEL-14	2102217	10-Apr-02	1-2 ft						27
AP-DEL-15	2102215	10-Apr-02	1-2 ft						27
AP-DEL-16	2102213	10-Apr-02	1-2 ft						27
AP-DEL-18	2102210	10-Apr-02	1-2 ft						27
AP-DEL-19	2102208	10-Apr-02	1-2 ft						27
AP-DEL-20	2102206	10-Apr-02	1-2 ft						27
CMS-418	CMS-418-B	30-Jun-99	1-2 ft	61	71	27	10	24	5
CMS-474	CMS-474-B	29-Jul-99	1-2 ft						30
CMS-474	CMS-474-C	29-Jul-99	2-3 ft						30
SB-14-271	CM-SO-SB-14-271-0102	21-Jun-01	1-2 ft	48	65	28		23	30
SB-14-271	CM-SO-SB-14-271-0204	21-Jun-01	2-4 ft	48	64	28		23	29
SB-14-271	CM-SO-SB-14-271-0406	21-Jun-01	4-6 ft	48	64	28		23	30
SB-14-271	CM-SO-SB-14-271-0608	21-Jun-01	6-8 ft	48	64	28		23	29

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-4.
Soil Samples and Analyses - Eastern Shore of Lyman Mill Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sampling Location	Field Sample ID	Date Sampled	Sample Depth	SVOCs	Pesticides/ PCBs	Metals	Dioxins/ Furans	Coplanar PCBs
10-DEL-301	2108297	18-Jul-02	0-2 ft				27	
10-DEL-302	2108296	18-Jul-02	0-2 ft				27	
10-DEL-304	2112410	10-Sep-02	0-2 ft				27	
11-DEL-100	2108286	17-Jul-02	0-2 ft				27	
9-DEL-201	2108293	17-Jul-02	0-2 ft				27	
9-DEL-202	2108290	17-Jul-02	0-2 ft				27	
9-DEL-203	2108292	17-Jul-02	0-2 ft				27	
LPX-FP-4006	LPX-FP-4006-0000-01	19-Jul-01	0-0.5 ft	33	31	21	30	
LPX-FP-4007	LPX-FP-4007-0000-01	19-Jul-01	0-0.5 ft	33	31	21	30	107
RES-10-004-01	RES-SS-10-004-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-10-004-02	RES-SS-10-004-02	18-Nov-99	0-1 ft				31	
RES-10-004-03	RES-SS-10-004-03	18-Nov-99	0-1 ft				31	
RES-10-005-01	RES-SS-10-005-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-10-005-02	RES-SS-10-005-02	18-Nov-99	0-1 ft				31	
RES-10-005-03	RES-SS-10-005-03	18-Nov-99	0-1 ft				31	
RES-10-042-01	RES-SS-10-042-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-10-042-02	RES-SS-10-042-02	18-Nov-99	0-1 ft				31	
RES-10-042-03	RES-SS-10-042-03	18-Nov-99	0-1 ft				31	
RES-10-044-01	RES-SS-10-044-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-10-044-02	RES-SS-10-044-02	19-Nov-99	0-1 ft				31	
RES-10-044-03	RES-SS-10-044-03	19-Nov-99	0-1 ft				31	
RES-10-053-01	RES-SS-10-053-01	02-Dec-99	0-1 ft	69	29	23	31	
RES-10-053-02	RES-SS-10-053-02	02-Dec-99	0-1 ft				31	
RES-10-053-03	RES-SS-10-053-03	02-Dec-99	0-1 ft				31	
RES-10-068-01	RES-SS-10-068-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-10-074-01	RES-SS-10-074-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-10-074-02	RES-SS-10-074-02	19-Nov-99	0-1 ft				31	
RES-10-075-01	RES-SS-10-075-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-10-075-02	RES-SS-10-075-02	19-Nov-99	0-1 ft				31	
RES-10-075-03	RES-SS-10-075-03	19-Nov-99	0-1 ft				31	
RES-10-076-01	RES-SS-10-076-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-10-076-02	RES-SS-10-076-02	19-Nov-99	0-1 ft				31	
RES-10-076-03	RES-SS-10-076-03	19-Nov-99	0-1 ft				31	
RES-10-604-01	RES-SS-10-604-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-10-604-02	RES-SS-10-604-02	18-Nov-99	0-1 ft				31	
RES-10-604-03	RES-SS-10-604-03	18-Nov-99	0-1 ft				31	
RES-11-011-01	RES-SS-11-011-01	02-Dec-99	0-1 ft	69	29	23	32	
RES-11-011-02	RES-SS-11-011-02	02-Dec-99	0-1 ft				31	
RES-11-011-03	RES-SS-11-011-03	02-Dec-99	0-1 ft				31	
RES-11-012-01	RES-SS-11-012-01	02-Dec-99	0-1 ft	69	29	23	32	
RES-11-012-02	RES-SS-11-012-02	02-Dec-99	0-1 ft				31	
RES-11-012-03	RES-SS-11-012-03	02-Dec-99	0-1 ft				31	
RES-11-328-01	RES-SS-11-328-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-11-328-02	RES-SS-11-328-02	18-Nov-99	0-1 ft				31	
RES-11-328-03	RES-SS-11-328-03	18-Nov-99	0-1 ft				31	
RES-11-396-02	RES-SS-11-396-02	17-Nov-99	0-1 ft				31	
RES-11-396-03	RES-SS-11-396-03	17-Nov-99	0-1 ft				31	
RES-11-419-01	RES-SS-11-419-01	19-Nov-99	0-1 ft	69	29	23	31	
RES-11-419-03	RES-SS-11-419-03	19-Nov-99	0-1 ft				30	
RES-11-420-01	RES-SS-11-420-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-420-02	RES-SS-11-420-02	17-Nov-99	0-1 ft				31	
RES-11-420-04	RES-SS-11-420-04	17-Nov-99	0-1 ft				31	
RES-11-422-01	RES-SS-11-422-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-422-02	RES-SS-11-422-02	17-Nov-99	0-1 ft				31	
RES-11-422-03	RES-SS-11-422-03	17-Nov-99	0-1 ft				31	
RES-11-423-01	RES-SS-11-423-01	16-Nov-99	0-1 ft	69	29	23	31	
RES-11-423-02	RES-SS-11-423-02	16-Nov-99	0-1 ft				31	
RES-11-423-03	RES-SS-11-423-03	16-Nov-99	0-1 ft				31	

Table B-1-4.
Soil Samples and Analyses - Eastern Shore of Lyman Mill Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Sampling Location	Field Sample ID	Date Sampled	Sample Depth	SVOCs	Pesticides/ PCBs	Metals	Dioxins/ Furans	Coplanar PCBs
RES-11-424-01	RES-SS-11-424-01	16-Nov-99	0-1 ft	69	29	23	31	
RES-11-424-02	RES-SS-11-424-02	16-Nov-99	0-1 ft				31	
RES-11-424-03	RES-SS-11-424-03	16-Nov-99	0-1 ft				31	
RES-11-425-02	RES-SS-11-425-02	17-Nov-99	0-1 ft				31	
RES-11-425-03	RES-SS-11-425-03	17-Nov-99	0-1 ft				31	
RES-11-426-01	RES-SS-11-426-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-426-02	RES-SS-11-426-02	17-Nov-99	0-1 ft				31	
RES-11-426-03	RES-SS-11-426-03	17-Nov-99	0-1 ft				31	
RES-11-427-01	RES-SS-11-427-01	16-Nov-99	0-1 ft	69	29	23	31	
RES-11-427-02	RES-SS-11-427-02	16-Nov-99	0-1 ft				31	
RES-11-427-03	RES-SS-11-427-03	16-Nov-99	0-1 ft				31	
RES-11-428-01	RES-SS-11-428-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-428-02	RES-SS-11-428-02	17-Nov-99	0-1 ft				31	
RES-11-428-03	RES-SS-11-428-03	17-Nov-99	0-1 ft				31	
RES-11-429-01	RES-SS-11-429-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-429-02	RES-SS-11-429-02	17-Nov-99	0-1 ft				31	
RES-11-430-01	RES-SS-11-430-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-430-02	RES-SS-11-430-02	17-Nov-99	0-1 ft				31	
RES-11-431-01	RES-SS-11-431-01	17-Nov-99	0-1 ft	69	29	23	31	
RES-11-431-02	RES-SS-11-431-02	17-Nov-99	0-1 ft				31	
RES-11-431-03	RES-SS-11-431-03	17-Nov-99	0-1 ft				31	
RES-11-432-01	RES-SS-11-432-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-11-432-02	RES-SS-11-432-02	18-Nov-99	0-1 ft				31	
RES-11-432-03	RES-SS-11-432-03	18-Nov-99	0-1 ft				31	
RES-11-433-01	RES-SS-11-433-01	18-Nov-99	0-1 ft	18	3	19	31	
RES-11-433-02	RES-SS-11-433-02	18-Nov-99	0-1 ft				31	
RES-11-433-03	RES-SS-11-433-03	18-Nov-99	0-1 ft				31	
RES-11-486-01	RES-SS-11-486-01	18-Nov-99	0-1 ft	69	29	18	31	
RES-11-486-02	RES-SS-11-486-02	18-Nov-99	0-1 ft				31	
RES-11-486-03	RES-SS-11-486-03	18-Nov-99	0-1 ft				31	
RES-11-497-01	RES-SS-11-497-01	02-Dec-99	0-1 ft	69	29	23	31	
RES-11-497-02	RES-SS-11-497-02	02-Dec-99	0-1 ft				31	
RES-11-497-03	RES-SS-11-497-03	02-Dec-99	0-1 ft				31	
RES-11-577-01	RES-SS-11-577-01	18-Nov-99	0-1 ft	69	29	23	31	
RES-11-577-02	RES-SS-11-577-02	18-Nov-99	0-1 ft				31	
RES-11-577-03	RES-SS-11-577-03	18-Nov-99	0-1 ft				31	

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-5.
Summary of Analytical Results of Soil - Eastern Shore of Allendale Mill Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	Frequency of Detection			Range of Reporting Limits for Non-Detects			Range of Detected Concentrations			Average of All Samples	Residential Soil RSL (mg/Kg)	
Semivolatile Organics (mg/Kg)												
Acenaphthene	1	/	1				0.13	-	0.13	0.13	3400	n
Acenaphthylene	1	/	1				0.83	-	0.83	0.83		
Anthracene	1	/	1				0.9	-	0.9	0.9	17000	n
Benzo(a)anthracene	1	/	1				1.9	-	1.9	1.9	0.15	c
Benzo(a)pyrene	1	/	1				1.5	-	1.5	1.5	0.015	c
Benzo(ghi)perylene	1	/	1				0.58	-	0.58	0.58		
Benzo(k)fluoranthene	1	/	1				3.1	-	3.1	3.1	1.5	c
Bis(2-ethylhexyl)phthalate	1	/	1				0.18	-	0.18	0.18	35	c*
Carbazole	1	/	1				0.31	-	0.31	0.31		
Chrysene	1	/	1				1.8	-	1.8	1.8	15	c
Dibenzofuran	1	/	1				0.2	-	0.2	0.2	78	n
Fluoranthene	1	/	1				3.8	-	3.8	3.8	2300	n
Fluorene	1	/	1				0.5	-	0.5	0.5	2300	n
Indeno(1,2,3-cd)pyrene	1	/	1				0.63	-	0.63	0.63	0.15	c
Phenanthrene	1	/	1				3.4	-	3.4	3.4		
Pyrene	1	/	1				3.5	-	3.5	3.5	1700	n
Pesticides/PCBs (mg/Kg)												
4,4`-DDE	1	/	1				0.002	-	0.002	0.002	1.4	c
Endrin Aldehyde	1	/	1				0.0012	-	0.0012	0.0012		
Heptachlor Epoxide	1	/	1				0.00036	-	0.00036	0.00036	0.053	c*
Aroclor-1254	1	/	1				0.21	-	0.21	0.21	0.22	c**
Inorganics (mg/Kg)												
Aluminum	1	/	1				2490	-	2490	2490	77000	n
Arsenic	1	/	1				1.5	-	1.5	1.5	0.39	c*
Barium	1	/	1				16.6	-	16.6	16.6	15000	n
Beryllium	1	/	1				0.21	-	0.21	0.21	160	n
Cadmium	1	/	1				0.16	-	0.16	0.16	70	n
Calcium	1	/	1				504	-	504	504		
Chromium	1	/	1				9.9	-	9.9	9.9		
Cobalt	1	/	1				3.5	-	3.5	3.5	23	n
Copper	1	/	1				12.7	-	12.7	12.7	3100	n
Iron	1	/	1				8080	-	8080	8080	55000	n
Lead	1	/	1				89.4	-	89.4	89.4	400	nL
Magnesium	1	/	1				1150	-	1150	1150		
Manganese	1	/	1				134	-	134	134	1800	n
Molybdenum	1	/	1				2.6	-	2.6	2.6	390	n
Nickel	1	/	1				11	-	11	11	1500	n
Potassium	1	/	1				388	-	388	388		
Vanadium	1	/	1				8.6	-	8.6	8.6	5.5	n
Zinc	1	/	1				44.8	-	44.8	44.8	23000	n
Dioxins/Furans (mg/Kg)												
1,2,4,5,7,8-hexachloro(9h)xanthene	4	/	7				1.47E-06	-	1.67E-05	4.66E-06		
2378-TCDD	68	/	69	4.81E-07	:	4.81E-07	2.20E-07	-	8.40E-04	9.64E-05	4.50E-06	c*
TEQ (USEPA, 2010 Mammal)	69	/	69				4.78E-07	-	8.70E-04	1.09E-04		

mg/Kg = milligram per kilogram

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-6.
Summary of Analytical Results of Soil - Eastern Shore of Allendale Mill Pond (1-10 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	Frequency of Detection			Range of Reporting Limits for Non-Detects			Range of Detected Concentrations			Average of All Samples	Residential Soil RSL (mg/Kg)	
Volatile Organics (mg/Kg)												
Cis-1,2-dichloroethene	1	/	5	0.1	:	0.13	0.002	-	0.002	0.0464	160	n
Semivolatile Organics (mg/Kg)												
Acenaphthene	1	/	5	0.4	:	0.45	0.087	-	0.087	0.1854	3400	n
Acenaphthylene	2	/	5	0.4	:	0.45	0.06	-	0.13	0.166		
Anthracene	1	/	5	0.4	:	0.45	0.3	-	0.3	0.228	17000	n
Benzaldehyde	1	/	4	0.4	:	0.45	0.045	-	0.045	0.17125	7800	ns
Benzo(a)anthracene	2	/	5	0.4	:	0.45	0.21	-	0.92	0.354	0.15	c
Benzo(a)pyrene	2	/	2				0.17	-	0.76	0.465	0.015	c
Benzo(b)fluoranthene	1	/	5	0.37	:	0.45	0.36	-	0.36	0.237	0.15	c
Benzo(ghi)perylene	1	/	5	0.4	:	0.45	0.34	-	0.34	0.236		
Benzo(k)fluoranthene	2	/	5	0.4	:	0.45	0.11	-	1.4	0.43	1.5	c
Bis(2-ethylhexyl)phthalate	1	/	5	0.4	:	0.45	0.42	-	0.42	0.252	35	c*
Chrysene	2	/	5	0.4	:	0.45	0.26	-	0.83	0.346	15	c
Dibenz(a,h)anthracene	1	/	5	0.4	:	0.45	0.13	-	0.13	0.194	0.015	c
Fluoranthene	3	/	5	0.43	:	0.45	0.042	-	2.1	0.5824	2300	n
Fluorene	1	/	5	0.4	:	0.45	0.11	-	0.11	0.19	2300	n
Indeno(1,2,3-cd)pyrene	1	/	5	0.4	:	0.45	0.33	-	0.33	0.234	0.15	c
Phenanthrene	2	/	5	0.4	:	0.45	0.13	-	1.3	0.414		
Pyrene	3	/	5	0.43	:	0.45	0.044	-	2.2	0.6228	1700	n
Pesticides/PCBs (mg/Kg)												
4,4`-DDD	1	/	5	0.0019	:	0.0044	0.031	-	0.031	0.00764	2	c
4,4`-DDE	2	/	5	0.0039	:	0.0044	0.00073	-	0.023	0.005996	1.4	c
4,4`-DDT	2	/	5	0.0039	:	0.0044	0.0013	-	0.024	0.00631	1.7	c*
alpha-Chlordane	1	/	4	0.002	:	0.0023	0.12	-	0.12	0.0308125		
Dieldrin	2	/	5	0.0039	:	0.0044	0.00098	-	0.0083	0.003106	0.03	c
Endosulfan I	1	/	5	0.0019	:	0.0023	0.0043	-	0.0043	0.0017		
gamma-Chlordane	1	/	4	0.002	:	0.0023	0.12	-	0.12	0.0308125		
Heptachlor Epoxide	1	/	5	0.0019	:	0.0023	0.0076	-	0.0076	0.00236	0.053	c*
Aroclor-1254	1	/	5	0.039	:	0.044	0.2	-	0.2	0.0565	0.22	c**
Inorganics (mg/Kg)												
Aluminum	5	/	5				1890	-	8150	4480	77000	n
Arsenic	5	/	5				0.54	-	4.7	1.748	0.39	c*
Barium	5	/	5				8.4	-	76	28.04	15000	n
Beryllium	5	/	5				0.13	-	0.82	0.362	160	n
Cadmium	5	/	5				0.16	-	1.6	0.652	70	n
Calcium	5	/	5				321	-	1540	715.8		
Chromium	5	/	5				4	-	10.5	7.24		
Cobalt	5	/	5				1.6	-	4.5	2.44	23	n
Copper	2	/	5	2.8	:	3.1	11.4	-	22.1	7.59	3100	n
Iron	5	/	5				4260	-	11100	6830	55000	n
Lead	5	/	5				2.2	-	303	110.14	400	nL
Magnesium	5	/	5				633	-	1430	869		
Manganese	5	/	5				41.4	-	179	87.92	1800	n
Mercury	1	/	5	0.045	:	0.065	0.095	-	0.095	0.0406	5.6	ns
Molybdenum	1	/	1				1.3	-	1.3	1.3	390	n
Nickel	5	/	5				2.7	-	8.1	4.4	1500	n
Potassium	5	/	5				200	-	385	304.4		
Sodium	1	/	5	24.1	:	565	218	-	218	109.84		
Vanadium	5	/	5				4.7	-	19.6	9.62	5.5	n
Zinc	5	/	5				22	-	162	60.12	23000	n
Dioxins/Furans (mg/Kg)												
1,2,4,5,7,8-hexachloro(9h)xanthene	2	/	2				3.11E-07	-	4.88E-07	4.00E-07		
2378-TCDD	23	/	24	2.00E-07	:	2.00E-07	3.90E-07	-	7.30E-04	6.91E-05	4.50E-06	c*
TEQ (USEPA, 2010 Mammal)	24	/	24				3.18E-07	-	7.80E-04	9.46E-05		

mg/Kg = milligram per kilogram

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-7.
Summary of Analytical Results of Soil - Eastern Shore of Lyman Mill Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	Frequency of Detection			Range of Reporting Limits for Non-Detects			Range of Detected Concentrations			Average of All Samples	Residential Soil RSL (mg/Kg)	
Semivolatile Organics (mg/Kg)												
2-methylnaphthalene	4	/	30	0.36	:	110	0.01729	-	1.1	2.782232	310	n
Acenaphthene	5	/	30	0.36	:	9.7	0.02138	-	14	1.527932	3400	n
Acenaphthylene	5	/	30	0.36	:	110	0.01934	-	3.1	2.856419		
Anthracene	16	/	30	0.36	:	4.8	0.017	-	40	1.993052	17000	n
Benzaldehyde	9	/	31	0.36	:	110	0.052	-	0.72	2.730586	7800	ns
Benzo(a)anthracene	26	/	31	0.41	:	3.9	0.03	-	140	5.826413	0.15	c
Benzo(a)pyrene	23	/	31	0.36	:	3.9	0.062	-	110	5.077088	0.015	c
Benzo(b)fluoranthene	26	/	31	0.41	:	3.3	0.038	-	120	5.423966	0.15	c
Benzo(ghi)perylene	14	/	31	0.36	:	4.8	0.071	-	58	3.314129		
Benzo(k)fluoranthene	26	/	31	0.41	:	3.3	0.036	-	100	4.863903	1.5	c
Biphenyl	3	/	30	0.36	:	110	0.01551	-	0.12	2.894368	3900	ns
Bis(2-ethylhexyl)phthalate	19	/	31	0.44	:	110	0.049	-	2.9	2.941806	35	c*
Butylbenzylphthalate	3	/	30	0.36	:	110	0.16	-	0.62	2.925167	260	c*
Carbazole	8	/	30	0.36	:	5	0.11	-	26	1.896333		
Chrysene	27	/	31	0.41	:	3.9	0.042	-	150	6.753152	15	c
Dibenz(a,h)anthracene	8	/	31	0.36	:	5	0.05503	-	26	1.813268	0.015	c
Dibenzofuran	6	/	30	0.36	:	110	0.02417	-	5.2	2.80198	78	n
Di-n-butylphthalate	6	/	31	0.37	:	110	0.046	-	0.85	2.835323	6100	n
Di-n-octylphthalate	1	/	30	0.36	:	110	0.097	-	0.097	2.914733		
Fluoranthene	27	/	31	0.41	:	3.9	0.072	-	300	13.46175	2300	n
Fluorene	9	/	30	0.36	:	4.8	0.02379	-	16	1.441731	2300	n
Indeno(1,2,3-cd)pyrene	16	/	31	0.36	:	4.8	0.056	-	56	3.234703	0.15	c
Naphthalene	5	/	30	0.36	:	110	0.02965	-	2.3	2.816602	3.6	c*
Phenanthrene	22	/	31	0.36	:	4	0.072	-	180	9.164969		
Pyrene	27	/	31	0.41	:	3.9	0.057	-	280	12.40033	1700	n
Pesticides/PCBs (mg/Kg)												
4,4`-DDD	7	/	30	0.0035	:	0.0085	0.0059	-	0.038	0.004941	2	c
4,4`-DDE	14	/	30	0.0035	:	0.0081	0.0046	-	0.056	0.011057	1.4	c
4,4`-DDT	14	/	30	0.0037	:	0.0081	0.0029	-	0.04313	0.007558	1.7	c*
Aldrin	1	/	30	0.00136	:	0.005	0.0034	-	0.0034	0.001418	0.029	c*
alpha-Chlordane	17	/	31	0.0018	:	0.0044	0.00123	-	0.026	0.006012		
Chlordane	2	/	2				0.08655	-	0.45584	0.271195	1.6	c*
Dieldrin	2	/	30	0.00149	:	0.0097	0.0054	-	0.015	0.003162	0.03	c
Endosulfan II	2	/	30	0.00136	:	0.0097	0.012	-	0.014	0.003241		
Endosulfan Sulfate	3	/	30	0.00149	:	0.0097	0.00171	-	0.018	0.003617		
Endrin Ketone	4	/	30	0.00136	:	0.0097	0.016	-	0.062	0.007626		
gamma-Chlordane	13	/	31	0.00136	:	0.0044	0.0024	-	0.018	0.003378		
Heptachlor Epoxide	4	/	30	0.00149	:	0.005	0.00207	-	0.026	0.002552	0.053	c*
Aroclor-1242	1	/	30	0.01706	:	0.097	0.14	-	0.14	0.029828	0.22	c
Aroclor-1254	11	/	30	0.035	:	0.097	0.03	-	0.25305	0.062478	0.22	c**
Aroclor-1260	1	/	30	0.01706	:	0.097	0.14	-	0.14	0.029311	0.22	c
Aroclor-1268	2	/	2				0.02344	-	0.02507	0.024255		
Inorganics (mg/Kg)												
Aluminum	31	/	31				2430	-	213000	14387.23	77000	n
Antimony	13	/	31	0.52	:	2.2	0.213	-	38.2	3.22571	31	n
Arsenic	30	/	31	1.6	:	1.6	1.7	-	55.6	8.030645	0.39	c*
Barium	31	/	31				16.9	-	874	147.7226	15000	n
Beryllium	13	/	29	0.21	:	0.41	0.39	-	0.93	0.37869	160	n
Cadmium	14	/	30	0.07	:	0.36	0.32	-	5.2	0.960667	70	n
Calcium	26	/	29	642	:	1340	714	-	48700	5938.828		
Chromium	30	/	31	27.2	:	27.2	1.8	-	404	45.26774		
Cobalt	30	/	31	0.25	:	0.25	1.8	-	21.7	4.868871	23	n
Copper	30	/	31	7.3	:	7.3	10	-	25500	974.0532	3100	n
Iron	31	/	31				4440	-	89700	18777.65	55000	n
Lead	31	/	31				8.1	-	2460	407.1097	400	nL
Magnesium	29	/	29				752	-	4260	1678.379		

Table B-1-7.
Summary of Analytical Results of Soil - Eastern Shore of Lyman Mill Pond (0-1 ft bgs)
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

PARAMETER	Frequency of Detection			Range of Reporting Limits for Non-Detects			Range of Detected Concentrations			Average of All Samples	Residential Soil RSL (mg/Kg)	
Manganese	31	/	31				61	-	2880	337.0871	1800	n
Mercury	14	/	29	0.11	:	0.21	0.09	-	1.9	0.23531	5.6	ns
Methyl Mercury	2	/	2				0.000159	-	0.000294	0.000227	7.8	n
Molybdenum	2	/	2				1.42	-	2.67	2.045	390	n
Nickel	31	/	31				3.2	-	64.6	17.92258	1500	n
Potassium	29	/	29				313	-	2530	626.931		
Selenium	3	/	29	0.438	:	2.1	0.63	-	1.9	0.634034	390	n
Silver	11	/	31	0.22	:	0.95	0.26	-	5.7	1.072419	390	n
Sodium	14	/	29	38.4	:	362	112	-	2010	248.4672		
Thallium	2	/	29	0.52	:	2.9	0.289	-	0.575	0.735138		
Vanadium	31	/	31				4.1	-	49.7	20.56774	5.5	n
Zinc	31	/	31				17.9	-	1730	355.4935	23000	n
Dioxins/Furans (mg/Kg)												
1,2,4,5,7,8-hexachloro(9h)xanthene	36	/	87				5.90E-07	-	4.07E-04	1.48E-05		
2378-TCDD	92	/	97	3.00E-07	:	1.97E-05	2.60E-07	-	8.00E-04	5.93E-05	4.50E-06	c*
TEQ (USEPA, 2010 Mammal)	97	/	97				7.26E-07	-	1.02E-03	8.06E-05		
Dioxin-Like PCBs (mg/Kg)												
PCB TEQ-MAMMAL	1	/	1				5.98E-06	-	5.98E-06	5.98E-06		

mg/Kg = milligram per kilogram

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

Table B-1-8.
Soil Samples Located Along the Eastern Shore Allendale and Lyman Mill Pond With Dioxin TEQ Greater Than 35 ppt
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Area	Boring	Sample ID	Sample Date	Sample Depth	TEQ (ppt)	Exceeds 35 ppt?	Exceeds 51 ppt?
Allendale Pond Surface Soil (0-1 ft bgs)	03/04-DEL-102	2108321	7/19/2002	0-2 ft	292	Yes	Yes
	04-DEL-201	2108316	7/19/2002	0-2 ft	142	Yes	Yes
	04-DEL-202	2108315	7/19/2002	0-2 ft	58	Yes	Yes
	04-DEL-203	2108313	7/19/2002	0-2 ft	313	Yes	Yes
	05-DEL-100	2108311	7/19/2002	0-2 ft	123	Yes	Yes
	07-DEL-201	2108306	7/18/2002	0-2 ft	424	Yes	Yes
	07-DEL-202	2108304	7/19/2002	0-2 ft	93	Yes	Yes
	07-DEL-203	2108305	7/19/2002	0-2 ft	398	Yes	Yes
	AP-DEL-01	2102243	4/11/2002	0-1 ft	52	Yes	Yes
	AP-DEL-02	2102241	4/11/2002	0-1 ft	155	Yes	Yes
	AP-DEL-05	2102235	4/11/2002	0-1 ft	480	Yes	Yes
	AP-DEL-07	2102231	4/11/2002	0-1 ft	141	Yes	Yes
	AP-DEL-08	2102228	4/11/2002	0-1 ft	104	Yes	Yes
	AP-DEL-12	2102220	4/10/2002	0-1 ft	51	Yes	--
	AP-DEL-13	2102218	4/10/2002	0-1 ft	145	Yes	Yes
	AP-DEL-14	2102216	4/10/2002	0-1 ft	259	Yes	Yes
	AP-DEL-15	2102214	4/10/2002	0-1 ft	114	Yes	Yes
	AP-DEL-17	2102211	4/10/2002	0-1 ft	870	Yes	Yes
	AP-DEL-18	2102209	4/10/2002	0-1 ft	279	Yes	Yes
	CMS-108	3428-CMS-108	2/17/1999	0-0.25 ft	95	Yes	Yes
	CMS-116	3428-CMS-116	2/17/1999	0-0.25 ft	132	Yes	Yes
	CMS-184	3428-CMS-184	2/17/1999	0-0.25 ft	88	Yes	Yes
	CMS-185	3428-CMS-185	2/17/1999	0-0.25 ft	62	Yes	Yes
	CMS-189	3428-CMS-189	2/17/1999	0-0.25 ft	153	Yes	Yes
	CMS-197	3428-CMS-197	2/17/1999	0-0.25 ft	616	Yes	Yes
	CMS-222	3428-CMS-222	2/16/1999	0-0.25 ft	99	Yes	Yes
	CMS-223	3428-CMS-223	2/16/1999	0-0.25 ft	120	Yes	Yes
	CMS-225	3428-CMS-225	2/16/1999	0-0.25 ft	133	Yes	Yes
	CMS-418	CMS-418-A	6/30/1999	0-1 ft	240	Yes	Yes
	CMS-444	CMS-444-A	7/14/1999	0-1 ft	44	Yes	--
	CMS-466	CMS-466-A	7/27/1999	0-1 ft	90	Yes	Yes
	CMS-474	CMS-474-A	7/29/1999	0-1 ft	72	Yes	Yes
	CMS-492	CMS-492-A	7/30/1999	0-1 ft	38	Yes	--
	CMS-497	CMS-497-A	8/12/1999	0-1 ft	81	Yes	Yes
	CMS-498	CMS-498-A	8/12/1999	0-1 ft	87	Yes	Yes
	CMS-499	CMS-499-A	8/12/1999	0-1 ft	93	Yes	Yes
	CMS-502	CMS-502-A	8/12/1999	0-1 ft	69	Yes	Yes
	CMS-507	CMS-507-A	8/12/1999	0-1 ft	47	Yes	--
	RES-14-333-02	RES-SS-14-333-02	11/15/1999	0-1 ft	102	Yes	Yes
	RES-14-365-02	RES-SS-14-365-02	11/15/1999	0-1 ft	86	Yes	Yes
	RES-14-365-03	RES-SS-14-365-03	11/15/1999	0-1 ft	106	Yes	Yes
Allendale Pond Subsurface Soil (1-10 ft bgs)	AP-DEL-01	2102244	4/11/2002	1-2 ft	80	Yes	Yes
	AP-DEL-03	2102240	4/11/2002	1-2 ft	77	Yes	Yes
	AP-DEL-07	2102232	4/11/2002	1-2 ft	142	Yes	Yes
	AP-DEL-12	2102221	4/10/2002	1-2 ft	48	Yes	--
	AP-DEL-14	2102217	4/10/2002	1-2 ft	425	Yes	Yes
	AP-DEL-18	2102210	4/10/2002	1-2 ft	780	Yes	Yes
	CMS-418	CMS-418-B	6/30/1999	1-2 ft	210	Yes	Yes
	CMS-474	CMS-474-B	7/29/1999	1-2 ft	101	Yes	Yes
	CMS-474	CMS-474-C	7/29/1999	2-3 ft	279	Yes	Yes
	SB-14-271	CM-SO-SB-14-271-0102	6/21/2001	1-2 ft	46	Yes	--

Table B-1-8.
Soil Samples Located Along the Eastern Shore Allendale and Lyman Mill Pond With Dioxin TEQ Greater Than 35 ppt
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Area	Boring	Sample ID	Sample Date	Sample Depth	TEQ (ppt)	Exceeds 35 ppt?	Exceeds 51 ppt?
Lyman Mill Pond Surface Soil (0-1 ft bgs)	10-DEL-301	2108297	7/18/2002	0-2 ft	332	Yes	Yes
	10-DEL-302	2108296	7/18/2002	0-2 ft	100	Yes	Yes
	10-DEL-304	2112410	9/10/2002	0-2 ft	67	Yes	Yes
	11-DEL-100	2108286	7/17/2002	0-2 ft	52	Yes	Yes
	12-DEL-101	2108282	7/17/2002	0-1 ft	819	Yes	Yes
	12-DEL-103	2108284	7/17/2002	0-1 ft	612	Yes	Yes
	9-DEL-203	2108292	7/17/2002	0-2 ft	52	Yes	Yes
	LPX-FP-4006	LPX-FP-4006-0000-01	7/19/2001	0-0.5 ft	152	Yes	Yes
	LPX-FP-4007	LPX-FP-4007-0000-01	7/19/2001	0-0.5 ft	83	Yes	Yes
	RES-10-004-01	RES-SS-10-004-01	11/18/1999	0-1 ft	118	Yes	Yes
	RES-10-005-01	RES-SS-10-005-01	11/18/1999	0-1 ft	154	Yes	Yes
	RES-10-042-01	RES-SS-10-042-01	11/18/1999	0-1 ft	332	Yes	Yes
	RES-10-044-01	RES-SS-10-044-01	11/19/1999	0-1 ft	532	Yes	Yes
	RES-10-044-02	RES-SS-10-044-02	11/19/1999	0-1 ft	62	Yes	Yes
	RES-10-053-01	RES-SS-10-053-01	12/2/1999	0-1 ft	42	Yes	--
	RES-10-074-02	RES-SS-10-074-02	11/19/1999	0-1 ft	86	Yes	Yes
	RES-10-076-01	RES-SS-10-076-01	11/19/1999	0-1 ft	115	Yes	Yes
	RES-10-604-01	RES-SS-10-604-01	11/18/1999	0-1 ft	264	Yes	Yes
	RES-10-604-02	RES-SS-10-604-02	11/18/1999	0-1 ft	52	Yes	Yes
	RES-11-328-01	RES-SS-11-328-01	11/18/1999	0-1 ft	387	Yes	Yes
	RES-11-396-02	RES-SS-11-396-02	11/17/1999	0-1 ft	61	Yes	Yes
	RES-11-419-01	RES-SS-11-419-01	11/19/1999	0-1 ft	596	Yes	Yes
	RES-11-420-04	RES-SS-11-420-04	11/17/1999	0-1 ft	116	Yes	Yes
	RES-11-422-01	RES-SS-11-422-01	11/17/1999	0-1 ft	40	Yes	--
	RES-11-424-01	RES-SS-11-424-01	11/16/1999	0-1 ft	40	Yes	--
	RES-11-426-01	RES-SS-11-426-01	11/17/1999	0-1 ft	37	Yes	--
	RES-11-431-01	RES-SS-11-431-01	11/17/1999	0-1 ft	35	Yes	--
	RES-11-432-01	RES-SS-11-432-01	11/18/1999	0-1 ft	122	Yes	Yes
	RES-11-433-01	RES-SS-11-433-01	11/18/1999	0-1 ft	1019	Yes	Yes
	RES-11-433-02	RES-SS-11-433-02	11/18/1999	0-1 ft	139	Yes	Yes
	RES-11-486-01	RES-SS-11-486-01	11/18/1999	0-1 ft	46	Yes	--
	RES-11-486-02	RES-SS-11-486-02	11/18/1999	0-1 ft	73	Yes	Yes
	RES-11-486-03	RES-SS-11-486-03	11/18/1999	0-1 ft	59	Yes	Yes
	RES-11-577-01	RES-SS-11-577-01	11/18/1999	0-1 ft	416	Yes	Yes
	RES-11-577-02	RES-SS-11-577-02	11/18/1999	0-1 ft	67	Yes	Yes

TEQ calculated using the TEF presented in USEPA, 2010.

Prepared By: KJC 4/19/12
Checked By: MJM 4/20/12

USEPA, 2010. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibnzo-*p*-dioxin and Dioxin-Like Compounds. Office of the Science Advisor. Risk Assessment Forum. EPA/100/R 10/005. December.

35 ppt is the human health risk-based PRG (10^{-5} cancer risk) for residential soil
51 ppt is the human health risk-based PRG (HQ=1 for the child) for residential soil

US EPA ARCHIVE DOCUMENT

APPENDIX B-1

Supporting Information for Risk Evaluation of Residential Floodplain Soil Eastern Shore of Allendale Pond and Lyman Mill Pond

ATTACHMENT A

Risk Calculations for the Eastern Shore Residential Floodplain Soil Evaluations

Tables appear in the following order (generally following a north to south direction)

Allendale Pond Surface Soil – Tables APB-SS-1 through APB-SS-28

Allendale Pond Subsurface Soil – Tables APB-SUB-1 through APB-SUB-17

Lyman mill Pond Surface Soil – Tables LPX-SS-1 through LPX-SS-20

US EPA ARCHIVE DOCUMENT

Table APB-SS-1
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 271
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		2.9 - 95	40	3.5	50	2.7E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-1
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 271
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102243 4/11/2002	3428-CMS-108 2/17/1999	3428-CMS-220 2/16/1999	CMS-506-A 8/12/1999	CMS-507-A 8/12/1999	CMS-508-A 8/12/1999
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	52	95	2.9	25	47	18

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-2
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 272
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	5 / 5		30 - 160	102	3.5	50	4.6E-05	3	Reproductive / Endocrine

SUM: 5E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-2
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 272
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102241 4/11/2002	2108330 7/22/2002	3428-CMS-116 2/17/1999	3428-CMS-223 2/16/1999	CMS-502-A 8/12/1999
Dioxins/Furans (ng/Kg)						
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	160	30	130	120	69

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-3
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 302
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		4.1 - 99	42	3.5	50	2.8E-05	2	Reproductive / Endocrine

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

SUM: 3E-05

US EPA ARCHIVE DOCUMENT

Table APB-SS-3
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 302
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	3428-CMS-137 2/17/1999	3428-CMS-222 2/16/1999	CMS-501-A 8/12/1999
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	4.1	99	23

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-4
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 303
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		22 - 130	76	3.5	50	3.7E-05	3	Reproductive / Endocrine

SUM: 4E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-4
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 303
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102239 4/11/2002	3428-CMS-225 2/16/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	22	130

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-5
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 333
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		5.1 - 100	53	3.5	50	2.9E-05	2	Reproductive / Endocrine

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

SUM: 3E-05

US EPA ARCHIVE DOCUMENT

Table APB-SS-5
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 333
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108327 7/22/2002	RES-SS-14-333-02 11/15/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	5.1	100

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-6
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 365
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		19 - 480	169	3.5	50	1.4E-04	10	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-6
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 365
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102235 4/11/2002	2108321 7/19/2002	2112412 9/10/2002	2112413 9/10/2002	RES-SS-14-365-02 11/15/1999	RES-SS-14-365-03 11/15/1999
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	480	290	19	27	86	110

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-7
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 366
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		13 - 88	51	3.5	50	2.5E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-7
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 366
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	3428-CMS-184 2/17/1999	RES-SS-14-366-03 11/15/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	88	13

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-8
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 398
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	8 / 8		58 - 310	123	3.5	50	8.9E-05	6	Reproductive / Endocrine

SUM: 9E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-8
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 398
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108313 7/19/2002	2108315 7/19/2002	2108316 7/19/2002	3428-CMS-185 2/17/1999	3428-CMS-189 2/17/1999	CMS-497-A 8/12/1999	CMS-498-A 8/12/1999	CMS-499-A 8/12/1999
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	310	58	140	62	150	81	87	93

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-9
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 399
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		120 - 120	120	3.5	50	3.4E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-9
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 399
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108311 7/19/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	120

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-10
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 418
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		620 - 620	620	3.5	50	1.8E-04	12	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-10
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 418
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	3428-CMS-197 2/17/1999
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	620

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-11
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		1.5 - 1.5	1.5	0.016	1720	9.4E-05	0.0009	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		1.5 - 1.5	1.5	0.35	22	4.3E-06	0.07	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		30 - 240	137	3.5	50	6.9E-05	5	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-11
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102231 4/11/2002	CMS-418-A 6/30/1999	CMS-461-A 7/27/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015		1.5 J	
Inorganics (mg/Kg)				
Arsenic	0.39		1.5 J	
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	140	240	30

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-12
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 420
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		0.48 - 2.2	1.3	3.5	50	6.3E-07	0.04	Reproductive / Endocrine

SUM: 6E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-12
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 420
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108294 7/18/2002	2108295 7/18/2002
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	0.48	2.2

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-13
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 421
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		100 - 100	100	3.5	50	2.9E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-13
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 421
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102228 4/11/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	100

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-14
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 422
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		25 - 25	25	3.5	50	7.1E-06	0.5	Reproductive / Endocrine

SUM: 7E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-14
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 422
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-14-422-02 12/2/1999
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	25

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-15
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 424 and 425
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		0.77 - 23	8.9	3.5	50	6.6E-06	0.5	Reproductive / Endocrine

SUM: 7E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-15
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 424 and 425
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102224 4/10/2002	2102226 4/10/2002	CMS-463-A 7/27/1999
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	2.9	0.77	23

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-16
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 430
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		9.7 - 25	17.4	3.5	50	7.1E-06	0.5	Reproductive / Endocrine

SUM: 7E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-16
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 430
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102222 4/10/2002	CMS-464-A 7/27/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	25	9.7

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-17
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 448
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		51 - 90	71	3.5	50	2.6E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-17
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 448
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102220 4/10/2002	CMS-466-A 7/27/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	51	90

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-18
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 449
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		140 - 140	140	3.5	50	4.0E-05	3	Reproductive / Endocrine

SUM: 4E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-18
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 449
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102218 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	140

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-19
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 450
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		110 - 260	185	3.5	50	7.4E-05	5	Reproductive / Endocrine

SUM: 7E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-19
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 450
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102216 4/10/2002	CMS-478-A 7/29/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	260	110

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-20
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 210
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		14 - 14	14.0	3.5	50	4.0E-06	0.3	Reproductive / Endocrine

SUM: 4E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-20
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 210
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-14-210-02 11/16/1999	RES-SS-14-210-03 11/16/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	14	14

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-21
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 239
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		5.7 - 110	58	3.5	50	3.1E-05	2	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-21
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 239
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102214 4/10/2002	CMS-486-A 7/30/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	110	5.7

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-22
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 240
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		3.2 - 3.2	3.2	3.5	50	9.1E-07	0.06	Reproductive / Endocrine

SUM: 9E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-22
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 240
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102212 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	3.2

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APS-SS-23
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 550
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		870 - 870	870	3.5	50	2.5E-04	17	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APS-SS-23
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 550
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102211 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	870

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-24
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 551
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		280 - 280	280	3.5	50	8.0E-05	6	Reproductive / Endocrine

SUM: 8E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-24
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 551
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102209 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	280

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-25
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 552
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		2.1 - 2.5	2.3	3.5	50	7.1E-07	0.05	Reproductive / Endocrine

SUM: 7E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-25
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 552
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102207 4/10/2002	CMS-488-A 7/30/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	2.5	2.1

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-26
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 553
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		2.6 - 38	17.9	3.5	50	1.1E-05	0.8	Reproductive / Endocrine

SUM: 1E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-26
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 553
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102205 4/10/2002	CMS-491-A 7/30/1999	CMS-492-A 7/30/1999
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	2.6	13	38

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-27
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 554
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		93 - 420	304	3.5	50	1.2E-04	8	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-27
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 554
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108304 7/19/2002	2108305 7/19/2002	2108306 7/18/2002
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	93	400	420

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SS-28
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 555
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		72 - 72	72	3.5	50	2.1E-05	1	Reproductive / Endocrine

SUM: 2E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SS-28
Surface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 555
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	CMS-474-A 7/29/1999
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	72

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-1
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 271
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.17 - 0.17	0.17	0.016	1720	1.1E-05	0.0001	Kidney
Inorganics (mg/Kg)									
Arsenic	4 / 4		0.54 - 4.7	1.9	0.35	22	1.3E-05	0.2	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	5 / 5		0.32 - 80	28	3.5	50	2.3E-05	2	Reproductive / Endocrine

SUM: 5E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligrams per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-1
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 271
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102244 4/11/2002	CM-SO-SB-14-271-0102 6/21/2001	CM-SO-SB-14-271-0204 6/21/2001	CM-SO-SB-14-271-0406 6/21/2001	CM-SO-SB-14-271-0608 6/21/2001
Semivolatile Organics (mg/Kg)						
Benzo(a)pyrene	0.015		0.17 J			
Inorganics (mg/Kg)						
Arsenic	0.39		4.7 J	1.1 J	1.1 J	0.54 J
Dioxins/Furans (ng/Kg)						
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	80	46	0.32	13	0.77

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligrams per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-2
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 272
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		3.6 - 3.6	3.6	3.5	50	1.0E-06	0.07	Reproductive / Endocrine

SUM: 1E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-2
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 272
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102242 4/11/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	3.6

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-3
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 303
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		77 - 77	77	3.5	50	2.2E-05	2	Reproductive / Endocrine

SUM: 2E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-3
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 303
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102240 4/11/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	77

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-4
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 365
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		16 - 16	16.0	3.5	50	4.6E-06	0.3	Reproductive / Endocrine

SUM: 5E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-4
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 365
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102236 4/11/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	16

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-5
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.76 - 0.76	0.76	0.016	1720	4.8E-05	0.0004	Kidney
Dibenz(a,h)anthracene	1 / 1		0.13 - 0.13	0.13	0.016	1720	8.1E-06	0.00008	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		1.3 - 1.3	1.3	0.35	22	3.7E-06	0.06	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		140 - 210	175	3.5	50	6.0E-05	4	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligrams per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-5
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102232 4/11/2002	CMS-418-B 6/30/1999
Semivolatile Organics (mg/Kg)			
Benzo(a)pyrene	0.015		0.76
Dibenz(a,h)anthracene	0.015		0.13 J
Inorganics (mg/Kg)			
Arsenic	0.39		1.3 J
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	140	210

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligrams per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-6
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 421
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		8.7 - 8.7	8.7	3.5	50	2.5E-06	0.2	Reproductive / Endocrine

Notes:
SUM: 2E-06

(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-6
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 421
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102229 4/11/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	8.7

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-7
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 424 and 425
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		2.2 - 18	10.1	3.5	50	5.1E-06	0.4	Reproductive / Endocrine

SUM: 5E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-7
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 424 and 425
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102227 4/10/2002	2102225 4/10/2002
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	18	2.2

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-8
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 430
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		5.5 - 5.5	5.5	3.5	50	1.6E-06	0.1	Reproductive / Endocrine

SUM: 2E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-8
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 430
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102223 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	5.5

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-9
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 448
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		48 - 48	48	3.5	50	1.4E-05	1	Reproductive / Endocrine

SUM: 1E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-9
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 448
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102221 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	48

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-10
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 449
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		3.3 - 3.3	3.3	3.5	50	9.4E-07	0.07	Reproductive / Endocrine

SUM: 9E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-10
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 449
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102219 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	3.3

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-11
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 450
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		430 - 430	430	3.5	50	1.2E-04	9	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-11
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 14 Lot 450
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102217 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	430

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-12
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 239
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		3.3 - 3.3	3.3	3.5	50	9.4E-07	0.07	Reproductive / Endocrine

SUM: 9E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-12
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 239
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102215 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	3.3

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-13
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 240
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		0.87 - 0.87	0.87	3.5	50	2.5E-07	0.02	Reproductive / Endocrine

SUM: 2E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-13
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 240
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102213 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	0.87

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-14
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 551
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		780 - 780	780	3.5	50	2.2E-04	16	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-14
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 551
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102210 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	780

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-15
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 552
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		3.3 - 3.3	3.3	3.5	50	9.4E-07	0.07	Reproductive / Endocrine

SUM: 9E-07

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-15
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 552
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102208 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	3.3

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-16
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 553
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	1 / 1		4.1 - 4.1	4.1	3.5	50	1.2E-06	0.08	Reproductive / Endocrine

SUM: 1E-06

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-16
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 553
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2102206 4/10/2002
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	4.1

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table APB-SUB-17
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 555
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		100 - 280	190	3.5	50	8.0E-05	6	Reproductive / Endocrine

SUM: 8E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table APB-SUB-17
Subsurface Soil Analytical and Human Health Risk Results on the East Bank of Allendale Pond in the Vicinity of Plat 12 Lot 555
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	CMS-474-B 7/29/1999	CMS-474-C 7/29/1999
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	100	280

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-1
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 011 and 012
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	2 / 2		0.96 - 1.7	1.3	0.016	1720	1.1E-04	0.001	Kidney
Dibenz(a,h)anthracene	2 / 2		0.14 - 0.17	0.16	0.016	1720	1.1E-05	0.0001	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		3.9 - 7.8	5.9	0.35	22	2.2E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		3.5 - 14	6.6	3.5	50	4.0E-06	0.3	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-1
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 011 and 012
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-011-01 12/2/1999	RES-SS-11-011-02 12/2/1999	RES-SS-11-011-03 12/2/1999	RES-SS-11-012-01 12/2/1999	RES-SS-11-012-02 12/2/1999	RES-SS-11-012-03 12/2/1999
Semivolatile Organics (mg/Kg)							
Benzo(a)pyrene	0.015	0.96			1.7 J		
Dibenz(a,h)anthracene	0.015	0.14 J			0.17 J		
Inorganics (mg/Kg)							
Arsenic	0.39	3.9			7.8		
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	7.2	4.4	4.5	14	3.5	5.7

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-2
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.5 - 0.5	0.5	0.016	1720	3.1E-05	0.0003	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		3.5 - 3.5	3.5	0.35	22	1.0E-05	0.2	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	2 / 2		2.1 - 600	301	3.5	50	1.7E-04	12	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-2
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 419
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-419-01 11/19/1999	RES-SS-11-419-03 11/19/1999
Semivolatile Organics (mg/Kg)			
Benzo(a)pyrene	0.015	0.5 J	
Inorganics (mg/Kg)			
Arsenic	0.39	3.5	
Dioxins/Furans (ng/Kg)			
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	600	2.1

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-3
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 420
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.14 - 0.14	0.14	0.016	1720	8.8E-06	0.00008	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		6.7 - 6.7	6.7	0.35	22	1.9E-05	0.3	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		6.4 - 120	46	3.5	50	3.4E-05	2	Reproductive / Endocrine

SUM: 6E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-3
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 420
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-420-01 11/17/1999	RES-SS-11-420-02 11/17/1999	RES-SS-11-420-04 11/17/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015	0.14 J		
Inorganics (mg/Kg)				
Arsenic	0.39	6.7		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	11	6.4	120

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-4
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 422
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.12 - 0.12	0.12	0.016	1720	7.5E-06	0.00007	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		6.6 - 6.6	6.6	0.35	22	1.9E-05	0.3	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		4.4 - 40	17.0	3.5	50	1.1E-05	0.8	Reproductive / Endocrine

SUM: 4E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-4
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 422
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-422-01 11/17/1999	RES-SS-11-422-02 11/17/1999	RES-SS-11-422-03 11/17/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015	0.12 J		
Inorganics (mg/Kg)				
Arsenic	0.39	6.6		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	40	6.7	4.4

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-5
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 423 and 424
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 2	0.41 : 0.41	110 - 110	55	0.016	1720	6.9E-03	0.06	Kidney
Dibenz(a,h)anthracene	1 / 2	0.41 : 0.41	26 - 26	13.1	0.016	1720	1.6E-03	0.02	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		1.7 - 2.9	2.3	0.35	22	8.3E-06	0.1	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		0.8 - 40	18.9	3.5	50	1.1E-05	0.8	Reproductive / Endocrine

SUM: 9E-03

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-5
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 423 and 424
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-423-01 11/16/1999	RES-SS-11-423-02 11/16/1999	RES-SS-11-423-03 11/16/1999	RES-SS-11-424-01 11/16/1999	RES-SS-11-424-02 11/16/1999	RES-SS-11-424-03 11/16/1999
Semivolatile Organics (mg/Kg)							
Benzo(a)pyrene	0.015	0.41 U			110 J		
Dibenz(a,h)anthracene	0.015	0.41 U			26 J		
Inorganics (mg/Kg)							
Arsenic	0.39	1.7 J			2.9		
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	14	0.8	0.89	40	30	28

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the reporting limit
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-6
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 425 and 426
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.12 - 0.12	0.12	0.016	1720	7.5E-06	0.0001	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		2.7 - 2.7	2.7	0.35	22	7.7E-06	0.1	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	8 / 8		0.73 - 52	17.3	3.5	50	1.5E-05	1	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-6
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 425 and 426
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108290 7/17/2002	2108292 7/17/2002	2108293 7/17/2002	RES-SS-11-425-02 11/17/1999	RES-SS-11-425-03 11/17/1999	RES-SS-11-426-01 11/17/1999	RES-SS-11-426-02 11/17/1999	RES-SS-11-426-03 11/17/1999
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	0.015						0.12 J		
Inorganics (mg/Kg)									
Arsenic	0.39						2.7 J		
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	16	52	20	10	1.1	37	1.9	0.73

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-7
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 427, 428 and 429
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	2 / 3	0.36 : 0.36	0.062 - 0.42	0.22	0.016	1720	2.6E-05	0.0002	Kidney
Inorganics (mg/Kg)									
Arsenic	3 / 3		3.4 - 8.7	5.2	0.35	22	2.5E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	8 / 8		0.91 - 17	4.9	3.5	50	4.9E-06	0.3	Reproductive / Endocrine

SUM: 6E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-7
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 427, 428 and 429
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-427-01 11/16/1999	RES-SS-11-427-02 11/16/1999	RES-SS-11-427-03 11/16/1999	RES-SS-11-428-01 11/17/1999	RES-SS-11-428-02 11/17/1999	RES-SS-11-428-03 11/17/1999	RES-SS-11-429-01 11/17/1999	RES-SS-11-429-02 11/17/1999
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	0.015	0.36 U			0.42 J			0.062 J	
Inorganics (mg/Kg)									
Arsenic	0.39	3.4			3.6			8.7	
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	0.91	1.2	1.1	5	3.4	2.9	17	7.9

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the reporting limit
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-8
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 430 and 431
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Inorganics (mg/Kg)									
Arsenic	1 / 2	1.6 : 1.6	1.7 - 1.7	1.3	0.35	22	4.9E-06	0.08	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	5 / 5		1.5 - 35	15.8	3.5	50	1.0E-05	0.7	Reproductive / Endocrine

SUM: 1E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-8
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 430 and 431
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-430-01 11/17/1999	RES-SS-11-430-02 11/17/1999	RES-SS-11-431-01 11/17/1999	RES-SS-11-431-02 11/17/1999	RES-SS-11-431-03 11/17/1999
Inorganics (mg/Kg)						
Arsenic	0.39	1.6 U		1.7 J		
Dioxins/Furans (ng/Kg)						
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	1.5	8.2	35	30	4.3

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-9
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 432 and 433
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 2	3.5 : 3.5	0.6 - 0.6	1.2	0.016	1720	3.8E-05	0.0003	Kidney
Dibenz(a,h)anthracene	1 / 2	3.5 : 3.5	0.13 - 0.13	0.94	0.016	1720	8.1E-06	0.00008	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		2.6 - 9.6	6.1	0.35	22	2.7E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		5 - 1000	217	3.5	50	2.9E-04	20	Reproductive / Endocrine

SUM: 4E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-9
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lots 432 and 433
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-432-01 11/18/1999	RES-SS-11-432-02 11/18/1999	RES-SS-11-432-03 11/18/1999	RES-SS-11-433-01 11/18/1999	RES-SS-11-433-02 11/18/1999	RES-SS-11-433-03 11/18/1999
Semivolatile Organics (mg/Kg)							
Benzo(a)pyrene	0.015	3.5 U			0.6 J		
Dibenz(a,h)anthracene	0.015	3.5 U			0.13 J		
Inorganics (mg/Kg)							
Arsenic	0.39	2.6 J			9.6		
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	120	5	8.2	1000	140	28

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the reporting limit
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-10
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 486
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.84 - 0.84	0.84	0.016	1720	5.3E-05	0.0005	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		6.5 - 6.5	6.5	0.35	22	1.9E-05	0.3	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		46 - 73	59	3.5	50	2.1E-05	1	Reproductive / Endocrine

SUM: 9E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-10
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 486
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-486-01 11/18/1999	RES-SS-11-486-02 11/18/1999	RES-SS-11-486-03 11/18/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015	0.84 J		
Inorganics (mg/Kg)				
Arsenic	0.39	6.5		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	46	73	59

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-11
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 328
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	2 / 2		0.2814 - 0.61	0.45	0.016	1720	3.8E-05	0.0004	Kidney
Dibenz(a,h)anthracene	1 / 2	2.7 : 2.7	0.055 - 0.055	0.70	0.016	1720	3.4E-06	0.00003	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		4.9 - 7.42	6.2	0.35	22	2.1E-05	0.3	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4 / 4		3.5 - 390	141	3.5	50	1.1E-04	8	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-11
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 328
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	LPX-FP-4006-0000-01 7/19/2001	RES-SS-11-328-01 11/18/1999	RES-SS-11-328-02 11/18/1999	RES-SS-11-328-03 11/18/1999
Semivolatile Organics (mg/Kg)					
Benzo(a)pyrene	0.015	0.28137	0.61 J		
Dibenz(a,h)anthracene	0.015	0.05503	2.7 U		
Inorganics (mg/Kg)					
Arsenic	0.39	7.42	4.9		
Dioxins/Furans (ng/Kg)					
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	150	390	22	3.5

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the detection limit
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-12
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 497
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Inorganics (mg/Kg)									
Arsenic	1 / 1		3 - 3	3.0	0.35	22	8.6E-06	0.1	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		5.1 - 7.5	6.3	3.5	50	2.1E-06	0.2	Reproductive / Endocrine

SUM: 1E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-12
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 497
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-497-01 12/2/1999	RES-SS-11-497-02 12/2/1999	RES-SS-11-497-03 12/2/1999
Inorganics (mg/Kg)				
Arsenic	0.39	3		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	7.5	6.2	5.1

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-13
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 396
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	5 / 5		8.5 - 330	113	3.5	50	9.4E-05	7	Reproductive / Endocrine

SUM: 9E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-13
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 396
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108296 7/18/2002	2108297 7/18/2002	2112410 9/10/2002	RES-SS-11-396-02 11/17/1999	RES-SS-11-396-03 11/17/1999
Dioxins/Furans (ng/Kg)						
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	100	330	67	61	8.5

Notes:
TEQ = Toxic Equivalence
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-14
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 577
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Inorganics (mg/Kg)									
Arsenic	1 / 1		5.1 - 5.1	5.1	0.35	22	1.5E-05	0.2	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		19 - 420	169	3.5	50	1.2E-04	8	Reproductive / Endocrine

SUM: 1E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-14
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 11 Lot 577
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-11-577-01 11/18/1999	RES-SS-11-577-02 11/18/1999	RES-SS-11-577-03 11/18/1999
Inorganics (mg/Kg)				
Arsenic	0.39	5.1		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	420	67	19

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-15
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 004
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.11 - 0.11	0.11	0.016	1720	6.9E-06	0.00006	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		9.1 - 9.1	9.1	0.35	22	2.6E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		2.1 - 120	43	3.5	50	3.4E-05	2	Reproductive / Endocrine

SUM: 7E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-15
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 004
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-10-004-01 11/18/1999	RES-SS-10-004-02 11/18/1999	RES-SS-10-004-03 11/18/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015	0.11 J		
Inorganics (mg/Kg)				
Arsenic	0.39	9.1		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	120	6.6	2.1

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-16
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 005
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Inorganics (mg/Kg)									
Arsenic	1 / 1		8.1 - 8.1	8.1	0.35	22	2.3E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		3.2 - 150	54	3.5	50	4.3E-05	3	Reproductive / Endocrine

SUM: 7E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-16
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 005
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-10-005-01 11/18/1999	RES-SS-10-005-02 11/18/1999	RES-SS-10-005-03 11/18/1999
Inorganics (mg/Kg)				
Arsenic	0.39	8.1		
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	150	9	3.2

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-17
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lots 042, 044 and 604
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	4 / 4		0.12 - 2.0664	0.76	0.016	1720	1.3E-04	0.001	Kidney
Dibenz(a,h)anthracene	1 / 4	0.82 : 4.3	0.4663 - 0.4663	1.1	0.016	1720	2.9E-05	0.0003	Kidney
Inorganics (mg/Kg)									
Arsenic	4 / 4		4 - 55.6	19.8	0.35	22	1.6E-04	3	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	10 / 10		3.2 - 530	134	3.5	50	1.5E-04	11	Reproductive / Endocrine
Dioxin-Like PCBs (ng/Kg)									
Dioxin-like PCB Congener TEQ	1 / 1		6.0 - 6.0	6.0	3.5	50	1.7E-06	0.1	Reproductive / Endocrine

SUM: 5E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-17
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lots 042, 044 and 604
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	LPX-FP-4007-0000-01 7/19/2001	RES-SS-10-042-01 11/18/1999	RES-SS-10-042-02 11/18/1999	RES-SS-10-042-03 11/18/1999	RES-SS-10-044-01 11/19/1999	RES-SS-10-044-02 11/19/1999	RES-SS-10-044-03 11/19/1999	RES-SS-10-604-01 11/18/1999
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	0.015	2.06637	0.12 J			0.42 J			0.44 J
Dibenz(a,h)anthracene	0.015	0.46627	0.82 U			4.3 U			3.1 U
Inorganics (mg/Kg)									
Arsenic	0.39	4.93	55.6			14.8			4
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	83	330	4.3	4.1	530	62	12	260
Dioxin-Like PCBs (ng/Kg)									
Dioxin-like PCB Congener TEQ	4.5	6.0							

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the reporting limit
RSL = Regional Screening Level (USEPA, May 2012)

US EPA ARCHIVE DOCUMENT

Table LPX-SS-17
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lots 042, 044 and 604
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	RES-SS-10-604-02 11/18/1999	RES-SS-10-604-03 11/18/1999
Semivolatile Organics (mg/Kg)		
Benzo(a)pyrene		
Dibenz(a,h)anthracene		
Inorganics (mg/Kg)		
Arsenic		
Dioxins/Furans (ng/Kg)		
Dioxin TEQ (USEPA, 2010 Mammal)	52	3.2
Dioxin-Like PCBs (ng/Kg)		
Dioxin-like PCB Congener TEQ		

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
U = not detected, value is the reporting limit
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-18
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 068
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	1 / 1		0.1 - 0.1	0.10	0.016	1720	6.3E-06	0.00006	Kidney
Inorganics (mg/Kg)									
Arsenic	1 / 1		2.8 - 2.8	2.8	0.35	22	8.0E-06	0.1	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	4 / 4		2.3 - 52	26.2	3.5	50	1.5E-05	1	Reproductive / Endocrine

SUM: 3E-05

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-18
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 068
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	2108286 7/17/2002	RES-SS-10-053-01 12/2/1999	RES-SS-10-053-02 12/2/1999	RES-SS-10-053-03 12/2/1999
Semivolatile Organics (mg/Kg)					
Benzo(a)pyrene	0.015		0.1 J		
Inorganics (mg/Kg)					
Arsenic	0.39		2.8 J		
Dioxins/Furans (ng/Kg)					
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	52	42	8.5	2.3

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-19
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 074
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	2 / 2		0.24 - 1.8	1.0	0.016	1720	1.1E-04	0.001	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		7.1 - 8.9	8.0	0.35	22	2.5E-05	0.4	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	3 / 3		17 - 86	43	3.5	50	2.5E-05	2	Reproductive / Endocrine

SUM: 2E-04

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-19
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lot 074
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Parameter	Residential Soil RSL	RES-SS-10-068-01 11/19/1999	RES-SS-10-074-01 11/19/1999	RES-SS-10-074-02 11/19/1999
Semivolatile Organics (mg/Kg)				
Benzo(a)pyrene	0.015	0.24 J	1.8 J	
Inorganics (mg/Kg)				
Arsenic	0.39	7.1	8.9	
Dioxins/Furans (ng/Kg)				
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	26	17	86

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

Table LPX-SS-20
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lots 075 and 076
Centredale Manor Restoration Project Superfund Site
North Providence, RI

Parameter	Frequency of Detection	Range of Reporting Limits for Non-Detects	Range of Detected Concentrations	Average of All Samples	Residential Soil PRG Based On Cancer Risk	Residential Soil PRG Based On Non-cancer Risk	ELCR (1)	HQ (2)	Target Organ
Semivolatile Organics (mg/Kg)									
Benzo(a)pyrene	2 / 2		8.6 - 20	14.3	0.016	1720	1.3E-03	0.01	Kidney
Dibenz(a,h)anthracene	2 / 2		2.7 - 4.5	3.6	0.016	1720	2.8E-04	0.003	Kidney
Inorganics (mg/Kg)									
Arsenic	2 / 2		7.7 - 32.8	20	0.35	22	9.4E-05	1	Skin / Hematological
Dioxins/Furans (ng/Kg)									
Dioxin TEQ (USEPA, 2010 Mammal)	6 / 6		3.3 - 120	27	3.5	50	3.4E-05	2	Reproductive / Endocrine

SUM: 2E-03

Notes:
(1) ELCR = 1E-06 x (Max Concentration) / (Residential Soil PRG based on Cancer Risk)
(2) HQ = (Max Concentration) / (Residential Soil PRG Based on Non-cancer Risk)
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanograms per kilogram
PRG = Preliminary Remediation Goal (site-specific)
Residential Soil PRG Based On Cancer Risk is associated with cancer risk = 10^{-6}.
Residential Soil PRG Based on Non-cancer Risk is associated with HQ = 1.

US EPA ARCHIVE DOCUMENT

Table LPX-SS-20
Surface Soil Analytical and Human Health Risk Results on the East Bank of Lyman Mill Pond in the Vicinity of Plat 10 Lots 075 and 076
Centredale Manor Restoration Project Superfund Site
North Providence, RI

Parameter	Residential Soil RSL	RES-SS-10-075-01 11/19/1999	RES-SS-10-075-02 11/19/1999	RES-SS-10-075-03 11/19/1999	RES-SS-10-076-01 11/19/1999	RES-SS-10-076-02 11/19/1999	RES-SS-10-076-03 11/19/1999
Semivolatile Organics (mg/Kg)							
Benzo(a)pyrene	0.015	20			8.6 J		
Dibenz(a,h)anthracene	0.015	4.5 J			2.7 J		
Inorganics (mg/Kg)							
Arsenic	0.39	32.8			7.7		
Dioxins/Furans (ng/Kg)							
Dioxin TEQ (USEPA, 2010 Mammal)	4.5	14	3.3	5.4	120	17	3.5

Notes:
TEQ = Toxic Equivalence
mg/Kg = milligram per kilogram
ng/Kg = nanogram per kilogram
J = value is estimated
RSL = Regional Screening Level (USEPA, May 2012)

Prepared By: EYM 5/7/12
Checked By: KJC 5/8/12

US EPA ARCHIVE DOCUMENT

APPENDIX B-2

Photographs Supporting the Evaluation of Floodplain Soil at Lee Romano Field and Vicinity

Appendix B-2
Photographs of Lee Roman Field and Vicinity

Page 1 Lee Romano Field looking southwest – paved parking lot and spectator seating n foreground, playing field in background, with Community Center at the back. Woonasquatucket River is to the right, beyond the buildings and 8 – 10 foot high chain link fence

Page 2 Lee Romano Field looking south - paved parking lot and spectator seating in foreground, playing field in background, with Community Center at the back.

Page 3 Lee Romano Field looking northeast from paved area between the ballpark perimeter fence and the fence along the river.

Page 4 Looking southwest from paved area between the ballpark fence and the fence along the river. The 8 – 10 foot high chain link fence is behind the trees on the right.

Page 5 Looking west at the Tri Town Community Center (which is located immediately south of the Lee Romano Field). Paved parking area in foreground.

Page 6 Looking west from south of the Tri Town Community Center building. Wooded and heavily vegetated area between the building and the river.

US EPA ARCHIVE DOCUMENT


NO. PROV. WEST
Little League







US EPA ARCHIVE DOCUMENT





US EPA ARCHIVE DOCUMENT

APPENDIX C

Source Area Baseline Human Health Risk Assessment

APPENDIX C

SOURCE AREA RISK ASSESSMENT

CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Prepared for:

U.S. EPA Region 1
5 Post Office Square, Suite 100
Boston, MA 02109

and

Department of the Army
U.S. Army Corps of Engineers
New England Division

Contract No. W912WJ-11
Delivery Order No. 0005

Prepared by:

AMEC Environment & Infrastructure, Inc.
107 Audubon Road, Suite 301
Wakefield, MA 01880
(781) 245-6606

May 2012

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1
- 1.1 Organization of Report 1-1
- 1.2 Description of Site 1-1
- 1.3 Site Investigations and Actions 1-2
- 1.4 Exposure Areas 1-3
- 1.5 Current and Reasonably Foreseeable Uses of the Site 1-3
- 1.6 Summary of Environmental Conditions 1-4
- 1.7 Conceptual Site Model 1-4
  - 1.7.1 Source Area 1-4
  - 1.7.2 Migration of Oil and/or Hazardous Materials (OHM) 1-5
  - 1.7.3 Potential Human Receptors 1-5
- 1.8 Summary of Data 1-5

2.0 HAZARD IDENTIFICATION 2-1
- 2.1 Selection of Chemicals of Potential Concern 2-1
  - 2.1.1 COPC Selection Methods 2-2
  - 2.1.2 COPC Selection Results 2-3

3.0 EXPOSURE ASSESSMENT 3-1
- 3.1 Characterization of Exposure Setting 3-1
- 3.2 Identification of Exposure Pathways, Potential Receptors, and Exposure Points 3-1
  - 3.2.1 Receptor Exposure Scenarios for Soil 3-2
  - 3.2.2 Exposure Points 3-3
- 3.3 Quantification of Exposures 3-4
  - 3.3.1.1 Estimation of Chemical-Specific Intakes 3-4

4.0 TOXICITY ASSESSMENT 4-1
- 4.1 Dose-Response Assessment for Carcinogenic Effects 4-1
  - 4.1.1 Adjustment for Early Life Exposure to Carcinogens with a Mutagenic Mode Mode of Action 4-3
- 4.2 Dose-Response Assessment for Noncarcinogenic Effects 4-4
- 4.3 Dermal Dose-Response Values 4-6
- 4.4 Sources of Dose-Response Values 4-6

5.0 RISK CHARACTERIZATION 5-1

6.0 UNCERTAINTY ANALYSIS 6-1

7.0 CONCLUSIONS 7-1

8.0 REFERENCES 8-1

US EPA ARCHIVE DOCUMENT

TABLES

ES-1 Risk Assessment Summary – Reasonable Maximum Exposure

Table 1.1 Exposure Pathway Summary

Table 2.1 Data Summary of Detected Parameters and Selection of Chemicals of Potential Concern

Table 3.1 Exposure Point Concentrations – Soil

Table 4.1 Values Used For Daily Intake Calculations
Table 4.2 Calculation of Total Particulate Emission Factor – Sources Other than Unpaved Roads

Table 5.1 Non-Cancer Toxicity Data – Oral/Dermal
Table 5.2 Non-Cancer Toxicity Data – Inhalation

Table 6.1 Cancer Toxicity Data – Oral/Dermal
Table 6.2 Cancer Toxicity Data – Inhalation

Table 7.1 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Child – Surface Soil
Table 7.2 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Older Child – Surface Soil
Table 7.3 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Adult – Surface Soil
Table 7.4 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Child – Subsurface Soil
Table 7.5 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Older Child – Subsurface Soil
Table 7.6 Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure – Future - Resident – Adult – Subsurface Soil
Table 7.7 Calculation of Chemical Cancer Risks and Non-Cancer Hazards – Reasonable Maximum Exposure – Future – Construction Worker – Adult – Soil

Table 9.1 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Child – Surface Soil
Table 9.2 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Older Child – Surface Soil

Table 9.3 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Adult – Surface Soil
Table 9.4 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Child – Subsurface Soil
Table 9.5 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Older Child – Subsurface Soil
Table 9.6 Summary of Receptor Risks and Hazards for COPCs -- Reasonable Maximum Exposure -- Future – Resident – Adult – Subsurface Soil
Table 9.7 Summary of Receptor Risks and Hazards for COPCs – Reasonable Maximum Exposure – Future – Construction Worker – Adult – Soil

Table 10.1 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Child – Surface Soil
Table 10.2 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Older Child – Surface Soil
Table 10.3 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Adult – Surface Soil
Table 10.4 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Child – Subsurface Soil
Table 10.5 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Older Child – Subsurface Soil
Table 10.6 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Adult – Subsurface Soil
Table 10.7 Risk Summary and COCs – Reasonable Maximum Exposure – Future – Resident – Adult – Subsurface Soil

Table 11.1 Risk Assessment Summary – Reasonable Maximum Exposure
Table 11.2 Lead Model Summary

FIGURES

Figure 1 Source Area Soil Samples

APPENDICES

Appendix A Samples Used for the Risk Assessment
Appendix B ProUCL
Appendix C Lead Model

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

GLOSSARY OF ACRONYMS

ABS	absorption factor
ADD	average daily doses
ADD_c	Average Daily Dose, Chronic
ADD_s	Average Daily Dose, Subchronic
AhR	Ah Receptor
ALM	adult lead model
AT	Averaging Time
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BW	Body Weight
C	Concentrations
CAL-EPA	California Environmental Protection Agency
CDC	Centers for Disease Control
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	chemicals of concern
COPCs	chemicals of potential concern
CSF	Cancer Slope Factor
CSM	conceptual site model
ED	Exposure Duration
EF	Exposure Frequency
EPC	exposure point concentrations
ft	feet
FI	Fraction Ingested
GSD	geometric standard deviation
HI	Hazard Index
HCX	hexachloroxanthene
HEAST	Health Effects Assessment Summary Table
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic Model
IR	Ingestion Rate
IRIS	Integrated Risk Information System
LADD	lifetime average daily dose
LOAEL	Lowest Observable Adverse Effect Level

$\mu g/m^3$	micrograms per cubic meter
µg/dL	micrograms per deciliter
µg/L	micrograms per liter
mg/kg/day	milligrams per kilogram per day
mg/m^3	milligrams per cubic meter
mf	modifying factor
MOA	Mode of Action
MRLs	Method Reporting Limits
NCP	National Hazardous Substances and Pollution Contingency Plan
NCEA	National Center for Environmental Assessment
NOAEL	No Observable Adverse Effect Level
OHM	oil and/or hazardous materials
10^{-4}	one in ten thousand
10^{-6}	one in one million
PAHs	polycyclic aromatic hydrocarbons
PbB	blood lead levels
PCBs	polychlorinated biphenyls
PCDD	polychlorinated dibenzodioxins
PCDF	polychlorinated dibenzofurans
PRGs	preliminary remediation goals
PRP	Potentially Responsible Party
PRTV	Peer Reviewed Toxicity Values
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk Based Concentration
RfC	Reference Concentration
RfC_s	Subchronic Reference Concentrations
RfDs	Reference Doses
RfD_s	Subchronic Reference Doses
RIDEM	Rhode Island Department of Environmental Management
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SA	Surface Area
SF	Slope Factor
STSC	Superfund Technical Support Center
SVOCs	semivolatile organic compounds
TCDD	tetrachlorodibenzo-p-dioxin
TEF	Toxicity Equivalent Factor
TEQ	Toxicity Equivalence

US EPA ARCHIVE DOCUMENT

UAO	Unilateral Administrative Order
UCL	upper concentration limit
UF	Uncertainty Factor
UR	Unit Risk
USACE	U.S. Army Corps of Engineers, New England District
USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds
WHO	World Health Organization

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

EXECUTIVE SUMMARY

A risk assessment has been conducted to evaluate potential future human health risks for the Source Area as part of the Centredale Manor Restoration Project Superfund Site in North Providence, Rhode Island. This risk assessment has been conducted in accordance with the U.S. Environmental Protection Agency (USEPA) Risk Assessment Guidance for Superfund (RAGS) Parts A, D, and E (USEPA, 1989, 2001a, 2004), as well as USEPA Region I risk assessment guidance contained in Risk Updates (USEPA, 1994, 1995, 1999). The focus of this risk assessment is to evaluate potential future risks at the Source Area.

The Source Area of the Site, consisting of approximately 9.04 acres, is located in North Providence, Rhode Island, just south of Route 44 on the eastern bank of the Woonasquatucket River. The Source Area of the Site is known as 2072 and 2074 Smith Street. The remaining portions of the Site consist of reaches, man-made ponds, and wetlands associated with the Woonasquatucket River. Previous risk assessments have been completed to evaluate risk associated with these man-made ponds and wetlands. The Source Area is improved with two apartment buildings for the elderly. These are Centredale Manor Apartments and Brook Village Apartments. Two caps have been constructed at areas known as 2072 and 2074 Smith Street. These caps were constructed to minimize direct contact soil exposures and to minimize migration of soil during storm events. In addition, the former tailrace area has been capped (Cap #3) and storm water has been re-routed around that area. The land-use for the Source Area is expected to remain multi-family residential. This source area risk assessment has been conducted with the assumption that the existing caps may potentially not be present or may no longer be effective in preventing direct contact exposure to soils. These assumptions have been made in order to provide supporting information for the selection of the Source Area soil remedy. This risk assessment does not evaluate potential soil exposure for current conditions since the existing caps minimize exposure.

The Site was used for disposal of wastes containing hazardous substances. Between approximately 1940 and 1970, USEPA has reason to believe that the main area of the Site was the location of a chemical manufacturing facility (which produced hexachlorophene, among other chemicals) and an incineration-based drum recycling facility. Soil sampling and analysis at the Source Area have detected elevated levels of dioxin (particularly 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD]), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and selected metals (Battelle, 2003b).

Direct infiltration of contaminants and leaching through the ground surface has led to contamination of surface and subsurface soils in the Source Area. Contaminants in Source Areas soils have leached into groundwater. Contaminants have migrated from the Source Area via surface soil runoff and direct discharge into the Woonasquatucket River. Downstream

US EPA ARCHIVE DOCUMENT

sediments have been impacted through the transport and deposition of contaminants from the Source Area. The downstream contamination has been previously evaluated in the Baseline Human Health Risk Assessment (BHHRA) (MACTEC, 2005).

The risk assessment analyzes potential adverse human health effects for a future scenario for residents and construction workers exposed to soils at the Source Area. As discussed above remedial actions have been taken at the Source Area (e.g. capping) to minimize exposure to soils. Potential inhalation of VOCs that might potentially migrate from groundwater or subsurface soil into buildings has previously been evaluated and reports indicate no significant migration of VOCs into buildings.

HAZARD IDENTIFICATION

The purpose of the hazard identification section is to present a compilation of the available sampling data for the hazardous substances present at the site, to identify data sets suitable for use in a quantitative risk evaluation, and to identify contaminants of potential concern in soil upon which the quantitative assessment of risk will be based. The risk assessment is based on data collected from multiple site investigations in soil over time.

COPC Selection for Soil

Using the available soil data, chemicals have been initially identified as chemicals of potential concern (COPCs) for the site. COPCs are those chemicals that are evaluated in the risk assessment.

Consistent with USEPA Region I guidance, COPCs were selected based on frequency of detection and comparison of detected concentrations to risk-based screening criteria. USEPA Regional Screening Levels (RSL) for residential soils were used in the selection of COPCs for soil in a manner consistent with USEPA national and regional guidance.

For the site soil, COPCs include dioxin toxicity equivalence (TEQ), hexachloroxanthene (HCX), 18 VOCs, ten SVOCs, six pesticides, five Aroclors, and 13 inorganics/metals. A review of the substances eliminated during the COPC selection process did not identify any substance(s) that was likely to pose significant risk despite elimination via the risk-based screening approach.

TOXICITY ASSESSMENT

The purpose of the toxicity assessment is to characterize the relationship between the dose of COPC administered or received and the likelihood of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values (e.g., slope factors, reference dose values, or reference concentrations [RfC]) are derived that can be used

US EPA ARCHIVE DOCUMENT

to estimate the likelihood of adverse effects as a function of human exposure to an agent. These toxicity values are used in the risk characterization process to estimate the potential for adverse effects occurring in humans at different exposure levels.

The dose-response information may be divided into two major categories:

- toxicity information associated with threshold (non-carcinogenic) health effects.
- toxicity information concerning carcinogenicity, either from human epidemiologic data or from laboratory studies.

All the chemicals selected as COPCs are evaluated for potential non-carcinogenic health effects. In addition, any substance considered to be a known, probable, or possible human carcinogen is also evaluated for its potential carcinogenic effects. The classification of a chemical as a carcinogen does not preclude an evaluation of that same chemical for potential non-carcinogenic health risks, as all potentially carcinogenic chemicals may also exert non-carcinogenic health effects.

Toxicity values were obtained from USEPA recommended sources, including the USEPA's Integrated Risk Information System (IRIS), and the USEPA's National Center for Environmental Assessment publications, and various USEPA reports.

EXPOSURE ASSESSMENT

The objective of the exposure assessment is to estimate the type and magnitude of receptors' exposures to COPCs at or migrating from the site. The exposure assessment is conducted to: 1) characterize the populations of humans potentially exposed via direct contact with soil at the Source Area; 2) identify the mechanisms by which receptors may be exposed; and 3) identify the intake, or dose, of COPCs that receptors may receive through the identified exposure pathways.

Identification of Potentially Exposed Human Populations

The potentially exposed human populations identified for evaluation in the risk assessment include: Potential Future Residents at the Source Area and Future Construction Workers at the Source Area.

Identification of Exposure Points

Three exposure points have been identified for the Source Area. For potential future residents soils have been evaluated as surface soil (0-1 feet [ft]) and subsurface soil (1-5 ft). For the construction worker surface soil and subsurface soil have been evaluated as one exposure point (0-5 ft). As stated in the Feasibility Study the water table is approximately 5 ft below

ground surface (bgs) throughout the Source Area. Future exposure to soils below the water table is not a foreseeable future scenario.

Exposure Scenarios and Routes of Exposure

Based on the potential future land use of the Site, the risk assessment evaluated the following exposure scenarios. Future Residents at the Source Area (child, older child, and adult) and Future Construction Workers (adult) are potentially exposed to soils via direct contact (incidental ingestion and dermal contact) and inhalation of dusts.

Exposure Point Concentrations

A single concentration is selected as representative of the actual concentration for each COPC in a given medium for a given exposure point. This value, called the exposure point concentration (EPC), is used in the estimates of health risks at the site. An EPC is selected for each COPC.

The 95% Upper Confidence Limit (UCL) on the mean concentration is typically used as the EPC. There are two exceptions to this rule. In the case where the 95% UCL is greater than the maximum detected concentration; and/or if there are fewer than five samples in a data set (the UCL is not calculated). For these two situations, the maximum detected concentration is used as the Reasonable Maximum Exposure (RME) EPC.

Identification of Exposure Models and Parameters

Chemical-specific intakes were calculated in a manner consistent with USEPA guidance for risk assessment. Average daily doses (ADDs) of COPCs were calculated as the measure of exposure. The ADDs are expressed as milligrams of contaminant per kilogram of bodyweight per day (mg/kg/day). For non-cancer health effects calculations, the ADD was averaged over the duration of exposure. For cancer risk calculations, the ADD was averaged over a 70-year lifetime (a lifetime average daily dose or LADD). The following exposure parameters are included in the dose calculations:

- Concentrations in soil (C)
- Ingestion rate (IR)
- Exposure frequency (EF)
- Fraction ingested from contaminated source (FI)
- Exposure duration (ED)
- Body weight (BW)

US EPA ARCHIVE DOCUMENT

- Averaging time (AT) – cancer and non-cancer
- Skin surface area exposed (SA)

Exposures were assessed for the RME scenario, expressed as the highest estimate of exposure that is likely to occur.

RISK CHARACTERIZATION

Using USEPA-approved toxicity values, potential risks associated with future exposure to soils for potential future residents and construction workers at the Source Area were evaluated. Risks have been calculated for only the RME scenario.

Chemical-Specific Excess Lifetime Cancer Risk was calculated using the following equations:

$$Risk_i = CDI_i \times CSF_i$$

where:

$Risk_i$	=	unitless probability of an individual developing cancer as the result of exposure to a chemical i
CDI_i	=	chronic daily intake of chemical i averaged over 70 years (mg/kg-day)
CSF_i	=	USEPA cancer slope factor for chemical i $(mg/kg\text{-}day)^{-1}$

Pathway-Specific Incremental Lifetime Cancer Risk:

$$Risk_T = \Sigma\, Risk_i$$

where:

$Risk_T$	=	unitless probability of an individual developing cancer as the result of multiple chemical exposures
$Risk_i$	=	unitless cancer risk estimate for a single chemical

The results from the carcinogenic risk assessment are compared to acceptable risk ranges established by the USEPA. The USEPA's guidelines, established in the National Hazardous Substances and Pollution Contingency Plan (NCP) identify acceptable exposure levels as those concentration levels "that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} [one in ten thousand] and 10^{-6} [one in one million] using information on the relationship between dose and response" (USEPA 1990). Where the cumulative RME site risk to an individual exceeds the upper end of this range, action is generally warranted at a site. Where the cumulative RME site risk to an individual is less than 10^{-4}, action is generally not warranted. The excess lifetime cancer risks estimates are also compared to other criteria, and requirements, including for this Site, a cancer risk of 10^{-5}.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Following are the equations used to determine the Hazard Quotient (HQs) and Hazard Index (HIs) values.

The following equation is used to determine the HQ:

$$HQ_i = \frac{I_i}{RfD_i}$$

where:

HQi	=	hazard quotient of chemical i
Ii	=	intake of chemical i averaged over the exposure period (mg/kg-day)
RfDi	=	reference dose for chemical i corresponding to the same exposure duration as the intake (mg/kg-day)

The following equation is used to determine the HI:

$$HI = \Sigma\ HQ_i$$

where:

HI	=	potential for noncarcinogenic effects from multiple chemical exposures
HQi	=	hazard quotient for each chemical

An HI of less than 1 indicates that noncarcinogenic toxic effects are unlikely. An HI greater than 1 indicates a greater possibility of a noncarcinogenic toxic effect occurring, but the circumstances must be evaluated on a case-by-case basis. USEPA typically considers action if the HI is greater than one.

RISK SUMMARY

The estimates of cancer risk and non-cancer hazards associated direct contact with soil for future residents and for future construction workers have been developed using the equations identified above.

Table ES-1 summarizes the calculated risks. This table presents the soil route-specific risks for each age-group for the Resident and the Construction Worker for each exposure area.

Potential Future Resident Surface Soil

As shown in Table ES.1, the total (summed across age groups) surface soil cancer risk for the future resident in the Source Area is 4×10^{-3}, which is above the Superfund cancer risk range.

US EPA ARCHIVE DOCUMENT

The highest non-cancer HI among the age groups in Source Area is 305, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to this HI is Aroclor-1232. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

Potential Future Resident Subsurface Soil

As shown in Table ES.1, the total (summed across age groups) subsurface soil cancer risk for the future resident in the Source Area is 2×10^{-3}, which is above the Superfund cancer risk range. The highest non-cancer HI among the age groups in Source Area is 109, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to the HI is Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

Potential Future Construction Worker Soil

As shown in Table ES.1, the total soil cancer risk for the future construction worker in Source Area is 5×10^{-5}, which is within the Superfund cancer risk range, but above 10^{-5}. The non-cancer HI for the construction worker in the Source Area is 15. This HI is associated with the Immune System. The largest chemical contributor to this HI is ingestion of Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

UNCERTAINTY ANALYSIS

The extensive environmental investigations have provided a substantial body of information that has been utilized in the risk assessment. The identification of COPCs has been conducted consistent with USEPA guidance and has been done in a health protective manner. Based on currently available information, it is unlikely that any detected substances that have not been selected as COPCs would have a substantial impact on the risk assessment results and conclusions if they had been retained in the risk assessment.

The selection of receptors is conservative and health-protective for the conditions identified at the Site.

The toxicity assessment has been conducted consistently with available USEPA guidance. Dose-response information has been obtained from the IRIS database, National Center for Environmental Assessment (NCEA), California Environmental Protection Agency (CAL-EPA), and USEPA's Health Effects Assessment Summary Tables (HEAST). These sources of dose-response values are commonly used for regulatory risk assessment activities and are generally considered to be conservative in nature. The use of surrogate toxicity values for chemicals

lacking USEPA recommended values is conservative since it is likely that the chemical specific toxicity would be lower than those exhibited by their surrogate.

Overall, the risk assessment provides conservative estimates of non-cancer and cancer risks consistent with USEPA risk assessment guidance (USEPA, 1989).

CONCLUSIONS

The potential risks associated with future exposure for potential future residents and construction workers at the Source Area have been characterized. The risk characterization included the evaluation of potential future exposures to surface soil and subsurface soil in the Source Area. Risks have been calculated using an RME exposure scenario. The calculated risks have been compared to the Superfund cancer risk range of 10^{-6} to 10^{-4} and to a HI value of 1 and to the cancer risk of 10^{-5} associated with the Remedial Action Objectives identified in the Feasibility Study.

The following conclusions have been drawn.

- The calculated total potential future resident (all age groups summed) receptor cancer risk for surface soil exposure at the Source Area is above the Superfund risk range of 10^{-6} to 10^{-4} and obviously above 10^{-5}.
- The calculated total resident (all age groups summed) receptor cancer risk for subsurface soil exposure at the Source Area is above the Superfund risk range of 10^{-6} to 10^{-4}.
- Ingestion is the pathway that is the largest contributor to cancer risk in both surface and subsurface soil for the potential future resident.
- Dioxins and furans (particularly 2,3,7,8-TCDD) are the largest contributors to cancer risk for both surface and subsurface soil exposure for the resident.
- The non-cancer HI is substantially higher than one for the potential future resident for both exposure to surface and subsurface soil at the Source Area. Aroclor-1232 is the largest contributor to the HI for surface soil. Aroclor-1254 is the largest contributor to the HI for subsurface soil.
- The calculated construction worker cancer risk for soil exposure at the Source Area is within the Superfund risk range of 10^{-6} to 10^{-4}.
- The non-cancer HI is above one for the construction worker for exposure to soil at the Source Area. Aroclor-1254 is the largest contributor to the HI for this receptor.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) Region I and U.S. Army Corps of Engineers, New England District (USACE) has prepared a Human Health Risk Assessment (HHRA) for the Source Area soils at the Centredale Manor Restoration Project Superfund Site located in North Providence, Rhode Island (hereafter referred to as "the Site"). The Source Area soil was qualitatively evaluated in the *Draft Health Consultation* (ATSDR, 1999). That evaluation led to the installation of Cap #1 and Cap #2. Cap #3 was installed based on additional investigations. The Interim-Final Baseline Human Health Risk Assessment (BHHRA) (MACTEC, 2005) was completed in 2005 for the Site, but it did not evaluate the Source Area soil. Currently, the existing caps minimize exposure to soils by people living at and visiting the property. This risk assessment has been prepared to characterize risks associated with a scenario that assumes the existing caps are no longer effective in preventing soil exposure. This risk assessment focuses only on the area of the Site known as the Source Area. An aerial photograph of the Source Area, capped areas, and the surrounding areas is provided as Figure 1.

1.1 Organization of Report

This risk assessment is divided into seven sections: an introduction is provided in Section 1.0; a hazard identification is presented in Section 2.0; exposure assessment including receptor identification, development of exposure profiles and exposure point concentrations (EPCs) is presented in Section 3.0; the toxicity assessment is presented in Section 4.0, the risk characterization is contained in Section 5.0, the uncertainty analysis is discussed in Section 6.0, and the Conclusions and Recommendations are presented in Section 7.0. Appendix A addresses sample selection considerations for the risk assessment. Appendix B contains ProUCL outputs used in EPC calculations. Appendix C contains documentation of the exposure and risk assessment for lead in soil.

The table numbering in this report is consistent with the numbering of Tables in the USEPA's *Risk Assessment Guidance for Superfund (RAGS): Volume I - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final* (USEPA, 2001a). That guidance includes standardized tables (with a specific numbering scheme) for reporting risk assessment activities. For each group of tables (such as the Table 2s that present the selection of chemicals of potential concern [COPC]), the tables are numbered consecutively.

1.2 Description of Site

The main area of the Site, consisting of approximately 9.04 acres, is located in North Providence, Rhode Island, just south of Route 44 on the eastern bank of the Woonasquatucket

US EPA ARCHIVE DOCUMENT

River. The main area of the Site is known as 2072 and 2074 Smith Street. The remaining portions of the Site consist of reaches, man-made ponds, and wetlands associated with the Woonasquatucket River. This risk assessment focuses only on the Source Area as shown in Figure 1.

As shown in Figure 1, currently, two high rise buildings (Centredale Manor and Brook Village, both federally-subsidized, senior housing complexes) are located within the Source Area, which is zoned for residential occupancy. In addition to the buildings, the Source Area is covered by roadway and parking lots. On the eastern portion of the Source Area is a drainage swale that begins near the northern portion of the Source Area and extends south, then curves to the west and discharges south of the main area into the Woonasquatucket River and Allendale Pond. Stormwater has been redirected around this area and a cap has been installed over the drainage swale area. This area has also been referred to as the "tailrace" area.

It has been reported that the Site was used for disposal of wastes containing hazardous substances. Between approximately 1940 and 1970, USEPA has reason to believe that the Source Area of the Site was the location of a chemical manufacturing facility (which produced hexachlorophene, among other chemicals) and an incineration-based drum recycling facility. The first housing complex was built in approximately 1976. The second high rise was built in 1982. Construction records show that hazardous substances were removed from the Source Area during the construction of the second complex. Soil sampling and analysis at the Source Area have detected elevated levels of dioxin (particularly 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD]), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and selected metals (Battelle, 2003a).

1.3 Site Investigations and Actions

From 1970 to 1986, the Rhode Island Department of Environmental Management (RIDEM) oversaw several investigations at the property. In November 1981, RIDEM issued a Notice of Violation and Order requiring the property owners to immediately identify all hazardous materials on site and properly dispose of all hazardous wastes. No information regarding compliance actions is provided in available file information. In February 1982, approximately 400 drums were excavated from the property and disposed of off site. Approximately 30 of the drums contained chemical residues. The residues were sampled and at least eight drums containing hazardous materials were manifested off site. In 1982, RIDEM required that soil samples be collected in the footprint of the Centredale Manor building prior to its construction. Following sampling and analysis, approximately 6,000 cubic yards of soil from the building footprint were excavated and disposed of as non-hazardous waste.

In January 1999, USEPA began a time-critical removal action at the property. The removal action involved sampling; clearing; installation of fencing; a Flood Evaluation Study of the Site and surrounding area; the design and implementation of interim soil caps for specific areas of

US EPA ARCHIVE DOCUMENT

the Site; and community outreach. This time-critical removal action was completed in the spring of 2000.

In the fall of 2000, USEPA began a source area investigation. As part of the investigation, monitoring wells were installed, and soil, groundwater, and surface and downhole geophysical data were collected. The source area investigation was completed in the summer of 2001.

In the fall of 2003, USEPA began implementing another time-critical removal action, which involved designing and building a third soil cap as part of the reconstructed tailrace. This removal action has been completed.

Therefore, three caps have been constructed at areas known as 2072 and 2074 Smith Street (Source Area). These caps were constructed to minimize direct contact soil exposures and to minimize eliminate migration of soil during storm events. The caps are referred to as Cap #1 and Cap #2 and the two-foot cap over the tailrace area (Cap #3).

During 2009 – 2010, a soil removal action and installation of RCRA C cap was conducted within the Source Area. Excavated soil was disposed off-site. Samples collected within 5 feet (ft) of ground surface within the excavation footprint have been excluded from this risk assessment since the soils have been excavated.

1.4 Exposure Areas

For the purpose of this risk assessment the Source Area has been evaluated as one exposure area. The exposure area is represented by soils within the boundaries of the Source Area as shown in Figure 1.

1.5 Current and Reasonably Foreseeable Uses of the Site

The Source Area is occupied by the Brook Village and Centredale Manor apartment complexes. These parcels are currently occupied and covered by buildings, pavement, or landscaping. The land-use for the Source Area is expected to remain multi-family residential.

Currently the soils at the Source Area are under caps, pavement or landscaped areas. Therefore, there is no current exposure to soils at the Source Area. It is possible in the future that the caps, pavement, and landscaped areas could degrade and soils would become accessible to residents at the Source Area. Also if the Source Area were to be redeveloped in the future, construction workers could come in contact with soils.

US EPA ARCHIVE DOCUMENT

1.6 Summary of Environmental Conditions

Sampling activities conducted by USEPA and RIDEM revealed elevated polychlorinated dibenzo dioxins and furans (dioxins and furans) in soils. As mentioned above, other contaminants detected onsite include: PCBs, chlorinated and aromatic VOCs, polycyclic aromatic hydrocarbons (PAHs), phthalates, and metals.

Temporary fencing was erected around areas of contaminated surface soil in January 1999. The temporary fencing was replaced with chain-link fence between May and September 1999 to prevent access to contaminated areas. There is currently chain-link fencing along the perimeter of each of the three caps.

Numerous soil sample locations no longer represent current soil exposure opportunities for potential receptors at the Source Area. Soil sample locations within the footprint of the three caps and the rip-rap along the eastern bank of the Woonasquatucket River adjacent to and downstream of the source area are no longer representative of soils with current exposure potential. Although these sample locations are not representative of current exposure, they have been utilized in the assessment of potential future residential land use.

1.7 Conceptual Site Model

The conceptual site model (CSM) identifies potential source areas from which chemicals may have been released, the migration pathways through which chemicals may have been transported and/or translocated to other environmental media, and where possible exposure may occur. The CSM provides a framework for understanding sources of chemicals, migration pathways, identification of potential receptors, and development of exposure profiles.

1.7.1 Source Area

It has been reported that releases of hazardous substances from former industrial operations have occurred at the Site. The source area consists of two parcels located at 2072 and 2074 Smith Street (Lots 200 & 250) that cover approximately 9 acres (Figure 1). Evidence suggests that operations at the former chemical company and drum reconditioning facility resulted in waste disposal onto surface soil and beneath the ground surface. Wastes have also been released directly into the Woonasquatucket River, which runs along the western side of the source area (Tetra Tech NUS Inc., 2000). Dioxins and furans have been detected in soils and sediments as well as in fish tissue collected from the Woonasquatucket River. Other contaminants detected in Site media include PCBs, VOCs, PAHs, hexachloroxanthene (HCX), phthalates, and metals.

US EPA ARCHIVE DOCUMENT

1.7.2 Migration of **Oil and/or Hazardous Materials** (OHM)

Direct infiltration of contaminants and leaching through the ground surface has led to contamination of surface and subsurface soils in the Source Area. Contaminants in Source Areas soils have leached into groundwater. Contaminants have migrated from the Source Area via surface soil runoff and direct discharge into the Woonasquatucket River. Downstream sediments have been impacted through the transport and deposition of contaminants from the Source Area. The downstream contamination has been previously evaluated in the BHHRA (MACTEC, 2005).

1.7.3 Potential Human Receptors

Previous risk assessment activities have identified and evaluated certain current and/or future human receptors. These receptors include residents who live along the eastern shore of Allendale Pond and Lyman Mill Pond, visiting recreational anglers, and commercial/industrial workers. Potential current exposures to surface and subsurface soil, groundwater, potential vapors, and waste materials for residents of the Centredale Manor Apartments and the Brook Village Apartments were previously evaluated and measures have been taken to mitigate and/or eliminate those exposures. Current residents were not evaluated in this Source Area risk assessment.

Consistent with USEPA objectives, the following receptors and pathways were evaluated in this risk assessment as summarized in Table 1.1:

1) Potential exposure to COPCs via soil contact. Potential future residents were evaluated in this risk assessment focusing on three age groups that include the child (ages 1 through 6), the older child (ages 7 through 18), and the adult (ages 19 through 30) that might come into contact (ingestion and dermal contact) with surface soil in the Source Area.
2) Potential exposure to COPCs via soil contact. Future construction workers have been evaluated for the Source Area. Exposure to soil via ingestion, dermal contact, and inhalation of soil-derived dust were evaluated.

1.8 Summary of Data

Soil samples used in the risk assessment include those collected from zero to five ft below grade within the Source Area. For the purpose of this risk assessment the Source Area is defined as shown in Figure 1. Field duplicate samples were not used in the risk assessment. Soil samples used in the risk assessment were collected from 1998 to 2008. A list of samples used in the risk assessment is presented in Appendix A. Samples collected from soils that have subsequently been excavated and disposed off-site have been excluded from the risk

assessment. All data used in the risk assessment have been validated and are considered appropriate for use.

A summary of analytical data for the soil evaluated in the risk assessment is presented in Table 2.1, which documents the selection of COPCs. The selection of COPCs for the risk assessment is based on all of the available environmental data that are representative of current and future conditions.

One of the analytical parameters shown in Table 2.1 is dioxin toxicity equivalence (TEQ) concentrations. The TEQs are media-specific concentrations that are normalized to the toxicity of the 2,3,7,8-TCDD congener, generally considered to be the most toxic of the dioxin and furan compounds. The dioxin TEQ concentrations are calculated by multiplying the medium-specific concentration of each 2,3,7,8-chlorinated congener or congener group by a Toxicity Equivalent Factor (TEF) and summing those products. The TEF is a measure of the estimated toxicity of a particular congener or congener group relative to toxicity of 2,3,7,8-TCDD. The TEFs used in this assessment are those identified in USEPA's 2010 guidance (USEPA, 2010a). In simple terms, total dioxin TEQ for the mixture of TCDD and other dioxins and furans indicates the sum of the individual TCDD TEQs for all the congeners in the mixture.

As shown in Table 2.1, several VOCs, numerous SVOCs, several pesticides, Aroclor-1254, dioxins/furans, and HCX were frequently detected in soil samples. Also, as expected, most inorganics/metals were detected frequently in soil samples from the Source Area. Among VOCs, 1,2-dichlorobenzene, chlorobenzene, tetrachloroethene, and trichloroethene were detected at the highest concentrations. Among SVOCs, bis(2-ethylhexyl)phthalate, 4-chloroaniline, di-n-butyl phthalate were detected at the highest concentrations. Seven Aroclors were detected in soil samples, with Aroclor-1254 having the highest concentration.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

2.0 HAZARD IDENTIFICATION

The objective of this section is to present an orderly compilation of the available sampling data on the hazardous substances present at the site, to identify data sets suitable for use in a quantitative risk evaluation, and to identify contaminants of potential concern upon which the quantitative assessment of risk will be based. A summary of the sampling data has been generated using RAGS Part D standard Table 2s for soils. Table 2s include the minimum and maximum concentrations (including locations of the latter), minimum and maximum data qualifiers, units, frequency of detection, range of detection limits, concentration used for screening, screening toxicity value, potential regulatory criteria, whether a contaminant is chosen as a COPC, and the rationale for that choice.

When choosing COPCs, USEPA guidance was followed. Consistent with EPA's Guidance for *Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*, September 2002, EPA Region I recommends a baseline risk assessment approach that retains all constituents that exceed risk-based screening concentrations as COPCs for further human health risk evaluation. Per this guidance, background chemical concentrations were not utilized in the selection of COPCs. All chemicals detected during sampling efforts, not just site-related chemicals or those that bioaccumulate, have been considered in the selection of COPCs for the human health evaluation. This results in a total estimate of risk (including risks associated with background conditions) to the receptors potentially exposed to soils. Any site-specific background issues or background risks can be addressed in the risk characterization section or in the development of Preliminary Remediation Goals (PRGs) to distinguish site-related risks from background risks.

Chemicals that are infrequently detected may be artifacts in the data due to sampling, analytical, or other problems, and may not be related to site operations or disposal practices. Based on RAGS Part A, a chemical is considered for elimination from the quantitative risk assessment if: 1) it is detected infrequently in one or perhaps two environmental media, 2) it is not detected in any other sampled media or at high concentrations, and 3) there is no reason to believe that the chemical may be present. In addition, chemicals that are considered essential human nutrients (i.e., iron, magnesium, calcium, potassium, and sodium) will not be considered in the quantitative risk assessment.

2.1 Selection of Chemicals of Potential Concern

This section identifies the chemicals present at the Site and provides rationale for inclusion of analytes as COPCs.

US EPA ARCHIVE DOCUMENT

2.1.1 COPC Selection Methods

COPCs are chemicals for which data of sufficient quality are available, and which may pose more than a *de minimus* health risk. A risk-based concentration screen is used to identify and eliminate from further consideration those detected chemicals with concentrations below even residential risk-based screening levels. COPCs for soil were selected using all available Source Area surface (0-1 ft) and subsurface (1-5 ft) soil data. The procedure used to select COPCs for the risk assessment is summarized as follows, and is consistent with USEPA Region I (USEPA, 1999) methodology:

1) *Comparison to Available Criteria*

- Selected as a COPC in soils if the maximum detected concentration exceeds the USEPA Regional Screening Level (RSL) for residential soils (USEPA, 2012).

The RSLs for soil address direct contact (ingestion and dermal contact) exposures, as well as inhalation of constituents that may be released to air. The published RSLs have been derived as the lower of the concentration associated with a cancer risk of one in one million ($1x10^{-6}$) and the concentration associated with a non-cancer hazard quotient (HQ) of 1. Per USEPA Region I guidance (USEPA, 1995), the published RSLs have been adjusted for use in the risk-based screening step. The adjusted RSL used for that purpose is the lower of the concentration associated with a cancer risk of 1 in 1 million ($1x10^{-6}$) and the concentration associated with a non-cancer HQ of 0.1. This adjustment of the risk based concentrations (RBCs) per the guidance is applied to account for the possible cumulative impacts of having several chemicals that might have similar mechanisms of toxic action.

2) Essential Nutrients:

- Eliminated as COPCs because they are considered essential human nutrients. The following inorganic analytes are considered essential human nutrients: calcium, magnesium, iron, potassium, and sodium.

3) Chemicals for which risk-based concentrations were not available were retained as COPCs.

- The results of the COPC selection for soil at the Source Area are summarized in Table 2.1. The following notes are used to denote the reasons for selection or exclusion of analytes as COPCs:

  ASL: The concentration used for COPC screening (the maximum detected concentration) is greater than the risk-based concentration; the analyte is therefore selected as a COPC.

BSL: The concentration used for COPC screening (the maximum detected concentration) is less than the risk-based concentration; the analyte is therefore not selected as a COPC.

FOD: The analyte was detected in less than five percent of the samples, and is therefore not selected as a COPC.

E: The analyte is an essential nutrient, and is therefore not selected as a COPC.

NSL: No screening level available; analyte is therefore selected as a COPC.

2.1.2 COPC Selection Results

COPCs have been selected for combined surface soil and subsurface soil at the Source Area as one dataset. The COPC selection is documented in Table 2.1. COPCs include dioxin TEQ, HCX, 18 VOCs, ten SVOCs, six pesticides, five Aroclors, and 13 inorganics/metals. A review of the substances eliminated during the COPC selection process did not identify any substance(s) that was likely to pose significant risk despite elimination via the risk-based screening approach.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

3.0 EXPOSURE ASSESSMENT

As defined by the USEPA (USEPA, 1989), exposure to a chemical is the contact of that chemical with the outer boundary of the body (i.e., skin and openings such as mouth, nostrils, or punctures and lesions). An exposure assessment is the quantitative or qualitative evaluation of that contact. It describes the intensity, frequency, and duration of contact, as well as the rates at which the chemical crosses the boundary (chemical intake or uptake rates), the route by which it crosses the boundary, and the resulting amount of chemical that actually crosses the boundary (a dose) and the amount absorbed (internal dose).

The objective of the exposure assessment is to estimate the type and magnitude of exposures to COPCs at or migrating from the site. The exposure assessment is conducted to: 1) characterize the populations of humans potentially exposed via direct contact with soil at the Source Area; 2) identify the mechanisms by which receptors may be exposed; and 3) identify the intake, or dose, of COPCs that receptors may receive through the identified exposure pathways. The exposure assessment includes the following components:

- Characterization of the exposure setting (including current and future land use);
- Identification of exposure pathways (including receptor identification and exposure scenarios, and exposure points);
- Identification of EPCs;
- Quantification of exposures; and
- A summary of exposures by receptor and exposure point.

Narrative descriptions and summary tables of exposure scenarios are provided in this section. The exposure scenarios for current and future potential scenarios are summarized in RAGS Part D Table 4s.

3.1 Characterization of Exposure Setting

The exposure setting has previously been described in Section 1.4.

3.2 Identification of Exposure Pathways, Potential Receptors, and Exposure Points

This subsection describes the receptors, exposure pathways, exposure parameters and exposure points for the receptors.

US EPA ARCHIVE DOCUMENT

This step involves the identification of all relevant exposure pathways through which specific populations may be exposed (current and future) to contaminants at the site. An exposure pathway consists of four necessary elements: 1) a source or mechanism of chemical release; 2) a transport or retention medium; 3) a point of human contact; and 4) a route of exposure at the point of contact (USEPA, 1989). Table 1.1 is the exposure pathway summary table. This table identifies the receptor populations, exposure media and pathways, and exposure points for this risk assessment.

Exposures were evaluated based on a Reasonable Maximum Exposure (RME) scenario. The RME is the highest exposure that is reasonably expected to occur at a site. The RME scenario is characterized by coupling the contaminant concentrations with conservative exposure parameters developed for the exposure scenario. The RME scenario is summarized in Table 4.1 and is discussed in Sections 3.2.1 and 3.2.2 below. Exposure parameters are obtained from USEPA guidance and other USEPA-approved sources. In general, RME parameters represent 95th percentile values.

3.2.1 Receptor Exposure Scenarios for Soil

Using the information summarized in Table 1.1, receptor exposure scenarios were compiled. The following paragraphs discuss the receptor exposure scenarios.

Exposure parameters for the RME scenario were selected from USEPA guidance documents (USEPA, 1994; 1996; 1997a; 2002a; 2004; 2009) and were based on professional judgment considering the site-specific exposure conditions. The subsections below describe the exposure scenarios and exposure parameters in detail.

Future Resident

A future resident may be exposed to soil above the water table via direct contact (incidental ingestion and dermal contact) and dust inhalation. It is assumed that future residents include young children (ages 1 through 6), older children (ages 7 through 18), and adults (assumed ages 19 through 30).

Cancer and non-cancer risk estimates are calculated separately for soils at each exposure point. These risks are used in a soil-specific evaluation. The risks associated with the Source Area soils have not been combined with the previously calculated risks associated with potential exposures associated with fish consumption and contact with surface water and sediment in the river.

The RME exposure parameters for the future resident are presented in Table 4.1.

US EPA ARCHIVE DOCUMENT

Exposure Duration. For the RME scenario, it is assumed that the future resident is raised at and remains at the same residence over a 30-year period (USEPA, 1994). The 30-year duration is segregated into three age periods: young-child (ages 1 through 6) for 6 years; older child (ages 7 through 18) for 12 years; and adult (ages 19 through 30) for 12 years.

Body Weight. Body weight values for young children and adults are based on values recommended in USEPA guidance (USEPA, 2002). Body weight values for older children are based on the average of 50th percentile body weights for males ages 7 through 18 (USEPA, 1997).

Incidental Ingestion Rate and Fraction Ingested. The incidental ingestion rates for soil are the default ingestion rate values for soil recommended in USEPA (2002) guidance; the ingestion rate for adults is applied to older children who are less likely than young children to place soil-covered hands in the mouth. The fraction ingested parameter for soil is 100%.

Dermal Surface Area and Adherence Factor. The dermal surface area and adherence factor values for soil are based on the RAGS Part E (USEPA, 2004) default values for residential exposures to soil.

Future Construction Worker

Under future land use conditions, it is assumed that the Source Area will remain as an apartment complex. However, it is possible that the Site could be redeveloped. Redevelopment of this area could involve soil excavation activities to support development and construction (e.g., roads, foundations, landscaping). These activities could involve potential contact with soil above the water table during excavation activities. Construction workers would only be expected to contact soil. The RME exposure parameters for the future construction worker are presented in Table 4.1.

3.2.2 Exposure Points

Three exposure points have been identified for the Source Area. For future residents soils have been evaluated as surface soil (0-1 ft) and subsurface soil (1-5 ft). For the construction worker surface soil and subsurface soil have been evaluated as one exposure point (0-5 ft). As stated in the Feasibility Study the water table is approximately 5 ft below ground surface (bgs) throughout the Source Area. Future exposure to soils below the water table is not a foreseeable future scenario.

Exposure Point Concentrations

A single concentration is selected as representative of the actual concentration for each COPC in a given medium for a given exposure point. This value, called the EPC, is used in the

US EPA ARCHIVE DOCUMENT

estimates of health risks at the site. An EPC is selected for every COPC identified in the screening process described earlier.

The 95% Upper Confidence Limit (UCL) on the mean is typically used as the EPC. There are two exceptions to this rule. In the case where the 95% UCL is greater than the maximum detected concentration; and/or if there are fewer than five samples in a data set (the UCL is not calculated). For these two situations, the maximum detected concentration is used as the RME EPC. The EPC for lead differs from the approach used for other COPCs. Consistent with USEPA guidance the average lead concentration is used as the EPC.

The 95% UCL values are calculated using the ProUCL software (V. 4.1.01; USEPA, 2010b). The ProUCL software performs a goodness-of-fit test that accounts for data sets without any non-detect observations, as well as data sets with non-detect observations. The software then determines the distribution of the data set for which the EPC is being derived (e.g., normal, lognormal, gamma, or non-discernable), and then calculates a conservative and stable 95 percent UCL value in accordance with the framework described in "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites" (USEPA, 2002b). The software includes numerous algorithms for calculating 95% UCL values, and provides a recommended UCL value based on the algorithm that is most applicable to the statistical nature of the data set.

EPCs are provided in 'RAGS Part D Table 3s', which are presented as Table 3.1. ProUCL output sheets are provided in Appendix B.

3.3 Quantification of Exposures

The next step is to calculate COPC intakes, via direct contact with soil for each of the potentially exposed populations. Population-related variables have been selected that describe the characteristics associated with individual receptors in that population.

3.3.1.1 Estimation of Chemical-Specific Intakes

The chemical-specific intake, or the average daily dose (ADD), is the amount of COPC absorbed into the body. When appropriate, it is the product of the average daily exposure and an absorption factor (ABS). Chemical-specific intakes were calculated in a manner consistent with USEPA guidance for risk assessment (USEPA, 1989; 2004; 2009).

A Lifetime Average Daily Dose (LADD) is calculated in order to estimate carcinogenic risk. The Averaging Time (AT) over which the total intake of COPC is averaged is 70 years for carcinogenic effects (USEPA, 1989).

US EPA ARCHIVE DOCUMENT

For noncarcinogenic effects, depending on the duration of the exposure period, an Average Daily Dose, Chronic (ADD_c) for long-term exposure (seven years or longer) or Average Daily Dose, Subchronic (ADD_s) for exposure periods from a month up to seven years may be calculated.

Soil Direct Contact Exposures

The ADD received by a receptor via direct contact with soil (ADD_{soil}) is the sum of the ADDs for exposure via the routes of dermal contact with the contaminated soil and ingestion of the contaminated soil. Possible inhalation exposures are evaluated as described below. Thus,

$$ADD_{soil} = ADD_{dermal} + ADD_{ingestion}$$

Dermal Contact. The ADD due to dermal contact with COPC-contaminated soil ($ADD_{dermal\ absorption}$) may be calculated:

$$ADD_{dermal\ absorption} = \frac{DAevent * SA * EF * ED}{BW * AT}$$

and:

$$DAevent = [COPC]soil * AF * AbF * C$$

Where:

$ADD_{dermal\ absorption}$	=	Average daily dose of COPC received through dermal contact with soil during the period of exposure (dimensions: mass/mass×time, typical units: mg/kg×day)
DAevent	=	Dose of COPC absorbed during each exposure event (dimensions: mg/cm^2)
$[COPC]_{soil}$	=	EPC of COPC in the soil at the exposure point during the period of exposure (dimensions: mg/kg)
SA	=	Skin surface area in contact with the soil on days exposed (dimensions: cm^2/day)
AF	=	Mass of soil adhered to the unit surface area of skin exposed (dimensions: mg/cm^2)
AbF	=	Absorption Factor; represents the fraction of COPC that may be absorbed through the skin from soil (unitless)
EF	=	Exposure Frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (dimensions: days/year)

ED	=	Exposure Duration: the period of time over which exposure may occur (dimension: years)
BW	=	Body Weight of the receptor of concern during the exposure duration dimension: kg)
AT	=	Averaging Time (dimension: days)
C	=	Appropriate units conversion factor(s)

Ingestion. The ADD due to the incidental ingestion of COPC contaminated soil ($ADD_{ingestion}$) may be calculated:

$$ADD_{ingestion} = \frac{[COPC]_{soil} * IR * EF * ED * C}{BW * AT}$$

Where:

ADDingestion	=	Average daily dose of COPC received through the ingestion of soil during the period of exposure (dimensions: mass/mass×time, typical units: mg/kg×day)
[COPC]soil	=	EPC of the COPC in soil (dimensions: mass/mass, typical units: mg/kg)
IR	=	Daily soil ingestion rate on days exposed during the exposure period (dimensions: mass/time, typical units: mg/day)
EF	=	Number of exposure events during the exposure period divided by the number of days in the exposure period (dimensions: events/time, typical units: days/year)
ED	=	Duration of the exposure period (dimensions: time, typical units: years)
C	=	Appropriate units conversion factor(s)
BW	=	Body weight of the receptor of concern during the averaging period (dimensions: mass, typical units: kg)
AT	=	Averaging Time (dimension: time, typical units: days)

Inhalation Exposures

Receptors at the Site, under certain conditions, have the potential to be exposed via inhalation to COPC adsorbed to wind-eroded particles or dust.

The methodology for evaluating inhalation exposures differs from that used for other exposure pathways in that the toxicity values used are reference concentrations (RfCs) and unit risks (URs) instead of reference doses (RfDs) and slope factors. Because concentration and not

US EPA ARCHIVE DOCUMENT

dose is the basis for these toxicity values, body weight, and respiration rate are not used in calculating potential risk estimates for carcinogenic and noncarcinogenic chemicals. Therefore, an average air concentration, rather than an ADD, is calculated.

The general equation for estimating the average air concentration due to inhalation is as follows:

$$COPC_{air} = \frac{[CA]_{air} * ET * EF * ED}{C * AT}$$

Where:

$[COPC]_{air}$	=	Representative concentration of COPC in the air at the Exposure Point during the period of exposure (dimensions: mass/volume)
[CA]air	=	Measured or modeled EPC (dimensions: mass/volume, typical units: micrograms per cubic meter [µg/m^3])
EF	=	Number of exposure events during the exposure period divided by the number of days in the exposure period (dimensions: events/time, typical units: days/year)
ET	=	Number of hours per day the exposure occurs (dimensions: time, typical units: hours/day)
ED	=	Duration of the exposure period (dimensions: time, typical units: years).
C	=	Appropriate units conversion factor(s) (24 hours per day)
AT	=	Averaging Time (dimension: time, typical units: days).

The daily chemical intakes have been calculated separately for non-cancer and cancer endpoints using the EPCs presented in Table 3.1, the exposure parameters and intake equations shown in Tables 4.1. The daily intakes for residents and construction workers, all age-groups, and all media are calculated in Tables 7.1 through 7.7. Each of those tables shows all daily intake calculations for all exposure media for a receptor group/age-group/exposure point combination.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

4.0 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is to characterize the relationship between the dose of COPC administered or received and the incidence of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values (e.g., slope factors, reference dose values, or RfCs) are derived that can be used to estimate the likelihood of adverse effects as a function of human exposure to an agent. These toxicity values are used in the risk characterization process to estimate the potential for adverse effects occurring in humans at different exposure levels.

The dose-response relationship(s) for each chemical that has been selected as a COPC is presented in this section. The dose-response information may be divided into two major categories:

- Toxicity information associated with threshold (non-carcinogenic) health effects.
- Toxicity information concerning carcinogenicity, either from human epidemiologic data or from laboratory studies.

All the chemicals selected as COPCs are evaluated for potential *non-carcinogenic* health effects. In addition, any substance considered to be a *known*, *probable*, or *possible* human carcinogen is also evaluated for its potential carcinogenic effects. The classification of a chemical as a carcinogen does not preclude an evaluation of that same chemical for potential non-carcinogenic health risks, as all potentially carcinogenic chemicals may also exert non-carcinogenic health effects.

4.1 Dose-Response Assessment for Carcinogenic Effects

It has generally been assumed that carcinogenic effects are non-threshold effects (IRIS, 2012). This means that any dose, no matter how small, is assumed to pose a finite probability of generating a response. Thus, no dose of a carcinogen is thought to be risk-free. For carcinogenic effects, USEPA uses a two-part evaluation in which the substance is first assigned a weight-of-evidence classification, and then a slope factor or UR is calculated to reflect the carcinogenic potency.

The weight-of-evidence evaluation involves determining the likelihood that the agent is a human carcinogen. USEPA has developed a system for characterizing the overall weight of evidence for a chemical's carcinogenicity based on the availability of animal, human, and other supportive data (USEPA, 1989). The weight-of-evidence classification rates the likelihood that an agent is a human carcinogen. It qualitatively affects the interpretation of potential health risks. Three major factors are considered in characterizing the overall weight-of-evidence for carcinogenicity:

US EPA ARCHIVE DOCUMENT

(1) the quality of evidence from human studies, (2) the quality of evidence from animal studies, and (3) other supportive information, such as mutagenicity data and structure-activity data.

USEPA's final classification of the overall weight-of-evidence has the following five categories:

Group A - Human Carcinogen. This category indicates there is sufficient evidence from epidemiological studies to support a causal association between an agent and human cancer.

Group B - Probable Human Carcinogen. This category generally indicates there is at least limited evidence from epidemiologic studies of carcinogenicity to humans (Group B1) or that, in the absence of data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).

Group C - Possible Human Carcinogen. This category indicates that there is limited evidence of carcinogenicity in animals in the absence of data on humans.

Group D - Not Classified. This category indicates that the evidence for carcinogenicity in animals is inadequate.

Group E - No Evidence of Carcinogenicity to Humans. This category indicates that there is evidence of noncarcinogenicity in at least two adequate animal tests in different species or in both epidemiologic and animal studies.

USEPA's revised guidelines for cancer risk assessment (USEPA, 2005a) have been adopted as agency policy for cancer risk assessment. These guidelines contain a revised classification system for carcinogenic effects with the following classifications.

- Carcinogenic to humans
- Likely to be carcinogenic to humans
- Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential
- Data inadequate for an assessment of human carcinogenic potential
- Not likely to be carcinogenic in humans

In the Integrated Risk Information System (IRIS), the weight of evidence classification for a given chemical may reflect either of the two classification schemes identified above.

The ability of a chemical to increase the incidence of cancer in a target population is described by one of two values: the carcinogenic slope factor or the UR. Slope factors or URs are typically calculated for chemicals in Groups A, B1, and B2. Cancer dose-response values for chemicals in Group C are calculated on a case-by-case basis.

US EPA ARCHIVE DOCUMENT

For some chemicals, human epidemiologic data is the basis of an estimate of the carcinogenic potency, although the most common basis of these values is an animal study. The slope factor is given in units of $(mg/kg/day)^{-1}$ and is based upon the concept of a LADD. Oral slope factors are used to estimate the risks associated with exposure to carcinogens via ingestion. No slope factors are available for the dermal route of exposure, but are instead calculated from oral slope factors using the methodology described in Section 4.3.

In this risk assessment, slope factors are used to estimate the cancer risks associated with ingestion and dermal exposures, and URs are used to estimate the cancer risks associated with inhalation of COPCs in air (airborne dust).

The dose-response data used in this risk assessment for carcinogenic effects, including slope factor and UR values, are presented in Tables 6.1 and 6.2.

4.1.1 Adjustment for Early Life Exposure to Carcinogens with a Mutagenic Mode of Action

USEPA has developed guidance for characterizing cancer susceptibility associated with early life exposures (e.g., young children) to potentially carcinogenic chemicals (USEPA, 2005b; 2008). The approach developed by USEPA to characterize cancer risks for early life stages includes consideration of differences in physiology and exposure potential between children and adults, as well as differences in susceptibility to tumor development between children and adults. Physiological and behavioral differences are accounted for in the exposure assessment, whereby age-specific exposure parameters (e.g., BWs, ingestion rates, inhalation rates, contact frequencies) are applied to the various age groups evaluated in the risk assessment. Differences in susceptibility to tumor development are accounted for by considering the carcinogenic mode of action (MOA) in accordance with the MOA framework developed by USEPA (USEPA, 2005b).

In accordance with the MOA framework, for chemicals that initiate carcinogenesis by a mutagenic MOA and for which data concerning differential susceptibility for early life stages is available, USEPA may develop slope factors that are applicable to specific ages (e.g., infants and young children, adults). The following COPCs at the Site are considered carcinogenic and operate with a mutagenic MOA: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and trichloroethene (TCE). USEPA has not developed slope factor for different age groups for these COPCs. Therefore, the slope factors for each COPC are adjusted for specific age groups to account for the mutagenic MOA. A 10 fold adjustment is used for the first two years of life (ages 0-2). A 3 fold adjustment is used after two year through <16 years of ages. After 16 years of age no adjustment is made to the slope factors (USEPA, 2005b). USEPA has determined that TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. Therefore, USEPA has concluded that the slope factor for TCE should only be adjusted based on age for

the kidney cancer component of the total cancer risk. For the purpose of this risk assessment, the TCE slope factor has been adjusted for the total cancer risk, which will result in a slight overestimation of the cancer risk for TCE.

This risk assessment evaluates children (ages 1-6), adolescents (ages 7-18) and adults (ages 19-30). The slope factors for the previously identified chemicals which have a mutagenic MOA have been adjusted. The slope factors for the child receptor have been multiplied by a factor of 4.2 to account for the mutagenic MOA. The value of 4.2 for the child receptor represents a weighted average:

$$\frac{(1\ year \times 10) + (5\ years \times 3)}{6\ years} = 4.2$$

The same process was used for the adolescent receptor as shown below:

$$\frac{(9\ years \times 3) + (3\ years \times 1)}{12\ years} = 2.5$$

As stated previously no slope factor adjustment is necessary for the adult receptor.

4.2 Dose-Response Assessment for Noncarcinogenic Effects

In contrast to carcinogens, noncarcinogens are believed to have threshold exposure levels below which adverse effects are not expected. USEPA has derived standards and guidelines based on acceptable levels of exposure for such compounds. Noncarcinogenic effects of concern on which many of the standards and guidelines are based include liver toxicity, reproductive effects, neurotoxicity, teratogenicity, and other chronic toxicities. Various criteria have been developed from experiments that can be used to estimate the dose-response relationship of noncarcinogens. Some of the same uncertainties involved in deriving cancer risk estimates (namely, selection of an appropriate data set and extrapolation of high-dose animal data to low-dose human exposure) are also involved in deriving noncarcinogenic dose-response criteria. Dose-response values used most often to evaluate noncarcinogenic effects are RfDs and RfCs.

The RfD expressed in units of mg/kg/day, is defined as an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime (USEPA, 1989). When available, the RfD is the dose-response criterion most appropriate for quantitatively estimating noncarcinogenic effects. The RfD is derived from the following equation:

US EPA ARCHIVE DOCUMENT

$$RfD\ (mg/kg/day) = \frac{NOAEL\ or\ LOAEL}{UF\ and/or\ MF}$$

The No Observable Adverse Effect Level (NOAEL) represents the dose of a chemical at which there are no statistically or biologically significant differences in the frequency of an adverse effect between the exposed population and its appropriate control. The Lowest Observable Adverse Effect Level (LOAEL) represents the lowest dose at which a statistically significant difference in the frequency of an effect is noted. Both the NOAEL and the LOAEL are reported in terms of mg/kg/day. An uncertainty factor (UF) of ten per type of uncertainty (e.g., extrapolation from animal sensitivity to human sensitivity, relationship between lowest adverse effect level and no adverse effect level) is used to account for interspecies and interspecies differences, severity of the adverse effect, whether the dose was an NOAEL or an LOAEL, and the adequacy of the data. The magnitude of the UF will therefore vary from chemical to chemical, ranging from 10 to 10,000. A modifying factor (MF), ranging from less than 1 to 10 may also be added to reflect qualitative uncertainties not explicitly addressed in the UFs. The toxicity endpoint upon which the RfD is derived and the UF and/or MF used in the calculation are presented in the dose-response tables. No RfDs are available for the dermal route of exposure but are instead calculated from oral RfDs using the methodology described below (USEPA, 2004).

The RfC, in units of milligrams per cubic meter (mg/m^3), is analogous to the RfD and is developed through a similar process. However, unlike RfDs, which represent a dose (in mg/kg/day) at which adverse or deleterious effects are unlikely, RfCs represent air concentrations (in mg/m^3) at which adverse or deleterious effects are unlikely (i.e., an air concentration corresponding to a hazard index (HI) = 1.0). In this risk assessment, inhalation RfCs are used to estimate the non-cancer risks associated with inhaling COPCs.

The use of chronic RfDs and RfCs to evaluate the potential for adverse health effects resulting from substantially less-than-lifetime exposures may be overly protective. Subchronic Reference Doses and Subchronic Reference Concentrations (RfDss/RfCss) have been developed for some chemicals to evaluate the potential non-carcinogenic effects of limited duration exposures. RfDss/RfCss are similar to chronic RfDs/RfCs; the distinction is the length of exposure duration. The construction worker scenario is the only scenario evaluated in this risk assessment that is associated with subchronic exposures. Therefore, when available, subchronic RfDs and RfCs are used to evaluate potential non-cancer risks for the construction worker. When subchronic values are not available, chronic RfDs and RfCs are used. Chronic RfDs and RfCs are used for all other receptor scenarios.

The RfDs and RfCs and supporting documentation for the chemicals selected as COPCs are provided in Tables 5.1 and 5.2.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

4.3 Dermal Dose-Response Values

Cancer slope factors and non-cancer RfDs were developed to evaluate risk associated with the dermal contact exposure route. In accordance with USEPA guidance (USEPA, 2004), dermal dose-response values are calculated from oral dose-response values using an oral ABS. The oral ABS represents the amount of substance that is absorbed from the gastrointestinal tract following oral administration of a substance. The absorbed dose represents the amount of substance that is potentially available for biological interaction; it is this dose-response relationship that the toxicity of a dermally absorbed substance must be evaluated by. Thus, for potentially carcinogenic substances, the dermal dose-response value is calculated as follows:

$$SF_d = SF_{oral} / Oral\ ABS$$

The dermal dose-response value for evaluating non-carcinogenic effects is calculated as follows:

$$RfD_d = RfD_{oral} \times Oral\ ABS$$

The Oral ABS is the fraction of contaminant absorbed in the gastrointestinal tract (dimensionless) in the critical toxicity study. Chemical-specific Oral ABS values are published by USEPA (USEPA, 2004). In accordance with USEPA guidance (USEPA, 2004), oral dose-response values are only adjusted using an Oral ABS value if the COPC has an oral ABS value less than 50%. Otherwise, the oral dose-response value is used as the dermal dose-response value. Dermal slope factors and RfDs are presented in Tables 6.1 and 5.1 respectively.

4.4 Sources of Dose-Response Values

The following hierarchy of sources for dose-response values has been utilized in identifying dose-response values for this risk assessment.

Tier 1- IRIS (http://www.epa.gov/iris/). In accordance with USEPA guidance, the main source of dose-response values is the USEPA IRIS, which is a database established by USEPA containing all validated data on many toxic substances found at hazardous waste Sites. This database was used to identify the slope factors and RfDs applied in this risk assessment (IRIS, 2012).

Tier 2- NCEA's peer reviewed toxicity values (PRTVs). National Center for Environmental Assessment (NCEA's) PRTVs are developed by the Superfund Technical Support Center (STSC) for the EPA Superfund program. STSC's reassessment of Health Effects Assessment Summary Table (HEAST) toxicity values, as well as development of PRTVs in response to Regional or Headquarters Superfund program requests, are consistent with Agency practices on toxicity value development, use the most recent scientific literature, and are supported by

US EPA ARCHIVE DOCUMENT

both internal and external peer review, providing a high level of confidence in the use of these values in the Superfund Program.

Tier 3 - Other toxicity values

- Agency for Toxic Substances and Disease Registry (ATSDR's) method reporting limits (MRLs) address non-cancer effects only, and are available on the ATSDR website at http://www.atsdr.cdc.gov/mrls.html.
- Toxicity values remaining in current versions of HEAST (1997b).
- State and other regulating agencies.

In this risk assessment, the majority of dose-response values used are published in IRIS. For some Site-related COPCs required dose-response data are only available as NCEA provisional values or from California Environmental Protection Agency (CAL-EPA). These dose-response values were used in this risk assessment in order to provide a more complete evaluation of potential risks.

Uncertainties related to the absence of dose-response data, particularly for COPCs for which the exposure pathway, which represents the only pathway or most significant exposure pathway, has no toxicity criterion, will be discussed in the risk assessment uncertainty analysis.

Evaluation of Dioxin-Like Compounds in Site Media

Due to the limited toxicological data available for many individual dioxins, furans, and HCX, and to simplify the risk assessment process, a methodology has been developed that quantifies the toxicities of various dioxin, furan, relative to the toxicity of 2,3,7,8-TCDD (USEPA, 2010). TCDD is widely accepted to be the most toxicological significant chemical among these groups of chemicals, all of whose toxicological properties are assumed to be regulated by their individual abilities to bind to the cytosolic Ah receptor (AhR).

Based on the potency of 2,3,7,8-TCDD, and the greater amount of research that has been devoted to 2,3,7,8-TCDD, a cancer slope factor (CSF) has only been developed for this congener. Other dioxin and furan, compounds exert toxicity through the same mechanism of action as 2,3,7,8-TCDD, but the threshold effects levels for the other compounds are directly related to their affinity to interact with the AhR. Therefore, dioxin and furan compounds are evaluated using the dose-response data for 2,3,7,8-TCDD, but the concentrations are weighted according to their potency relative to the 2,3,7,8-TCDD using TEFs.

In summary, since 2,3,7,8-TCDD has the greatest affinity for the AhR, it is arbitrarily assigned a TEF of 1. Other congeners are assigned a TCDD TEF relative to 2,3,7,8-TCDD based on experimental evidence concerning their relative binding potential to the AhR. The potency of the congener is then estimated by multiplying the measured media concentration by the TEF for

US EPA ARCHIVE DOCUMENT

the particular congener to yield a TEQ. Finally, a TEQ for the entire sample can be determined by summing the calculated TEQs for each AhR binding congener; the resulting concentration is a measure of the potency of the entire mixture represented in terms of 2,3,7,8-TCDD, and is expressed as a TEQ concentration. This methodology assumes that the combined effects of the different congeners are dose or concentration additive, and this has been generally supported by results of many studies. This approach fails to consider the toxicological significance of effects that are not mediated by the AhR (e.g., neurotoxicity and various hormonal effects). However, current consensus is that the TEF approach is the best methodology for assessing the impacts associated with exposure to dioxin-like compounds (USEPA, 2010a).

The CSF for 2,3,7,8-TCDD of 1.5E+05 per mg/kg/day (USEPA, 1997b) is used to evaluate the potential risks associated with dioxin-like compounds. The use of this CSF value in the absence of a Tier 1 IRIS toxicity value is consistent with the approach used in the 2005 BHHRA and the 2011 Supplemental Baseline Human Health Risk Assessment for the Oxbow Area. Specifically, this CSF is applied to the calculated intakes for the dioxin TEQ (sum of TEQs for individual dioxin and furan compounds). The TEFs for PCDDs and polychlorinated dibenzofurans (PCDFs) identified for mammals (USEPA, 2010a) are applied to the soil EPCs for each of the congeners to identify a TEQ. The TEQ are used in conjunction with the oral cancer slope factor for 2,3,7,8-TCDD (HEAST, USEPA 1997b) to estimate cancer risk for those compounds.

The compound HCX has been identified as a dioxin-like compound. However, there is no formally published USEPA CSF, RfD, or dioxin TEF for HCX. The HCX toxicity information in the literature is limited. A TEF of 0.0002 has been applied for HCX. In addition, there is discussion in of the potential impact of the uncertainty in this toxicity value on the results of the risk assessment. This is also consistent with the approach used to address HCX in the 2005 BHHRA.

Evaluation of Chromium in Site Media

The most common forms of chromium in environmental media are chromium III (trivalent chromium) and chromium VI (hexavalent chromium). Although chromium was detected in Site media, no speciation analyses were performed. For the purpose of this risk assessment chromium with be evaluated as chromium III.

Evaluation of Lead in Site Media

In accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) risk assessment procedures, risks associated with potential exposures to lead in soil are characterized using lead biokinetic uptake models (USEPA, 2002b;). USEPA publishes two biokinetic uptake models: one is used to evaluate lead uptake in children, and one is used to evaluate lead uptake in adults. The child lead model (integrated exposure uptake biokinetic

model [IEUBK]) is used to characterize lead risks associated with residential land uses, because children are more susceptible to lead toxicity than adults; lead concentrations that are protective for children are also protective for adults. The adult lead model (ALM) is used to characterize lead risks associated with land uses where exposures to lead-contaminated soil are primarily limited to adults, such as industrial/commercial land uses.

In this HHRA, the IEUBK model is used to characterize potential lead exposures and risks for residential land use. The ALM is used to evaluate potential lead exposures and risks to construction workers.

Appendix C presents the IEUBK model and ALM.

Evaluation of Mercury in Site Media

Mercury may exist as elemental mercury, inorganic mercury salts, and organic mercury. Typically, mercury is present in environmental media as inorganic mercury salts or organic mercury (methyl mercury) that may be produced by bacterial methylation of inorganic mercury. Methyl mercury is known to bioaccumulate. In this risk assessment mercury detected in soil is evaluated using oral dose-response values for inorganic mercury.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

5.0 RISK CHARACTERIZATION

The final step of the risk assessment is the risk characterization. This step involves the integration of the exposure and toxicity assessment into quantitative expressions of potential human health risks associated with COPC exposure. Quantitative estimates of both carcinogenic and noncarcinogenic risks are made for each COPC and each exposure point.

Cancer Risks

Carcinogenic risks associated with exposure to individual chemicals are estimated by multiplying the chemical intake for each carcinogen by its slope factor. This value represents an upper bound of the probability of an individual developing cancer over a lifetime as the result of exposure to a chemical. For each receptor and each exposure pathway (exposure to a specific medium) such as dermal exposure to soil, the chemical-specific risks for all carcinogenic compounds will be summed to determine the lifetime cancer risk for that receptor for that medium. The following equations are used to estimate the chemical- and pathway-specific cancer risks.

Chemical-Specific Excess Lifetime Cancer Risk:

$$Risk_i = CDI_i \times CSF_i$$

where:

$Risk_i$	=	unitless probability of an individual developing cancer as the result of exposure to a chemical i
CDI_i	=	chronic daily intake of chemical i averaged over 70 years (mg/kg-day)
CSF_i	=	USEPA cancer slope factor for chemical i $(mg/kg\text{-}day)^{-1}$

The results from the carcinogenic risk assessment are compared to acceptable risk ranges established by the USEPA. The USEPA's guidelines, established in the National Hazardous Substances and Pollution Contingency Plan (NCP) identify acceptable exposure levels as those concentration levels "that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response" (USEPA 1990).

Non-cancer Risks

Non-cancer risk estimates will be calculated by dividing specific chemical intake by the appropriate RfD or RfC. The result is called the HQ. The HQs for individual compounds within an exposure pathway are summed to obtain the HI for that particular pathway.

Following are the equations used to determine the HQs and HIs.

US EPA ARCHIVE DOCUMENT

The following equation is used to determine the HQ:

$$HQ_i = \frac{I_i}{RfD_i}$$

where:

HQi	=	hazard quotient of chemical i
Ii	=	intake of chemical i averaged over the exposure period (mg/kg-day)
RfDi	=	reference dose for chemical i corresponding to the same exposure duration as the intake (mg/kg-day)

The following equation is used to determine the HI:

$$HI = \Sigma\ HQ_i$$

where:

HI	=	potential for noncarcinogenic effects from multiple chemical exposures
HQi	=	hazard quotient for each chemical

An HI of less than 1 indicates that noncarcinogenic toxic effects are unlikely. An HI greater than 1 indicates a greater possibility of a noncarcinogenic toxic effect occurring, but the circumstances must be evaluated on a case-by-case basis. Generally, as the HI increases, so does the likelihood that adverse effects might be associated with exposure. However, the relationship between increased risk and larger HI values may not be linear.

Lead Risk Calculations

In accordance with CERCLA risk assessment procedures, risks associated with potential exposures to lead in soil are characterized using lead biokinetic uptake models (USEPA, 2002b). USEPA publishes two biokinetic uptake models: one is used to evaluate lead uptake in children, and one is used to evaluate lead uptake in adults. The child lead model (IEUBK; Version 1.0, Build 11) was developed to characterize lead risks associated with residential land use exposures to multiple media. Because children are more susceptible to lead toxicity than adults, lead concentrations that are protective for children are also protective for adults. The ALM is used to characterize lead risks associated with land uses where exposures to lead-contaminated soil are primarily limited to adults, such as industrial/commercial land uses.

US EPA ARCHIVE DOCUMENT

The IEUBK and ALM provide estimates of blood lead levels (PbB) that may result from chronic exposures to lead in various exposure media. To evaluate the significance of the estimated blood lead concentrations, the blood lead concentrations are compared to a threshold PbB of 10 micrograms per deciliter (µg/dL). This threshold PbB is a multi-Agency goal that has been designated by the US Centers for Disease Control (CDC) and the ATSDR as a level of concern to protect sensitive populations, including neonates, infants, and children. The protection of sensitive populations is assumed to also provide protection for adults. USEPA indicates that 95% of the exposed population should have a geometric mean PbB that does not exceed 10 µg/dL.

Child Lead Model (IEUBK)

The IEUBK model quantifies lead exposures from multiple pathways, including soil ingestion, drinking water, inhalation (of dust and airborne lead), and diet. The model incorporates default assumptions concerning the amount of lead exposure that comes from drinking water, air, and diet, in order to establish a baseline lead exposure (i.e., lead exposure from sources other than Site media). Lead intake from these other sources accounts for a portion of the allowable blood-lead level of 10 micrograms per liter (µg/L). Contribution of lead exposures from Site media (soil) adds to the total lead uptake, and evaluation of the total lead uptake from all sources allows for a determination of whether Site media contribute to unacceptable lead exposures.

To evaluate lead uptake from surface and subsurface soil associated with future residential land use, the model was run using default values for all parameters except the soil lead concentration, for which the exposure point-specific soil lead EPCs were used as shown in Table 3.1.

IEUBK modeling input parameters and results are provided in Appendix C.

Adult Lead Model

The ALM was used to evaluate potential lead uptake and estimated PbBs for future construction worker scenario.

Unlike the IEUBK model, the ALM allows for modification of the exposure frequency. Therefore, the model was run using the soil (0-5) EPC with the associated exposure frequency parameter for the future construction worker. Table 11.2 provides a summary of the lead modeling results. ALM modeling input parameters and results are provided Appendix C.

The ALM provides an estimate of PbB s to the exposed adult, as well as fetal PbB s that might occur to a pregnant adult female. Use of the 10 µg/dL blood lead threshold concentration ensures the protection of fetuses that may be carried by women of child-bearing age (i.e.,

female who may become pregnant while being exposed to lead in soil at the Site). To help ensure protection for this population, a geometric standard deviation (GSD) of blood lead parameter is used to account for women of child-bearing age that have non-uniform response (e.g., intake and biokinetics) to lead exposures. The values for $PbB_{adult,0}$ and GSD are derived from recent studies concerning blood lead concentrations in adult women in the United States (USEPA, 2002b). Blood lead calculations are performed using a range of $PbB_{adult,0}$ and GSD values to account for homogenous and heterogeneous populations.

Calculation of Non-cancer and Cancer Risks

RAGS Part D Table 7s are used to present the risk calculations. In simplistic terms, for a given receptor/age-group, cancer risks are calculated for each chemical in each medium (e.g., soil) and exposure route (e.g., ingestion, dermal contact). Risks across exposure routes are summed to yield the risk for that medium. Cancer risks associated with all exposure media for that receptor/age-group are summed to yield the cumulative receptor cancer risk for that receptor/age-group. For a given receptor (by age-group), the non-cancer HI is calculated for each chemical, and exposure route for a given medium. HI values associated with all exposure media for each receptor/age-group are summed to yield the screening cumulative HI for that receptor/age-group. This summing of HI values across chemicals and exposure media is a conservative screening approach; because chemicals can have different target organs, non-cancer risks are not necessarily additive.

The calculated RME cancer risks and HI values are presented in Tables 7.1 through 7.7. The RAGS Part D Table 7s document the risk calculations by identifying the COPCs, EPCs, daily chemical intakes by chemical for both cancer and non-cancer endpoints, the CSFs or URs and RfDs or RfCs, and the calculated cancer risk and HQ for each chemical in each exposure medium. Further, the Table 7s present summed risks for each medium/exposure route combination, each medium, and for all exposure media combined.

The risk calculation spreadsheets are presented in the following order.

Source Area Surface Soil (0-1 ft)

- Resident – child, adolescent, adult – soil. Tables 7.1 through 7.3.

Source Area Subsurface Soil (1-5 ft)

- Resident – child, adolescent, adult – soil. Tables 7.4 through 7.6.

Source Area

- Construction Worker – adult – soil. Table 7.7.

US EPA ARCHIVE DOCUMENT

There are no RAGS Part D Table 8s for this risk assessment. Table 8s are specifically for the calculation of radiological risks. No radiological COPCs were identified in this assessment. Therefore, no Table 8s are required.

Summary of Non-cancer and Cancer Risks

RAGS Part D Table 9s summarize the information that is documented in the Table 7s. In addition, consistent with USEPA guidance (USEPA, 1989, 2001a), the Table 9s segregate the HI calculations by target organ system, and calculate a HI for each target organ system. This presentation of the HI calculations is an enhancement of the screening HI calculations presented previously in the Table 7s. RAGS Part D Tables 9.1 through 9.7 summarize the risk calculations that are documented in the Table 7s that were discussed previously.

Identification of Chemicals of Concern

Because estimated cancer risks were greater than 10^{-4} and HQs were greater than one, soil chemicals of concern (COC) have been identified.

RAGS Part D Table 10s identify, for each of the three age groups for the Resident at the Source Area and the Construction Worker at the Source Area, COCs. COCs are those substances that have associated cancer risk greater than 10^{-6} and/or a HI greater than one for a given medium/receptor/age-group combination. COCs are those substances that would typically be considered in the Feasibility Study process. Tables 10.1 through 10.7 identify the COCs and the risks associated with each of the COCs in each medium for the Future Resident and Future Construction Worker.

The COCs for RME scenarios are identified and summarized by exposure point, medium, and receptor in the text below.

COCs at the Source Area (Tables 10.1 through 10.7).

Resident

- Surface soil COCs include: 1,2,3-trichlorobenzne, 1,2,4-trichlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, 4-chloroaniline, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, heptachlor, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1268, arsenic, thallium, and dioxin TEQ.
- Subsurface soil COCs include: benzene, trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, aldrin, dieldrin, heptachlor,

US EPA ARCHIVE DOCUMENT

Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, arsenic, thallium, and dioxin TEQ.

Construction Worker

- Soil COCs include: trichloroethene, Aroclor-1248, Aroclor-1254, and dioxin TEQ.

Summary of Calculation of Receptor Risks

Table 11.1 summarizes the calculated risks. This table presents the soil route-specific risks for each age-group for the potential future Resident and the Construction Worker for each exposure area. The HI for the target organ with the highest HI is discussed for each scenario.

Potential Future Resident Surface Soil

As shown in Table 11.1, the total (summed across age groups) surface soil cancer risk for the future resident in the Source Area is 4×10^{-3}, which is above the Superfund cancer risk range. The highest non-cancer HI among the age groups in Source Area is 305, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to this HI is Aroclor-1232. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

Potential Future Resident Subsurface Soil

As shown in Table 11.1, the total (summed across age groups) subsurface soil cancer risk for the future resident in the Source Area is 2×10^{-3}, which is above the Superfund cancer risk range. The highest non-cancer HI among the age groups in Source Area is 109, for the potential future child resident. This HI is associated with the Immune System. The largest chemical contributor to the HI is Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

Potential Future Construction Worker Soil

As shown in Table 11.1, the total soil cancer risk for the future construction worker in Source Area is 5×10^{-5}, which is within the Superfund cancer risk range, but above 10^{-5}. The non-cancer HI for the construction worker in the Source Area is 15. This HI is associated with the Immune System. The largest chemical contributor to this HI is ingestion of Aroclor-1254. Ingestion of soil by the child receptor contributes the largest cancer risk among exposure pathways. The largest chemical contributor to cancer risk is dioxin TEQ.

US EPA ARCHIVE DOCUMENT

Lead Risk Summary

As shown in Table 11.2 the probability percentage of blood lead concentration greater than 10 µg/dL (child resident) is below 5% for both surface soil and subsurface soil in all the Source Area. As shown in Table 11.2 the probability percentage of fetal blood lead concentration greater than 10 µg/dL is below 5% for soil in the Source Area. In addition the adult blood lead concentration from exposure to soil is below 10 µg/dL.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

6.0 UNCERTAINTY ANALYSIS

This section includes a discussion of major limitations of the analyses, any sources of uncertainties, and, if possible, any indication as to whether these uncertainties and limitations may have resulted in and over- or under-estimation of risk. The uncertainty section may also include unusual site conditions or extenuating circumstances that may be pertinent to risk management decisions. Other factors such as the inadequacy of toxicity factors to describe all possible COPC-receptor interactions and individual differences within the human population are included in this section. Uncertainties in the quantification of risk associated with the site are identified and their impacts on risk estimates are discussed below.

Hazard Identification

The extensive environmental investigations have provided a substantial body of information that has been utilized in the risk assessment. The identification of COPCs has been conducted consistent with USEPA guidance and has been done in a health protective manner. Based on currently available information, it is unlikely that any detected substances that have not been selected as COPCs would have a substantial impact on the risk assessment results and conclusions if they had been retained in the risk assessment.

Background conditions have not been specifically considered in the selection or elimination of substances as COPCs. Several of the persistent organic COPCs (such as dioxins, furans, and PCBs), while they are not naturally-occurring substances, are detectable at some concentration almost ubiquitously in environmental samples such as biota and sediments. Therefore, exposure concentrations of those COPCs represent “total” exposure potential from both site-related and non-site-related sources.

Exposure Assessment

The selection of receptors is conservative and health-protective for the conditions identified at the Site. The values for receptor-specific exposure parameters such as soil contact rates, and soil ingestion rates have been identified in a conservative manner. Values have been identified based on available guidance and professional judgment. In risk assessment, when values are assigned in lieu of actual measurements, there is some uncertainty in the values, and that uncertainty may have an impact on the results of the risk assessment. In that context, the exposure estimates and associated risk estimates in this assessment would likely be overestimated rather than underestimated. Some factors that were not specifically addressed in the calculations could result in lower risk estimates.

US EPA ARCHIVE DOCUMENT

Toxicity Assessment

The toxicity assessment has been conducted consistently with available USEPA guidance. Dose-response information has been obtained from the IRIS database, NCEA, CAL-EPA, and USEPA's HEAST. These sources of dose-response values are commonly used for regulatory risk assessment activities and are generally considered to be conservative in nature. The use of surrogate toxicity values for chemicals lacking USEPA recommended values is conservative since it is likely that the chemical specific toxicity would be lower than those exhibited by their surrogate.

HCX

There are no dose-response values listed in IRIS or by NCEA for the compound HCX (also known as 1,2,4,5,7,8-HCX). There is also a paucity of laboratory toxicity testing data for HCX, particularly with respect to chronic exposure in animals. A structurally similar compound, 2,3,6,7-terachoroxanthene, has been reported to be as effective in causing the blue sac syndrome in fish fry and sac fry mortality as is 2,3,7,8-TCDD (Zabel and Peterson, 1996). These authors report an acute toxicity toxic equivalency factor of 1.09 to 2.29 for the compound 2,3,6,7-tetrachloroxanthene.

An in-vitro bioassay evaluating mouse epithelial cell proliferation (Viswanathan et al., 1987) suggests HCX is one million-fold less toxic than 2,3,7,8-TCDD. In addition, a multi-species study by DeCaprio et al. (1987), concluded that HCX was less toxic than 2,3,7,8-TCDD by factors ranging from 5000-fold less toxic to one million-fold less toxic. In a draft unpublished report, Mark Hahn of Woods Hole reports that HCX is able to displace TCDD from trout and human AhRs. Although the study was not able to determine relative affinities (only two concentrations tested), the author suggests a very rough estimate of the relative affinity of HCX of approximately 5000-fold less than TCDD. In the absence of other toxicity data, a TEF of 0.0002 has been applied to HCX concentrations in order to assess cancer potential of that compound.

Dioxin and Furan Congeners

Dioxin and furan congeners have been evaluated using the 2,3,7,8-TCDD oral CSF of 1.5×10^5 per mg/kg/day (taken from USEPA's HEAST, 1997) and the mammalian TEFs (from Van den Berg et al. 1998 and cited in USEPA, 2010a). This approach represents the most recent risk assessment approach for evaluating dioxins and furans. This approach has been employed because there is not adequate toxicity testing for each of the hundreds of dioxin and furan congeners. Although the TEFs do have scientific basis, the use of the TEFs to estimate the cancer potency of each of the congeners does have some uncertainty associated with it. However, the predominant congener in environmental media at the exposure points is 2,3,7,8-TCDD. Since 2,3,7,8-TCDD is considered to be the most toxic of the dioxin and furan congeners, the use of the TEFs has less impact on the risk assessment than would be the case

where 2,3,7,8-TCDD was not the predominant congener and other congeners without published CSFs were the focus of the assessment.

Risk Characterization

Overall, the risk characterization provides conservative estimates of non-cancer and cancer risks consistent with USEPA risk assessment guidance (USEPA, 1989).

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

7.0 CONCLUSIONS

The potential risks associated with future exposure for residents and construction workers at the Source Area have been characterized. The risk characterization included the evaluation of exposures to surface soil and subsurface soil in the Source Area. Risks have been calculated using an RME exposure scenario. The calculated risks have been compared to the Superfund cancer risk range of 10^{-6} to 10^{-4} and to a HI value of 1.

The following conclusions have been drawn.

- The calculated total potential future resident (all age groups summed) receptor cancer risk for surface soil exposure at the Source Area is above the Superfund risk range of 10^{-6} to 10^{-4}.
- The calculated total potential future resident (all age groups summed) receptor cancer risk for subsurface soil exposure at the Source Area is above the Superfund risk range of 10^{-6} to 10^{-4}.
- Ingestion is the pathway that is the largest contributor to cancer risk in both surface and subsurface soil for the resident.
- Dioxins and furans (particularly 2,3,7,8-TCDD) are the largest contributors to cancer risk for both surface and subsurface soil exposure for the potential future resident.
- The non-cancer HI is significantly above one for the potential future resident for both exposure to surface and subsurface soil at the Source Area. Aroclor-1232 is the largest contributor to the HI for surface soil. Aroclor-1254 is the largest contributor to the HI for subsurface soil.
- The calculated potential future construction worker cancer risk for soil exposure at the Source Area is within the Superfund risk range of 10^{-6} to 10^{-4} but above 10^{-5}.
- The non-cancer HI is above one for the potential future construction worker for exposure to soil at the Source Area. Aroclor-1254 is the largest contributor to the HI for this receptor.

US EPA ARCHIVE DOCUMENT

8.0 REFERENCES

Battelle, 2003a. *Final Work Plan, Remedial Investigation and Feasibility Study, Centredale Manor Restoration Project Site, North Providence, Rhode Island.* April.

Cleary, Thomas F., 2003. *DEPOSITION OF THOMAS F. CLEARY, Monday, February 10, 2003, Mendocino, California, United States District Court of Rhode Island, EMHART INDUSTRIES, INC., PLAINTIFF, vs. HOME INSURANCE COMPANY, INSURANCE COMPANY OF NORTH AMERICA, LIBERY MUTUAL INSURANCE COMPANY, NORTH RIVER INSURANCE COMPANY, ONEBEACON AMERICA INSURANCE COMPANY, AND UNITED STATES FIRE INSURANCE COMPANY, Defendants, Civil Action No. 02-053 S*, reported by Luel J. Simson, CSR No. 4720, SIMSON Reporting, Certified Shorthand Reporters, Windsor, California.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2005. Interim-Final Baseline Human Health Risk Assessment, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island. November.

Tetra Tech NUS, Inc., 2000. *Final Technical Memorandum, Woonasquatucket River Sediment Investigation, Centredale Manor Restoration Project Site, North Providence, Rhode Island*. June.

U.S. Environmental Protection Agency (USEPA), 1989. *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)*; Office of Emergency and Remedial Response; EPA-540/1-89/002 (Interim Final); Washington, D.C. December.

USEPA, 1990, National Oil and Hazardous Substances Contingency Plan: Final Rule, 40 CFR 300, vol. 55, no. 46, p. 8666-8865. March 8.

USEPA, 1994. "Risk Updates"; USEPA New England, Waste Management Division; No. 2. August.

USEPA, 1995. "Risk Updates"; USEPA New England, Waste Management Division; No. 3. August.

USEPA, 1997a. "Exposure Factors Handbook", Office of Research and Development, EPA/600/P-95/002Fb. August.

USEPA, 1997b. Health Effects Summary Tables, FY-1997 Update, EPA 540/R-97-036. July.

US EPA ARCHIVE DOCUMENT

USEPA, 1999. "Risk Updates"; USEPA New England, Waste Management Division; No. 5. September.

USEPA, 2001a. *Risk Assessment Guidance for Superfund (RAGS): Volume I - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final*. December.

USEPA, 2002a. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.*

USEPA, 2002b. *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children*, EPA 9285.7-42. May 2002.

USEPA, 2002c. User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA 9285.7-42. May 2002.

USEPA, 2003. *Human Health Toxicity Values in Superfund Risk Assessments*, OSWER No. 9285.7-53. December 2003.

USEPA, 2004. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final*, EPA/540/R/99/005. July.

USEPA, 2005a. *Guidelines for Carcinogen Risk Assessment*, Risk Assessment Forum. Washington DC. EPA/630/P-03/001F. March.

USEPA, 2005b. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens*, Risk Assessment Forum; EPA/630/R-03/003F; Washington, D.C. March.

USEPA, 2009. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final". EPA/540/R/070/002. January.*

USEPA, 2010a. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds, EPA/100/R/ 10/005. December.

USEPA, 2010b. Software for Calculating Upper Confidence Limits. ProUCL Version 4.1.00. Technical Support Center for Monitoring and Site Characterization. www.epa.gov/esd/tsc/software.htm.

USEPA, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites, EPA Office of Superfund. November.

USEPA, 2012. Integrated Risk Information System (IRIS); on-line data-base search (http://www.epa.gov/iris/); May.

World Health Organization (WHO), 1989. *Environmental Health Criteria 88, Polychlorinated Dibenzo-para-dioxins and Dibenzofurans*, International Programme on Chemical Safety (IPCS), published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization, and the World Health Organization.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

FIGURES

Source Area Baseline Human Health Risk Assessment

US EPA ARCHIVE DOCUMENT

Route 44
Steere Avenue
Grover Street
Redfern Street
George Street

Legend

- 100 Year Flood Plain
- Source Area Soil Location

0 30 60
Feet

N

Prepared by BJR | Checked by MJM

Figure 1
Source Area Soil Samples

Centredale Manor Restoration
Project Superfund Site
North Providence, Rhode Island

AMEC Environment & Infrastructure
107 Audubon Road, Bldg. 2, Suite 301
Wakefield, MA 01880

Document: P:\old_Wakefield_Data\projects\GIS\Projects\Centredale\Mapdocuments\Centredale 11x17_P.mxd PDF: P:\old_Wakefield_Data\projects\3650110221 - USACE - Centredale Manor\4.0 Project Deliverables\4.1 Reports\TechnicalMemo_Dioxin_APRIL_2012\MAY14DRAFT\FIGURES\Figure 2-6 - Source Area Soil Samples.pdf 5/17/2012 12:41 PM brian.roden

US EPA ARCHIVE DOCUMENT

TABLES

For the Source Area Baseline Human Health Risk Assessment

US EPA ARCHIVE DOCUMENT

Table ES.1
Risk Assessment Summary - Reasonable Maximum Exposure
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Excess Lifetime Cancer Risk	Hazard Index (1)	Target Organ/System
Hypothetical Future - Source Area						
Resident	Child (ages 1 through 6)	Surface Soil	Incidental ingestion	2.2E-03	223	Immune System
			Dermal contact	4.6E-04	82	Immune System
			Dust inhalation	3.8E-08	0.000000002	Immune System
			Total Risk:	**3E-03**	**305**	
	Older Child (ages 7 through 18)	Surface Soil	Incidental ingestion	7.2E-04	38	Immune System
			Dermal contact	5.0E-04	47	Immune System
			Dust inhalation	7.5E-08	0.000000002	Immune System
			Total Risk:	**1E-03**	**85**	
	Adult (ages 19 and above)	Surface Soil	Incidental ingestion	4.5E-04	24	Immune System
			Dermal contact	1.3E-04	13	Immune System
			Dust inhalation	7.4E-08	0.000000002	Immune System
			Total Risk:	**6E-04**	**37**	
			Total Receptor Risk:	**4E-03**	**NA**	
Hypothetical Future - Source Area						
Resident	Child (ages 1 through 6)	Subsurface Soil	Incidental ingestion	8.3E-04	82	Immune System
			Dermal contact	1.6E-04	27	Immune System
			Dust inhalation	2.2E-08	0.000003	Immune System
			Total Risk:	**1E-03**	**109**	
	Older Child (ages 7 through 18)	Subsurface Soil	Incidental ingestion	2.7E-04	14	Immune System
			Dermal contact	1.7E-04	16	Immune System
			Dust inhalation	4.4E-08	0.000003	Immune System
			Total Risk:	**4E-04**	**30**	
	Adult (ages 19 and above)	Subsurface Soil	Incidental ingestion	1.7E-04	9	Immune System
			Dermal contact	4.2E-05	4	Immune System
			Dust inhalation	4.4E-08	0.000003	Immune System
			Total Risk:	**2E-04**	**13**	
			Total Receptor Risk:	**2E-03**	**NA**	
Hypothetical Future - Source Area						
Construction Worker	Adult	Soil	Incidental ingestion	4.5E-05	11	Immune System
			Dermal contact	6.9E-06	4	Immune System
			Dust inhalation	5.3E-08	0.000007	Immune System
			Total Risk:	**5E-05**	**15**	

NA - Not Applicable
(1) Hazard Index shown is for the target organ/suystem with the highest hazard index.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

Table 1.1
Exposure Pathway Summary

Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point and Receptor Population	Receptor Age	Scenario Timeframe	Potential Exposure Medium And Relevant Pathways		
			Surface Soil (0-1 ft)	Subsurface Soil (1-5 ft)	Soil (0-5 ft)
Source Area					
Resident	Child, Adolescent, Adult	Future	ING, DERM, INHAL	ING, DERM, INHAL	--
Construction Worker	Adult	Future	-	-	ING, DERM, INHAL

Notes:
Pathways:
DERM - exposure via dermal contact
ING - exposure via incidental ingestion
INHAL - exposure via inhalation of dusts
"--" indicates that the pathway is not evaluated .

Prepared by: EYM
Checked by: BJR

Table 2.1
Data Summary of Detected Parameters and Selection of Chemicals of Potential Concern
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Cas Number	Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Location of Maximum Concentration	Frequency of Detection	Range of Reporting Limits for Non-Detects	Concentration Used for Screening (2)	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (5)
	Volatile Organics																
71-55-6	1,1,1-trichloroethane	27		110	J	mg/kg	CMS-417-B	2 / 67	0.0041 : 28	110		870	ns			No	BSL
79-00-5	1,1,2-trichloroethane	0.12		0.12	J	mg/kg	CM-SO-MW06-0406	1 / 67	0.0041 : 130	0.12		0.16	n			No	BSL
75-34-3	1,1-dichloroethane	0.15		7	J	mg/kg	CMS-417-C	2 / 67	0.0041 : 130	7		3.3	c			No	FOD
75-35-4	1,1-dichloroethene	0.026		0.026	J	mg/kg	CM-SO-MW14-0102	1 / 67	0.0041 : 130	0.026		24	n			No	BSL
87-61-6	1,2,3-trichlorobenzene	0.0028		180		mg/kg	CMS-417-A	5 / 43	0.0041 : 17	180		4.9	n			Yes	ASL
120-82-1	1,2,4-trichlorobenzene	0.0018		340		mg/kg	CMS-417-A	9 / 67	0.0041 : 17	340		6.2	n			Yes	ASL
95-63-6	1,2,4-trimethylbenzene	0.0017		160		mg/kg	CMS-417-B	15 / 43	0.0045 : 17	160		6.2	n			Yes	ASL
96-12-8	1,2-dibromo-3-chloropropane	0.061		0.24	J	mg/kg	CM-SO-MW09-0406	2 / 63	0.0082 : 270	0.24		0.0054	c			No	FOD
95-50-1	1,2-dichlorobenzene	0.0021		2800		mg/kg	CMS-417-B	19 / 68	0.0041 : 6.6	2800		190	ns			Yes	ASL
107-06-2	1,2-dichloroethane	0.16		1.7	J	mg/kg	CMS-405-E	2 / 67	0.0041 : 130	1.7		0.43	c			No	FOD
108-67-8	1,3,5-trimethylbenzene	0.031		42	J	mg/kg	CMS-417-B	7 / 43	0.0041 : 17	42		78	ns			No	BSL
541-73-1	1,3-dichlorobenzene	0.0013		13	J	mg/kg	CMS-419-B	5 / 67	0.0041 : 130	13						Yes	NSL
106-46-7	1,4-dichlorobenzene	0.0041		40	J	mg/kg	CMS-417-B	12 / 68	0.0041 : 17	40		2.4	c			Yes	ASL
78-93-3	2-butanone	0.15		4		mg/kg	CM-SO-MW06-0406	3 / 24	0.11 : 0.5	4		2800	ns			No	BSL
106-43-4	4-chlorotoluene	0.014		8.7	J	mg/kg	CMS-419-B	3 / 45	0.0041 : 130	8.7		160	n			No	BSL
99-87-6	4-iso-Propyltoluene	0.034		0.18	J	mg/kg	CMS-417-D	3 / 43	0.0041 : 130	0.18						Yes	NSL
108-10-1	4-methyl-2-pentanone	0.25		0.59		mg/kg	B-7, S-2	2 / 26	0.12 : 0.5	0.59		530	ns			No	BSL
79-20-9	Acetic acid, methyl ester	0.25		6.2		mg/kg	CM-SO-MW04-0204	8 / 24	0.18 : 1.2	6.2		7800	ns			No	BSL
71-43-2	Benzene	0.0017		480		mg/kg	CMS-408-C	20 / 73	0.0041 : 130	480		1.1	c*			Yes	ASL
108-90-7	Chlorobenzene	0.0027		1000		mg/kg	CMS-417-B	26 / 70	0.0041 : 6.6	1000		29	n			Yes	ASL
75-00-3	Chloroethane	0.11		0.11	JTB	mg/kg	CM-SO-MW15D-0204	1 / 66	0.0045 : 270	0.11		1500	ns			No	BSL
67-66-3	Chloroform	0.38		0.38		mg/kg	B-6, S-2	1 / 69	0.0041 : 130	0.38		0.29	c			No	FOD
156-59-2	Cis-1,2-dichloroethene	0.0016		500		mg/kg	CMS-417-B	18 / 70	0.0041 : 6.6	500		16	n			Yes	ASL
110-82-7	Cyclohexane	0.53		0.53	J	mg/kg	CM-SO-MW06-0406	1 / 24	0.11 : 0.5	0.53		700	ns			No	BSL
100-41-4	Ethyl benzene	0.0028		81	J	mg/kg	CMS-417-B	21 / 70	0.0041 : 1	81		5.4	c			Yes	ASL
87-68-3	Hexachlorobutadiene	1		1	J	mg/kg	CMS-408-B	1 / 43	0.0041 : 130	1		6.1	n			No	BSL
98-82-8	Isopropylbenzene	0.005		5.4	J	mg/kg	CMS-419-B	8 / 68	0.0041 : 130	5.4		210	ns			No	BSL
179601-23-1	m&p-Xylene	0.0045		270		mg/kg	CMS-417-B	19 / 46	0.0041 : 0.33	270		59	n			Yes	ASL
108-87-2	Methyl cyclohexane	0.21		1.4		mg/kg	CM-SO-MW06-0406	2 / 24	0.11 : 0.5	1.4						Yes	NSL
75-09-2	Methylene Chloride	0.078		0.09	JTB	mg/kg	CM-SO-MW01-0102	2 / 67	0.0041 : 130	0.09		11	c			No	BSL
91-20-3	Naphthalene	0.0033		84	J	mg/kg	CMS-417-B	11 / 43	0.0041 : 17	84		3.6	c*			Yes	ASL
104-51-8	N-butylbenzene	0.0067		18	J	mg/kg	CMS-417-A	4 / 43	0.0041 : 130	18		390	n			No	BSL
103-65-1	Propylbenzene	0.0057		0.15	J	mg/kg	CMS-407-D	5 / 44	0.0041 : 130	0.15		340	ns			No	BSL
135-98-8	Sec-butylbenzene	0.0029		0.01	J	mg/kg	CMS-407-B	3 / 44	0.0041 : 130	0.01						Yes	NSL
100-42-5	Styrene	0.0025		10	J	mg/kg	CMS-417-C	3 / 67	0.0041 : 130	10		630	ns			No	BSL
98-06-6	Tert-butylbenzene	0.0089		10	J	mg/kg	CMS-419-B	2 / 43	0.0041 : 130	10						No	NSL
127-18-4	Tetrachloroethene	0.0075		1700		mg/kg	CMS-417-B	22 / 70	0.0041 : 6.6	1700		0.55	c			Yes	ASL
108-88-3	Toluene	0.0022		430		mg/kg	CMS-417-B	23 / 70	0.0041 : 6.6	430		500	ns			No	BSL
156-60-5	Trans-1,2-dichloroethene	0.0045		8.4	J	mg/kg	CMS-417-C	5 / 70	0.0041 : 130	8.4		15	n			No	BSL
79-01-6	Trichloroethene	0.0021		2400		mg/kg	CMS-417-B	23 / 70	0.0041 : 6.6	2400		0.44	n			Yes	ASL
75-01-4	Vinyl Chloride	0.07		2.3		mg/kg	B-6, S-2	4 / 69	0.0045 : 270	2.3		0.06	c			Yes	ASL
95-47-6	Xylene, o	0.011		110	J	mg/kg	CMS-417-B	15 / 46	0.0041 : 6.6	110		69	n			Yes	ASL
1330-20-7	Xylenes, Total	0.0045		380	J	mg/kg	CMS-417-B	25 / 67	0.0041 : 0.5	380		63	ns			Yes	ASL
	Semivolatile Organics																
95-95-4	2,4,5-trichlorophenol	0.073		0.56	J	mg/kg	CMS-456-B	4 / 89	0.34 : 74	0.56		610	n			No	BSL
105-67-9	2,4-dimethylphenol	0.048		0.9	J	mg/kg	CMS-417-D	4 / 87	0.33 : 74	0.9		120	n			No	BSL
91-57-6	2-methylnaphthalene	0.05		9.3	J	mg/kg	CMS-417-B	23 / 89	0.34 : 74	9.3		31	n			No	BSL
95-48-7	2-methylphenol	0.79		0.79	J	mg/kg	CMS-417-D	1 / 87	0.33 : 74	0.79		310	n			No	BSL
106-47-8	4-chloroaniline	0.059		280		mg/kg	CMS-417-A	5 / 87	0.33 : 74	280		2.4	c			Yes	ASL
106-44-5	4-methylphenol	0.058		0.91	J	mg/kg	CM-SO-MW08-0102	8 / 36	0.33 : 6.2	0.91		31	n			No	BSL
83-32-9	Acenaphthene	0.049		4.3	J	mg/kg	CMS-417-A	29 / 89	0.33 : 74	4.3		340	n			No	BSL
208-96-8	Acenaphthylene	0.045		4.4	J	mg/kg	CMS-405-B	27 / 89	0.33 : 74	4.4		170	n			No	BSL
120-12-7	Anthracene	0.047		2.4		mg/kg	CMW-SD-2018-01	56 / 90	0.34 : 74	2.4		1700	n			No	BSL
100-52-7	Benzaldehyde	0.048		0.78		mg/kg	RES-SS-14-272-01	4 / 29	0.33 : 5	0.78		780	ns			No	BSL
56-55-3	Benzo(a)anthracene	0.046		8.5		mg/kg	CMW-SD-2018-01	74 / 90	0.35 : 74	8.5		0.15	c			Yes	ASL
50-32-8	Benzo(a)pyrene	0.039		8.9		mg/kg	CMW-SD-2018-01	73 / 89	0.35 : 74	8.9		0.015	c			Yes	ASL
205-99-2	Benzo(b)fluoranthene	0.053		10	J	mg/kg	CMS-405-B	72 / 90	0.35 : 74	10		0.15	c			Yes	ASL
191-24-2	Benzo(ghi)perylene	0.053		5.3		mg/kg	CMW-SD-2018-01	59 / 90	0.34 : 74	5.3		170	n			No	BSL
207-08-9	Benzo(k)fluoranthene	0.041		8.8		mg/kg	CMW-SD-2018-01	41 / 90	0.34 : 74	8.8		1.5	c			Yes	ASL
92-52-4	Biphenyl	0.041		1.607346149	J	mg/kg	CMS-SS-4105-0010-01	7 / 29	0.33 : 5	1.6		5.1	n			No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	0.061		460		mg/kg	CMS-417-A	63 / 90	0.34 : 7.1	460		35	c*			Yes	ASL
85-68-7	Butylbenzylphthalate	0.054		27	J	mg/kg	CMS-419-B	17 / 89	0.33 : 9.8	27		260	c*			No	BSL
105-60-2	Caprolactam	0.11		0.11	J	mg/kg	CM-SO-SB02-0406	1 / 27	0.33 : 5	0.11		3100	n			No	BSL
86-74-8	Carbazole	0.051		2	J	mg/kg	CMW-SD-2018-01	29 / 88	0.33 : 74	2						Yes	NSL
218-01-9	Chrysene	0.066		11		mg/kg	CMW-SD-2018-01	73 / 90	0.35 : 74	11		15	c			No	BSL
53-70-3	Dibenz(a,h)anthracene	0.045		2.2		mg/kg	CMW-SD-2018-01	37 / 90	0.33 : 74	2.2		0.015	c			Yes	ASL
132-64-9	Dibenzofuran	0.045		0.53	J	mg/kg	CMW-SD-2018-01	27 / 89	0.34 : 74	0.53		7.8	n			No	BSL
84-66-2	Diethylphthalate	0.057		3.2		mg/kg	CMS-405-D	6 / 87	0.33 : 74	3.2		4900	n			No	BSL

Table 2.1
Data Summary of Detected Parameters and Selection of Chemicals of Potential Concern
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Cas Number	Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Location of Maximum Concentration	Frequency of Detection	Range of Reporting Limits for Non-Detects	Concentration Used for Screening (2)	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (5)
84-74-2	Di-n-butylphthalate	0.039		120		mg/kg	CMS-419-B	28 / 89	0.34 : 8.7	120		610	n			No	BSL
117-84-0	Di-n-octylphthalate	0.15		7.6	J	mg/kg	CMS-417-A	9 / 90	0.33 : 74	7.6						Yes	NSL
206-44-0	Fluoranthene	0.069		24	*	mg/kg	CMW-SD-2018-01	80 / 90	0.35 : 35	24		230	n			No	BSL
86-73-7	Fluorene	0.036		1.5	J	mg/kg	CMS-405-B	40 / 89	0.34 : 74	1.5		230	n			No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.053		5.3		mg/kg	CMW-SD-2018-01	60 / 90	0.34 : 74	5.3		0.15	c			Yes	ASL
78-59-1	Isophorone	0.1		0.79		mg/kg	SS-02	2 / 87	0.33 : 74	0.79		510	c*			No	BSL
65794-96-9	m+p-Methylphenol	4.9		8	J	mg/kg	CMS-417-C	2 / 46	0.34 : 74	8						No	NSL
98-95-3	Nitrobenzene	0.05		0.19	J	mg/kg	CM-SO-MW06-0204	3 / 87	0.33 : 74	0.19		4.8	c*			No	BSL
86-30-6	N-Nitrosodiphenylamine	0.085		0.085	J	mg/kg	CM-SO-SB02-0406	1 / 87	0.33 : 74	0.085		99	c			No	BSL
87-86-5	Pentachlorophenol	18		18	J	mg/kg	RES-SS-14-333-01	1 / 90	0.84 : 360	18		0.89	c			No	FOD
85-01-8	Phenanthrene	0.054		22	J	mg/kg	CMS-419-B	76 / 90	0.35 : 35	22		170	n			No	BSL
108-95-2	Phenol	0.052		2.2	EB	mg/kg	SS-02	6 / 86	0.33 : 74	2.2		1800	n			No	BSL
129-00-0	Pyrene	0.069		23	*	mg/kg	CMW-SD-2018-01	76 / 90	0.35 : 74	23		170	n			No	BSL
	Pesticides																
72-54-8	4,4`-DDD	0.00025		1.2	J	mg/kg	CMS-417-A	23 / 88	0.0018 : 4	1.2		2	c			No	BSL
72-55-9	4,4`-DDE	0.00055		2.2	J	mg/kg	CMS-417-B	53 / 89	0.0018 : 3.9	2.2		1.4	c			Yes	ASL
50-29-3	4,4`-DDT	0.002490483		0.41	J	mg/kg	CMS-419-B	14 / 89	0.0001642 : 4	0.41		1.7	c*			No	BSL
309-00-2	Aldrin	0.00054		1.2	J	mg/kg	CMS-417-B	10 / 86	0.000106 : 2	1.2		0.029	c*			Yes	ASL
319-84-6	alpha-BHC	0.00055		0.05		mg/kg	CMS-419-B	9 / 88	9.014E-05 : 2	0.05		0.077	c			No	BSL
5103-71-9	alpha-Chlordane	0.00075		0.16	J	mg/kg	CMS-164-A	28 / 73	0.0018 : 2	0.16		1.6	c			No	BSL
319-85-7	beta-BHC	0.0005		0.032		mg/kg	CMW-SD-2021-01	20 / 87	0.0001868 : 2	0.032		0.27	c			No	BSL
57-74-9	Chlordane	0.0022		10.60052478	J	mg/kg	CMS-SS-4105-0010-01	9 / 41	0.0018 : 2	10.6		1.6	c*			Yes	ASL
319-86-8	delta-BHC	0.00019		0.00028	J	mg/kg	CM-SO-SB02-0406	2 / 87	0.0001511 : 2	0.00028						No	NSL
60-57-1	Dieldrin	0.00029		9.9	J	mg/kg	CMS-417-B	50 / 86	0.0018 : 3.9	9.9		0.03	c			Yes	ASL
959-98-8	Endosulfan I	0.00033		0.67	J	mg/kg	CMS-417-C	6 / 87	0.0001712 : 2	0.67		37	n			No	BSL
33213-65-9	Endosulfan II	0.00045		3.4	*	mg/kg	RES-SS-14-303-01	14 / 88	0.0018 : 4	3.4		37	n			No	BSL
1031-07-8	Endosulfan Sulfate	0.00059		0.074		mg/kg	CM-SO-MW06-0406	22 / 86	0.0001748 : 4	0.074		37	n			No	BSL
72-20-8	Endrin	0.00026		2.1	J	mg/kg	CMS-417-C	22 / 88	0.000148 : 3.9	2.1		1.8	n			Yes	ASL
7421-93-4	Endrin Aldehyde	0.00036		1.7		mg/kg	CMS-419-B	21 / 89	0.0002421 : 4	1.7		1.8	n			No	BSL
53494-70-5	Endrin Ketone	0.00067		0.02	J	mg/kg	RES-SS-14-333-01	15 / 72	0.0001621 : 4	0.02		1.8	n			No	BSL
58-89-9	Gamma-BHC/Lindane	0.000610768		0.031	J	mg/kg	CMS-419-B	7 / 88	0.0018 : 2	0.031		0.52	c*			No	BSL
5103-74-2	gamma-Chlordane	0.00021		0.26		mg/kg	RES-SS-14-303-01	28 / 72	0.0018 : 2	0.26		1.6	c			No	BSL
76-44-8	Heptachlor	0.00031		5.1	J	mg/kg	CMS-417-C	11 / 87	0.0001385 : 0.52	5.1		0.11	c			Yes	ASL
1024-57-3	Heptachlor Epoxide	0.000054		0.026	*UJ	mg/kg	SS-02	10 / 87	0.0001279 : 2	0.026		0.053	c*			No	BSL
72-43-5	Methoxychlor	0.0023		0.46		mg/kg	CMS-419-B	9 / 82	0.000189 : 20	0.46		31	n			No	BSL
	Polychlorinated Biphenyls																
12674-11-2	Aroclor-1016	0.32		0.84		mg/kg	CM-SO-MW06-0204	2 / 275	0.0189002 : 220	0.84		0.39	n			No	FOD
11141-16-5	Aroclor-1232	1.2		250		mg/kg	CMS-417-A	5 / 275	0.0189002 : 490	250		0.14	c			Yes	ASL
53469-21-9	Aroclor-1242	0.19		230		mg/kg	CMS-410-A	13 / 276	0.0189002 : 270	230		0.22	c			Yes	ASL
12672-29-6	Aroclor-1248	0.026		420	J	mg/kg	CMS-402-C	27 / 275	0.0189002 : 300	420		0.22	c			Yes	ASL
11097-69-1	Aroclor-1254	0.0074		1300		mg/kg	CMS-147-C	221 / 276	0.035 : 160	1300		0.11	n			Yes	ASL
11096-82-5	Aroclor-1260	0.042		1.1		mg/kg	CM-SO-MW06-0204	5 / 275	0.0047 : 220	1.1		0.22	c			No	FOD
11100-14-4	Aroclor-1268	2.012628447		4.347480167	J	mg/kg	CMS-SS-4105-0010-01	2 / 2		4.35						Yes	NSL
	Herbicides																
93-72-1	2,4,5-TP/Silvex	0.059		0.059	J	mg/kg	CMS-417-B	1 / 47	0.02 : 0.11	0.059		49	n			No	BSL
94-75-7	2,4-D	0.071		0.071	J	mg/kg	CMS-419-B	1 / 34	0.082 : 0.26	0.071		69	n			No	BSL
94-82-6	2,4-DB	0.043		0.36	J	mg/kg	CMS-417-A	2 / 35	0.082 : 0.26	0.36		49	n			No	BSL
75-99-0	Dalapon	0.0098		0.12		mg/kg	CMS-456-B	4 / 47	0.041 : 0.21	0.12		180	n			No	BSL
94-74-6	MCPA	5.8		5.8	J	mg/kg	CMS-456-B	1 / 46	8.2 : 43	5.8		3.1	n			No	FOD
93-65-2	MCPP	1.7		11	J	mg/kg	CMS-456-B	2 / 47	8.2 : 43	11		6.1	n			No	FOD
	Inorganics																
7429-90-5	Aluminum	1260		13000	J	mg/kg	CMS-SS-4110-0010-01	83 / 83		13000		7700	n			Yes	ASL
7440-36-0	Antimony	0.28		27.8	J	mg/kg	CMS-417-A	38 / 81	0.38 : 9.4	27.8		3.1	n			Yes	ASL
7440-38-2	Arsenic	1		49.3		mg/kg	CMS-118-C	80 / 84	0.54 : 10.7	49.3		0.39	c*			Yes	ASL
7440-39-3	Barium	9.7		1010	J	mg/kg	CMS-417-B	84 / 84		1010		1500	n			No	BSL
7440-41-7	Beryllium	0.2		2.1		mg/kg	CMS-118-C	62 / 82	0.05 : 0.66	2.1		16	n			No	BSL
7440-43-9	Cadmium	0.17		180		mg/kg	CMS-417-B	60 / 83	0.06 : 0.64	180		7	n			Yes	ASL
7440-70-2	Calcium	270		18100	J	mg/kg	CMS-405-B	78 / 81	417 : 533	18100						No	E
7440-47-3	Chromium	2.5		350	J	mg/kg	CMS-417-B	84 / 84		350		0.29	c			Yes	NSL
7440-48-4	Cobalt	1		93.3	J	mg/kg	CM-SO-MW08-0204	83 / 83		93.3		2.3	n			Yes	ASL
7440-50-8	Copper	2.8		934		mg/kg	CMS-417-B	82 / 83	2.5 : 2.5	934		310	n			Yes	ASL
57-12-5	Cyanide, Total	0.89		8.2		mg/kg	CMS-417-A	9 / 47	0.51 : 1.7	8.2		160	n			No	BSL
7439-89-6	Iron	3200		72000		mg/kg	CMS-237-B	83 / 83		72000		5500	n			No	E
7439-92-1	Lead	2.8		3160	J	mg/kg	CMS-405-D	84 / 84		3160		400	nL			Yes	ASL
7439-95-4	Magnesium	375		9370		mg/kg	RES-SS-14-271-01	81 / 81		9370						No	E
7439-96-5	Manganese	35.7		1700	J	mg/kg	CMS-456-A	83 / 83		1700		180	n			Yes	ASL
7439-97-6	Mercury	0.023		7.4		mg/kg	CMS-417-A	62 / 82	0.02 : 0.16	7.4		2.3	n			Yes	ASL
22967-92-6	Methyl Mercury	0.000513		0.00526		mg/kg	CMS-SS-4110-0010-01	2 / 2		0.00526		0.78	n			No	BSL
7439-98-7	Molybdenum	0.34		35.6		mg/kg	CMS-164-A	48 / 49	4.1 : 4.1	35.6		39	n			No	BSL

Table 2.1
Data Summary of Detected Parameters and Selection of Chemicals of Potential Concern
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Cas Number	Chemical	Minimum (1) Concentration (Qualifier)		Maximum (1) Concentration (Qualifier)		Units	Location of Maximum Concentration	Frequency of Detection	Range of Reporting Limits for Non-Detects	Concentration Used for Screening (2)	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Retain as COPC?	Rationale for Contaminant Deletion or Selection (5)
7440-02-0	Nickel	1.6		74.3		mg/kg	CMS-456-B	82 / 83	1.3 : 1.3	74.3		150	n			No	BSL
7440-09-7	Potassium	167		3750		mg/kg	RES-SS-14-271-01	79 / 81	255 : 277	3750						No	E
7782-49-2	Selenium	0.47		15.1	J	mg/kg	CMS-118-C	52 / 82	0.35 : 37.4	15.1		39	n			No	BSL
7440-22-4	Silver	0.16		35.5		mg/kg	CMS-237-B	38 / 83	0.088 : 2	35.5		39	n			No	BSL
7440-23-5	Sodium	60.1		845	J	mg/kg	RES-SS-14-333-01	58 / 81	19.9 : 665	845						No	E
7440-28-0	Thallium	0.2		13.4		mg/kg	CM-SO-SB02-0406	12 / 83	0.36 : 660	13.4		0.078	n			Yes	ASL
7440-62-2	Vanadium	4.6		210	J	mg/kg	CM-SO-MW15D-0204	82 / 83	2.5 : 2.5	210		39	n			Yes	ASL
7440-66-6	Zinc	20.1		3330		mg/kg	CMS-237-B	83 / 83		3330		2300	n			Yes	ASL
	Dioxins/Furans																
38178-99-3	HCX	0.00000125		0.093773	J	mg/kg	SD-30	51 / 55	0 : 0.001352	0.094		0.0000045	c*			Yes	ASL
1746-01-6	Dioxin-TEQ-M	0.0000005		0.14		mg/kg	CMS-240-A	514 / 514		0.14		0.0000045	c*			Yes	ASL

Prepared By: EYM 5/16/12
Checked By: BJR 5/16/12

Notes
(1) Minimum or maximum concentration detected in data set.
(2) The concentration used for screening is the maximum detected concentration.
(3) Values are the Regional Screening Levels (RSLs) obtained from USEPA May 2012.
Values used for screening are the residential soil RSLs for the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1.
RSL for pyrene used for phenanthrene, acenaphthylene, benzo(ghi)perylene.
RSL for chlordane used for alpha-chlordane and gamma-chlordane
RSL for chromium VI used for chromium
RSL for endosulfan used for endosulfan sulfate, endosulfan I and endosulfan II.
RSL for endrin used for endrin ketone and endrin aldehye.
RSL for mercuric chloride used for mercury.
RSL for vanadium and compounds used for vanadium.
RSL for 2,3,7,8-TCDD used for dioxin TEQ - mammal and HCX
n - RSL is based on a non-cancer hazard quotient of 0.1.
c - RSL is based on an excess lifetime cancer risk of 1 in 1 million.
c* - where n RSL < 100X c RSL.
ns - RSL is based on a non-cancer hazard quotient of 0.1; concentration may exceed Csat.
nL - RSL for lead is not adjusted to HQ = 0.1. RSL is not based on HQ evaluation.
(4) There are no Applicable or Relevant and Appropriate Requirements / To Be Considered (ARAR/TBC) for soil.
(5) Analyte is selected as a COPC if the concentration used for screening exceeds the RSL or if no screening value is available.
ASL - Concentration used for screening is greater than the screening toxicity value; the analyte was selected as a COPC.
BSL - Concentration used for screening is less than the screening toxicity value; the analyte was not selected as a COPC.
NSL - No screening level available; the anlayte was selected as a COPC.
FOD - Analyte detected in less than 5% of the samples; the analyte was not selected as a COPC.
E - Compound is an essential nutrient; the analyte was not selected as a COPC.
COPC - Chemical of potential concern.
mg/kg - milligrams per kilogram.
PCBs - polychlorinated biphenyls
EB - Compound detected in the associated equipment rinsate blank.
J - Value is estimated.

US EPA ARCHIVE DOCUMENT

Table 3.1
Exposure Point Concentrations - Soil
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point	Chemical of Potential Concern (1)	Units	Arithmetic Mean	95% UCL (2) (calculation)		Maximum Detected Concentration (qualifier)	Exposure Point Concentration			
							EPC	Units	Statistic	Rationale
Surface Soil (0-1 ft)	**Volatile Organics**									
	1,2,3-trichlorobenzene	mg/Kg	13.9	NC	NC [a]	180	180	mg/Kg	Maximum	(4)
	1,2,4-trichlorobenzene	mg/Kg	26	380	NP [c]	340	340	mg/Kg	Maximum	(4)
	1,2,4-trimethylbenzene	mg/Kg	6.6	84	NP [c]	86	84	mg/Kg	UCL - NP [c]	(3)
	1,2-dichlorobenzene	mg/Kg	115	NC	NC [a]	1,500	1,500	mg/Kg	Maximum	(4)
	1,4-dichlorobenzene	mg/Kg	2.4	35	NP [c]	31	31	mg/Kg	Maximum	(4)
	Benzene	mg/Kg	2.1	0.069	NP [d]	0.098	0.069	mg/Kg	UCL - NP [d]	(3)
	Chlorobenzene	mg/Kg	28	324	NP [c]	360	324	mg/Kg	UCL - NP [c]	(3)
	Cis-1,2-dichloroethene	mg/Kg	13.9	201	NP [c]	180	180	mg/Kg	Maximum	(4)
	Ethyl benzene	mg/Kg	2.7	NC	NC [a]	35	35	mg/Kg	Maximum	(4)
	Naphthalene	mg/Kg	3.6	46	NP [c]	47	46	mg/Kg	UCL - NP [c]	(3)
	Tetrachloroethene	mg/Kg	63	724	NP [c]	820	724	mg/Kg	UCL - NP [c]	(3)
	Trichloroethene	mg/Kg	48	566	NP [c]	630	566	mg/Kg	UCL - NP [c]	(3)
	Xylenes, Total	mg/Kg	13.3	193	NP [c]	160	160	mg/Kg	Maximum	(4)
	Semivolatile Organics									
	4-chloroaniline	mg/Kg	10.0	NC	NC [a]	280	280	mg/Kg	Maximum	(4)
	Benzo(a)anthracene	mg/Kg	2.0	3.5	NP [h]	8.5	3.5	mg/Kg	UCL - NP [h]	(3)
	Benzo(a)pyrene	mg/Kg	2.1	2.9	NP [e]	8.9	2.9	mg/Kg	UCL - NP [e]	(3)
	Benzo(b)fluoranthene	mg/Kg	2.5	3.4	NP [e]	7.8	3.4	mg/Kg	UCL - NP [e]	(3)
	Benzo(k)fluoranthene	mg/Kg	1.9	2.0	NP [f]	8.8	2.0	mg/Kg	UCL - NP [f]	(3)
	Bis(2-ethylhexyl)phthalate	mg/Kg	18.0	163	NP [c]	460	163	mg/Kg	UCL - NP [c]	(3)
	Carbazole	mg/Kg	1.2	0.47	NP [g]	2	0.47	mg/Kg	UCL - NP [g]	(3)
	Dibenz(a,h)anthracene	mg/Kg	1.2	0.57	NP [d]	2.2	0.57	mg/Kg	UCL - NP [d]	(3)
	Di-n-octylphthalate	mg/Kg	1.0	2.8	NP [h]	7.6	2.8	mg/Kg	UCL - NP [h]	(3)
	Indeno(1,2,3-cd)pyrene	mg/Kg	1.6	1.4	NP [f]	5.3	1.4	mg/Kg	UCL - NP [f]	(3)
	Pesticides									
	4,4`-DDE	mg/Kg	0.16	0.93	NP [c]	2.1	0.93	mg/Kg	UCL - NP [c]	(3)
	Chlordane	mg/Kg	1.4	4.0	NP [d]	10.6	4.0	mg/Kg	UCL - NP [d]	(3)
	Dieldrin	mg/Kg	0.11	0.22	NP [g]	1.9	0.22	mg/Kg	UCL - NP [g]	(3)
	Endrin	mg/Kg	0.071	0.30	NP [h]	1.2	0.30	mg/Kg	UCL - NP [h]	(3)
	Heptachlor	mg/Kg	0.073	0.81	NP [c]	1.7	0.81	mg/Kg	UCL - NP [c]	(3)
	Polychlorinated Biphenyls									
	Aroclor-1232	mg/Kg	7.5	NC	NC [a]	250	250	mg/Kg	Maximum	(4)
	Aroclor-1242	mg/Kg	4.7	8.0	NP [g]	230	8.0	mg/Kg	UCL - NP [g]	(3)
	Aroclor-1248	mg/Kg	3.9	0.59	NP [d]	2.3	0.59	mg/Kg	UCL - NP [d]	(3)
	Aroclor-1254	mg/Kg	17.0	64	NP [h]	560	64	mg/Kg	UCL - NP [h]	(3)
	Aroclor-1268	mg/Kg	3.2	NC	NC [b]	4.3	4.3	mg/Kg	Maximum	(4)
	Inorganics									
	Aluminum	mg/Kg	7,063	8,168	N [j]	13,000	8,168	mg/Kg	UCL - N [j]	(3)
	Antimony	mg/Kg	2.8	4.2	NP [f]	27.8	4.2	mg/Kg	UCL - NP [f]	(3)
	Arsenic	mg/Kg	4.8	6.0	NP [f]	17.3	6.0	mg/Kg	UCL - NP [f]	(3)

US EPA ARCHIVE DOCUMENT

Table 3.1
Exposure Point Concentrations - Soil
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point	Chemical of Potential Concern (1)	Units	Arithmetic	95% UCL (2) (calculation)		Maximum Detected Concentration (qualifier)	Exposure Point Concentration			
							EPC	Units	Statistic	Rationale
Surface Soil (0-1 ft) cont'd	Cadmium	mg/Kg	2.5	4.1	NP [f]	14.7	4.1	mg/Kg	UCL - NP [f]	(3)
	Chromium	mg/Kg	78	118	G [k]	330	118	mg/Kg	UCL - G [k]	(3)
	Cobalt	mg/Kg	6.4	8.3	G [k]	30.1	8.3	mg/Kg	UCL - G [k]	(3)
	Copper	mg/Kg	83	118	G [k]	288	118	mg/Kg	UCL - G [k]	(3)
	Lead	mg/Kg	308	464	G [k]	1,110	299	mg/Kg	Mean	(5)
	Manganese	mg/Kg	348	456	G [k]	1,700	456	mg/Kg	UCL - G [k]	(3)
	Mercury	mg/Kg	0.94	2.5	NP [e]	7.4	2.5	mg/Kg	UCL - NP [e]	(3)
	Thallium	mg/Kg	85	6.2	NP [c]	6.8	6.2	mg/Kg	UCL - NP [c]	(3)
	Vanadium	mg/Kg	32	40	NP [f]	83.8	40	mg/Kg	UCL - NP [f]	(3)
	Zinc	mg/Kg	278	379	G [k]	828	379	mg/Kg	UCL - G [k]	(3)
	Dioxins/Furans									
	HCX	mg/Kg	0.016	0.035	NP [f]	0.094	0.0000069	mg/Kg	UCL - NP [f]	(6)
	Dioxin-TEQ-M	mg/Kg	0.0041	0.008	NP [i]	0.14	0.008	mg/Kg	UCL - NP [i]	(3)
Subsurface Soil (1-5ft)	**Volatile Organics**									
	1,2,3-trichlorobenzene	mg/Kg	3.8	22.7	NP [d]	83	22.7	mg/Kg	UCL - NP [d]	(3)
	1,2,4-trichlorobenzene	mg/Kg	6.5	15.3	NP [g]	270	15.3	mg/Kg	UCL - NP [g]	(3)
	1,2,4-trimethylbenzene	mg/Kg	9.0	71	NP [c]	160	71	mg/Kg	UCL - NP [c]	(3)
	1,2-dichlorobenzene	mg/Kg	54	570	NP [c]	2,800	570	mg/Kg	UCL - NP [c]	(3)
	1,3-dichlorobenzene	mg/Kg	1.8	0.73	NP [g]	13	0.73	mg/Kg	UCL - NP [g]	(3)
	1,4-dichlorobenzene	mg/Kg	1.7	10.9	NP [c]	40	10.9	mg/Kg	UCL - NP [c]	(3)
	Benzene	mg/Kg	18.6	109	NP [c]	480	109	mg/Kg	UCL - NP [c]	(3)
	Chlorobenzene	mg/Kg	27	214	NP [c]	1000	214	mg/Kg	UCL - NP [c]	(3)
	Cis-1,2-dichloroethene	mg/Kg	19.0	143	NP [c]	500	143	mg/Kg	UCL - NP [c]	(3)
	Ethyl benzene	mg/Kg	3.6	22.6	NP [c]	81	22.6	mg/Kg	UCL - NP [c]	(3)
	Naphthalene	mg/Kg	4.642	36.0	NP [c]	84	36.0	mg/Kg	UCL - NP [c]	(3)
	Sec-butylbenzene	mg/Kg	3.1	0.0100	NP [d]	0.01	0.0100	mg/Kg	Maximum	(4)
	Tetrachloroethene	mg/Kg	31	335	NP [c]	1,700	335	mg/Kg	UCL - NP [c]	(3)
	Trichloroethene	mg/Kg	43	470	NP [c]	2,400	470	mg/Kg	UCL - NP [c]	(3)
	Vinyl Chloride	mg/Kg	3.3	0.21	NP [g]	2.3	0.21	mg/Kg	UCL - NP [g]	(3)
	Xylenes, Total	mg/Kg	15.9	30	NP [g]	380	30	mg/Kg	UCL - NP [g]	(3)
	Semivolatile Organics									
	4-chloroaniline	mg/Kg	1.5	0.43	NP [g]	6.1	0.43	mg/Kg	UCL - NP [g]	(3)
	Benzo(a)anthracene	mg/Kg	1.722	1.3	NP [e]	5.5	1.3	mg/Kg	UCL - NP [e]	(3)
	Benzo(a)pyrene	mg/Kg	1.7	1.4	NP [e]	7.1	1.4	mg/Kg	UCL - NP [e]	(3)
	Benzo(b)fluoranthene	mg/Kg	2.037	2.1	NP [e]	10	2.1	mg/Kg	UCL - NP [e]	(3)
	Benzo(k)fluoranthene	mg/Kg	1.496	0.41	NP [g]	2.2	0.41	mg/Kg	UCL - NP [g]	(3)
	Bis(2-ethylhexyl)phthalate	mg/Kg	12.2	91	NP [c]	390	91	mg/Kg	UCL - NP [c]	(3)
	Carbazole	mg/Kg	1.4	0.22	NP [g]	0.5	0.22	mg/Kg	UCL - NP [g]	(3)
	Dibenz(a,h)anthracene	mg/Kg	1.4	0.25	NP [g]	1	0.25	mg/Kg	UCL - NP [g]	(3)

US EPA ARCHIVE DOCUMENT

Table 3.1
Exposure Point Concentrations - Soil
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point	Chemical of Potential Concern (1)	Units	Arithmetic	95% UCL (2) (calculation)		Maximum Detected Concentration (qualifier)	Exposure Point Concentration			
							EPC	Units	Statistic	Rationale
Subsurface Soil (1-5ft) cont'd	Di-n-octylphthalate	mg/Kg	1.6	0.53	NP [g]	5.1	0.53	mg/Kg	UCL - NP [g]	(3)
	Indeno(1,2,3-cd)pyrene	mg/Kg	1.523	0.52	NP [g]	3.3	0.52	mg/Kg	UCL - NP [g]	(3)
	Pesticides									
	4,4`-DDE	mg/Kg	0.18	0.66	NP [c]	2.2	0.66	mg/Kg	UCL - NP [c]	(3)
	Aldrin	mg/Kg	0.11	0.38	NP [c]	1.2	0.38	mg/Kg	UCL - NP [c]	(3)
	Chlordane	mg/Kg	0.18	0.12	NP [d]	0.27	0.12	mg/Kg	UCL - NP [d]	(3)
	Dieldrin	mg/Kg	0.33	2.4	NP [c]	9.9	2.4	mg/Kg	UCL - NP [c]	(3)
	Endrin	mg/Kg	0.14	0.52	NP [c]	2.1	0.52	mg/Kg	UCL - NP [c]	(3)
	Heptachlor	mg/Kg	0.22	0.43	NP [g]	5.1	0.43	mg/Kg	UCL - NP [g]	(3)
	Polychlorinated Biphenyls									
	Aroclor-1232	mg/Kg	4.3	1.8	NP [g]	35	1.8	mg/Kg	UCL - NP [g]	(3)
	Aroclor-1242	mg/Kg	4.0	2.9	NP [g]	160	2.9	mg/Kg	UCL - NP [g]	(3)
	Aroclor-1248	mg/Kg	5.8	17.2	NP [h]	420	17.2	mg/Kg	UCL - NP [h]	(3)
	Aroclor-1254	mg/Kg	26	88	NP [h]	1,300	88	mg/Kg	UCL - NP [h]	(3)
	Inorganics									
	Aluminum	mg/Kg	5,534	6,043	N [j]	11,400	6,043	mg/Kg	UCL - N [j]	(3)
	Antimony	mg/Kg	3.6	6.0	NP [e]	21.4	6.0	mg/Kg	UCL - NP [e]	(3)
	Arsenic	mg/Kg	6.0	9.9	NP [e]	49.3	9.9	mg/Kg	UCL - NP [e]	(3)
	Cadmium	mg/Kg	6.5	27	NP [h]	180	27	mg/Kg	UCL - NP [h]	(3)
	Chromium	mg/Kg	44	57	LN [l]	350	57	mg/Kg	UCL - LN [l]	(3)
	Cobalt	mg/Kg	7.8	9.1	LN [l]	93.3	9.1	mg/Kg	UCL - LN [l]	(3)
	Copper	mg/Kg	95	200	NP [e]	934	200	mg/Kg	UCL - NP [e]	(3)
	Lead	mg/Kg	276	563	LN [l]	3,160	252	mg/Kg	Mean	(5)
	Manganese	mg/Kg	253	293	G [k]	1,060	293	mg/Kg	UCL - G [k]	(3)
	Mercury	mg/Kg	0.40	0.84	NP [e]	5.1	0.84	mg/Kg	UCL - NP [e]	(3)
	Thallium	mg/Kg	76	4.7	NP [d]	13.4	4.7	mg/Kg	UCL - NP [d]	(3)
	Vanadium	mg/Kg	22	25	LN [l]	210	25	mg/Kg	UCL - LN [l]	(3)
	Zinc	mg/Kg	467	994	NP [i]	3,330	994	mg/Kg	UCL - NP [i]	(3)
	Dioxins/Furans									
	HCX	mg/Kg	0.0028	0.020	NP [c]	0.056	0.0000041	mg/Kg	UCL - NP [c]	(6)
	Dioxin-TEQ-M	mg/Kg	0.0010	0.0025	NP [i]	0.057	0.0025	mg/Kg	UCL - NP [i]	(3)
Soil (0-5 ft)	**Volatile Organics**									
	1,2,3-trichlorobenzene	mg/Kg	6.9	27	NP [d]	180	27	mg/Kg	UCL - NP [d]	(3)
	1,2,4-trichlorobenzene	mg/Kg	10.3	53	NP [h]	340	53	mg/Kg	UCL - NP [h]	(3)
	1,2,4-trimethylbenzene	mg/Kg	8.3	55	NP [c]	160	55	mg/Kg	UCL - NP [c]	(3)
	1,2-dichlorobenzene	mg/Kg	66	361	NP [h]	2,800	361	mg/Kg	UCL - NP [h]	(3)
	1,3-dichlorobenzene	mg/Kg	1.9	0.59	NP [g]	13	0.59	mg/Kg	UCL - NP [g]	(3)
	1,4-dichlorobenzene	mg/Kg	1.8	7.2	NP [h]	40	7.2	mg/Kg	UCL - NP [h]	(3)
	4-iso-Propyltoluene	mg/Kg	2.9	0.18	NP [d]	0.18	0.18	mg/Kg	Maximum	(4)
	Benzene	mg/Kg	15.4	61	NP [h]	480	61	mg/Kg	UCL - NP [h]	(3)
	Chlorobenzene	mg/Kg	27	128	NP [h]	1000	128	mg/Kg	UCL - NP [h]	(3)
	Cis-1,2-dichloroethene	mg/Kg	18.1	83	NP [h]	500	83	mg/Kg	UCL - NP [h]	(3)
	Ethyl benzene	mg/Kg	3.4	6.1	NP [g]	81	6.1	mg/Kg	UCL - NP [g]	(3)

US EPA ARCHIVE DOCUMENT

Table 3.1
Exposure Point Concentrations - Soil
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point	Chemical of Potential Concern (1)	Units	Arithmetic	95% UCL (2) (calculation)		Maximum Detected Concentration (qualifier)	Exposure Point Concentration			
							EPC	Units	Statistic	Rationale
Soil (0-5 ft) cont'd	Naphthalene	mg/Kg	4.335	28.4	NP [c]	84	28.4	mg/Kg	UCL - NP [c]	(3)
	Sec-butylbenzene	mg/Kg	2.8	0.010	NP [d]	0.01	0.01	mg/Kg	Maximum	(4)
	Tetrachloroethene	mg/Kg	37	207	NP [h]	1,700	207	mg/Kg	UCL - NP [h]	(3)
	Trichloroethene	mg/Kg	44	268	NP [h]	2,400	268	mg/Kg	UCL - NP [h]	(3)
	Vinyl Chloride	mg/Kg	3.6	0.18	NP [g]	2.3	0.18	mg/Kg	UCL - NP [g]	(3)
	Xylenes, Total	mg/Kg	15.5	28	NP [g]	380	28	mg/Kg	UCL - NP [g]	(3)
	Semivolatile Organics									
	4-chloroaniline	mg/Kg	4.4	9.4	NP [g]	280	9.4	mg/Kg	UCL - NP [g]	(3)
	Benzo(a)anthracene	mg/Kg	1.821	1.7	NP [e]	8.5	1.7	mg/Kg	UCL - NP [e]	(3)
	Benzo(a)pyrene	mg/Kg	1.9	1.7	NP [e]	8.9	1.7	mg/Kg	UCL - NP [e]	(3)
	Benzo(b)fluoranthene	mg/Kg	2.190	2.3	NP [e]	10	2.3	mg/Kg	UCL - NP [e]	(3)
	Benzo(k)fluoranthene	mg/Kg	1.654	0.99	NP [f]	8.8	0.99	mg/Kg	UCL - NP [f]	(3)
	Bis(2-ethylhexyl)phthalate	mg/Kg	14.3	60	NP [h]	460	60	mg/Kg	UCL - NP [h]	(3)
	Carbazole	mg/Kg	1.3	0.29	NP [g]	2	0.29	mg/Kg	UCL - NP [g]	(3)
	Dibenz(a,h)anthracene	mg/Kg	1.3	0.34	NP [g]	2.2	0.34	mg/Kg	UCL - NP [g]	(3)
	Di-n-octylphthalate	mg/Kg	1.4	0.59	NP [g]	7.6	0.59	mg/Kg	UCL - NP [g]	(3)
	Indeno(1,2,3-cd)pyrene	mg/Kg	1.539	0.78	NP [f]	5.3	0.78	mg/Kg	UCL - NP [f]	(3)
	Pesticides									
	4,4`-DDE	mg/Kg	0.18	0.41	NP [h]	2.2	0.41	mg/Kg	UCL - NP [h]	(3)
	Aldrin	mg/Kg	0.089	0.17	NP [h]	1.2	0.17	mg/Kg	UCL - NP [h]	(3)
	Chlordane	mg/Kg	0.58	0.97	NP [g]	10.6	0.97	mg/Kg	UCL - NP [g]	(3)
	Dieldrin	mg/Kg	0.25	1.08	NP [h]	9.9	1.08	mg/Kg	UCL - NP [h]	(3)
	Endrin	mg/Kg	0.11	0.26	NP [h]	2.1	0.26	mg/Kg	UCL - NP [h]	(3)
	Heptachlor	mg/Kg	0.17	0.29	NP [g]	5.1	0.29	mg/Kg	UCL - NP [g]	(3)
	Polychlorinated Biphenyls									
	Aroclor-1232	mg/Kg	5.3	4.0	NP [g]	250	4.0	mg/Kg	UCL - NP [g]	(3)
	Aroclor-1242	mg/Kg	4.3	3.6	NP [g]	230	3.6	mg/Kg	UCL - NP [g]	(3)
	Aroclor-1248	mg/Kg	5.2	11.8	NP [h]	420	11.8	mg/Kg	UCL - NP [h]	(3)
	Aroclor-1254	mg/Kg	23	68	NP [h]	1,300	68	mg/Kg	UCL - NP [h]	(3)
	Aroclor-1268	mg/Kg	3.2	NC	NC [b]	4.3	4.3	mg/Kg	Maximum	(4)
	Inorganics									
	Aluminum	mg/Kg	6,050	6,606	G [k]	13,000	6,606	mg/Kg	UCL - G [k]	(3)
	Antimony	mg/Kg	3.3	3.5	NP [f]	27.8	3.5	mg/Kg	UCL - NP [f]	(3)
	Arsenic	mg/Kg	5.6	8.4	NP [e]	49.3	8.4	mg/Kg	UCL - NP [e]	(3)
	Cadmium	mg/Kg	5.2	19.2	NP [h]	180	19.2	mg/Kg	UCL - NP [h]	(3)
	Chromium	mg/Kg	56	74	LN [l]	350	74	mg/Kg	UCL - LN [l]	(3)
	Cobalt	mg/Kg	7.3	8.2	LN [l]	93.3	8.2	mg/Kg	UCL - LN [l]	(3)
	Copper	mg/Kg	91	164	NP [e]	934	164	mg/Kg	UCL - NP [e]	(3)
	Lead	mg/Kg	287	368	G [k]	3,160	266	mg/Kg	Mean	(5)
	Manganese	mg/Kg	285	325	G [k]	1,700	325	mg/Kg	UCL - G [k]	(3)
	Mercury	mg/Kg	0.6	1.2	NP [e]	7.4	1.2	mg/Kg	UCL - NP [e]	(3)

US EPA ARCHIVE DOCUMENT

Table 3.1
Exposure Point Concentrations - Soil
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Point	Chemical of Potential Concern (1)	Units	Arithmetic	95% UCL (2) (calculation)		Maximum Detected Concentration (qualifier)	Exposure Point Concentration			
							EPC	Units	Statistic	Rationale
Soil (0-5 ft) cont'd	Thallium	mg/Kg	79	2.9	NP [d]	13.4	2.9	mg/Kg	UCL - NP [d]	(3)
	Vanadium	mg/Kg	26	31	NP [f]	210	31	mg/Kg	UCL - NP [f]	(3)
	Zinc	mg/Kg	404	761	NP [i]	3,330	761	mg/Kg	UCL - NP [i]	(3)
	Dioxins/Furans									
	HCX	mg/Kg	0.0082	0.041	NP [c]	0.094	0.0000081	mg/Kg	UCL - NP [c]	(6)
	Dioxin-TEQ-M	mg/Kg	0.0027	0.0047	NP [i]	0.14	0.0047	mg/Kg	UCL - NP [i]	(3)

NOTES:

Prepared By: EYM 4/25/12
Checked By: BJR 5/1/12

(1) Chemicals of potential concern (COPCs) are identified in Table 2.1.
(2) 95% UCL is calculated using ProUCL software (V. 4.1.00); calculations presented in Appendix B.

NC - Not Calculated
- [a] Only one distinct data value was detected
- [b] Dataset too small to calculate UCL

NP - Non-Parametric distribution
- [c] 99% KM (Chebyshev) UCL
- [d] 95% KM (Percentile Bootstrap) UCL
- [e] 95% KM (Chebyshev) UCL
- [f] 95% KM (BCA) UCL
- [g] 95% KM (t) UCL
- [h] 97.5% KM (Chebyshev) UCL
- [i] 95% Chebyshev (Mean, Sd) UCL

N - Normal distribution
- [j] 95% Student's-t UCL

G - Gamma distribution
- [k] 95% Approximate Gamma UCL

LN - Log Normal distribution
- [l] 95% H-UCL

(3) The 95% UCL is used as the EPC because the calculated 95% UCL is less than the maximum detected concentration.
(4) The maximum detected concentration is used as the EPC because it is lower than the calculated 95% UCL, or no 95% UCL is calculated.
(5) In accordance with USEPA guidance for evaluating lead exposure, the arithmetic mean concentration is used as the EPC.
(6) HCX EPC has been adjusted using a TEF of 0.0002.
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit on the arithmetic mean
mg/Kg = milligrams per kilogram

US EPA ARCHIVE DOCUMENT

Table 4.1
Values Used For Daily Intake Calculations
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SOIL

EXPOSURE ROUTE	RECEPTOR POPULATION	RECEPTOR AGE	EXPOSURE POINT	PARAMETER CODE	PARAMETER DEFINITION	VALUE	UNITS	RATIONALE/ REFERENCE	INTAKE EQUATION/ MODEL NAME
INGESTION	RESIDENT	ADULT	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-INGESTION =
		(ages 19 and above)		IR-S	INGESTION RATE OF SOIL	100	mg/day	USEPA, 2002	CS x IR-S x FI x EF x ED x CF x 1/BW x 1/AT
				FI	FRACTION INGESTED	1	unitless	Professional Judgement	
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	70	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
		ADOLESCENT	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-INGESTION =
		(ages 7 - 18)		IR-S	INGESTION RATE OF SOIL	100	mg/day	USEPA, 2002	CS x IR-S x FI x EF x ED x CF x 1/BW x 1/AT
				FI	FRACTION INGESTED	1	unitless	Professional Judgement	
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	45	kg	USEPA, 1997[2]	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
		CHILD	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-INGESTION =
		(ages 1 - 6)		IR-S	INGESTION RATE OF SOIL	200	mg/day	USEPA, 2002	CS x IR-S x FI x EF x ED x CF x 1/BW x 1/AT
				FI	FRACTION INGESTED	1	unitless	Professional Judgement	
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	6	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	15	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	2190	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
	CONSTURCTION WORKER	ADULT	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-INGESTION =
				IR-S	INGESTION RATE OF SOIL	330	mg/day	USEPA, 2002	CS x IR-S x FI x EF x ED x CF x 1/BW x 1/AT
				FI	FRACTION INGESTED	1	unitless	Professional Judgement	
				EF	EXPOSURE FREQUENCY	250	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	1	yr	USEPA, 2002	
				BW	BODY WEIGHT	70	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	365	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		

US EPA ARCHIVE DOCUMENT

Table 4.1
Values Used For Daily Intake Calculations
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SOIL

EXPOSURE ROUTE	RECEPTOR POPULATION	RECEPTOR AGE	EXPOSURE POINT	PARAMETER CODE	PARAMETER DEFINITION	VALUE	UNITS	RATIONALE/ REFERENCE	INTAKE EQUATION/ MODEL NAME
DERMAL	RESIDENT	ADULT (ages 19 and above)	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-DERMAL =
				AF	ADHERENCE FACTOR	0.07	mg/cm2	USEPA, 2004	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2004	
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	5700	cm2/day	USEPA, 2004	Where DAevent =
				EV	EVENT DAY	1	unitless	Professional Judgement	CS x AF x AbF x CF
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	70	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
	RESIDENT	ADOLESCENT (ages 7 - 18)	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-DERMAL =
				AF	ADHERENCE FACTOR	0.2	mg/cm2	USEPA, 2004	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2004	
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	4800	cm2/day	USEPA, 1997[3]	Where DAevent =
				EV	EVENT DAY	1	unitless	Professional Judgement	CS x AF x AbF x CF
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	12	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	45	kg	USEPA, 1997[2]	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	4380	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
		CHILD (ages 1 - 6)	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-DERMAL =
				AF	ADHERENCE FACTOR	0.2	mg/cm2	USEPA, 2004	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2004	
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	2800	cm2/day	USEPA, 2004	Where DAevent =
				EV	EVENT DAY	1	unitless	Professional Judgement	CS x AF x AbF x CF
				EF	EXPOSURE FREQUENCY	350	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	6	yr	USEPA, 1994[1]	
				BW	BODY WEIGHT	15	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	2190	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		
	CONSTURCTION WORKER	ADULT	SOURCE AREA	CS	CHEMICAL CONCENTRATION IN SOIL	chemical-specific	mg/kg	EPC Table	INTAKE-DERMAL =
				AF	ADHERENCE FACTOR	0.3	mg/cm2	USEPA, 2002	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				AbF	ABSORPTION FACTOR	chemical-specific	unitless	USEPA, 2004	
				SA	SKIN SURFACE AREA AVAILABLE FOR CONTACT	3300	cm2/day	USEPA, 2002	Where DAevent =
				EV	EVENT DAY	1	unitless	Professional Judgement	CS x AF x AbF x CF
				EF	EXPOSURE FREQUENCY	250	day/yr	USEPA, 2002	
				ED	EXPOSURE DURATION	1	yr	USEPA, 2002	
				BW	BODY WEIGHT	70	kg	USEPA, 2002	
				AT-C	AVERAGING TIME (CANCER)	25550	day	USEPA, 2002	
				AT-N	AVERAGING TIME (NONCANCER)	365	day	USEPA, 2002	
				CF	CONVERSION FACTOR	0.000001	kg/mg		

US EPA ARCHIVE DOCUMENT

Table 4.1
Values Used For Daily Intake Calculations
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SCENARIO TIMEFRAME: CURRENT/FUTURE
MEDIUM: SOIL
EXPOSURE MEDIUM: SOIL

EXPOSURE ROUTE	RECEPTOR POPULATION	RECEPTOR AGE	EXPOSURE POINT	PARAMETER CODE	PARAMETER DEFINITION	VALUE	UNITS	RATIONALE/ REFERENCE	INTAKE EQUATION/ MODEL NAME
DUST	RESIDENT	ADULT	SOURCE AREA	CS-c	Chemical Concentration in Soil	chemical-specific	mg/kg	EPC Table	CHEMICAL INTAKE-INHALATION (ug/m³) =
INHALATION		(ages 19 and above)		CAair	Concentration in Air	calculated	ug/m^3	Modeled from soil	CAair x ED x EF x ET x 1/AT x 1/24 hr
				EFo	Exposure Frequency	350	day/yr	USEPA, 2002	CAair =
				ED	Exposure Duration	12	yr	USEPA, 1994[1]	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	24	hr	USEPA, 2009	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	4380	day	USEPA, 2002	
				PEF	Particulate Emission Factor	1.32E+09	m^3/kg	USEPA, 1996	
		ADOLESCENT	SOURCE AREA	CS-c	Chemical Concentration in Soil	chemical-specific	mg/kg	EPC Table	CHEMICAL INTAKE-INHALATION (ug/m³) =
		(ages 7 - 18)		CAair	Concentration in Air	calculated	ug/m^3	Modeled from soil	CAair x ED x EF x ET x 1/AT x 1/24 hr
				EFo	Exposure Frequency	350	day/yr	USEPA, 2002	CAair =
				ED	Exposure Duration	12	yr	USEPA, 1994[1]	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	24	hr	USEPA, 2009	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	4380	day	USEPA, 2002	
				PEF	Particulate Emission Factor	1.32E+09	m^3/kg	USEPA, 1996	
		CHILD	SOURCE AREA	CS-c	Chemical Concentration in Soil	chemical-specific	mg/kg	EPC Table	CHEMICAL INTAKE-INHALATION (ug/m³) =
		(ages 1 - 6)		CAair	Concentration in Air	calculated	ug/m^3	Modeled from soil	CAair x ED x EF x ET x 1/AT x 1/24 hr
				EFo	Exposure Frequency	350	day/yr	USEPA, 2002	CAair =
				ED	Exposure Duration	6	yr	USEPA, 1994[1]	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	24	hr	USEPA, 2009	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 2002	
				PEF	Particulate Emission Factor	1.32E+09	m^3/kg	USEPA, 1996	
	CONSTRUCTION WORKER	ADULT	SOURCE AREA	CS-c	Chemical Concentration in Soil	chemical-specific	mg/kg	EPC Table	CHEMICAL INTAKE-INHALATION (ug/m³) =
				CAair	Concentration in Air	calculated	ug/m^3	Modeled from soil	CAair x ED x EF x ET x 1/AT x 1/24 hr
				EFo	Exposure Frequency	250	day/yr	USEPA, 2004	CAair =
				ED	Exposure Duration	1	yr	USEPA, 2004	CS-c x 1/PEF x 1000 ug/mg
				ET	Exposure Time	8	hr	Assumption	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	day	USEPA, 2002	
				PEF	Particulate Emission Factor	2.38E+07	m^3/kg	USEPA, 2002	

USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No. 2.
USEPA, 1996. "Soil Screening Guidance: Technical Background Document" EPA/540/R-95/128. May.
USEPA, 1997. "Exposure Factors Handbook, Volume 1"; Office of Research and Development; EPA-600/P-95/002Fa; Washington, D.C.; August.
USEPA, 2002. "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites". OSWER 9355.4-24. December.
USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final". EPA/540/R/99/005. July.
USEPA, 2009. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final". EPA/540/R/070/002. January.

1 - The total RME exposure duration is 30 years, consistent with USEPA, 1994. The allocation of exposure duration for the three age groups is based on professional judgement.
2 - Values are the average of 50th percentile body weights for males and females ages 7 through 18.
3 - Values are the average of 50th percentile body surface areas (sum of areas for face, hands, forearms, lower legs, and feet) for males in the various age groups indicated.
mg - milligrams
cm^2 - square centimeters
kg - kilograms

Prepared by: BJR 4/17/12
Checked by: EYM 4/19/12

Table 4.2
Calculation of Total Particulate Emission Factor - Sources Other than Unpaved Roads
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Equations:

$$PEF = Q/C_{SR} \times (1/F_D) \times [(T \times A_R)/(556 \times ((W/3)^{0.4}) \times ((365-p)/365) \times \sum VKT)]$$

$$Q/C_{sr} = A \times \exp[(\ln A_c - B)^2/C]$$

PARAMETER / DEFINITIONS	UNITS	VALUES
PEF'_{sc} / Subchronic particulate emission factor for construction activities other than traffic on unpaved roads	m^3/kg	2.38E+07 calculated
Q/C_{sr} / Inverse of the ratio of the 1-hr geometric mean air concentration to the emission flux along a straight road bisecting a squre site.	g/m^2-s per kg/m^3	**15.3** Calculated
A / Constant		12.9351 USEPA, 2002
B / Constant		5.7383 USEPA, 2002
C / Constant		71.7711 USEPA, 2002
A_c / Areal extent of site with surface soil contamination	m^2	37,800 Smallest Exposure Area
F_D / Dispersion correction factor	unitless	0.19 $F_D = 0.1852 + 5.3537/tc + -9.6318/tc^2$
tc / Duration of construction	hr	2000 8 hr/day for 250 days
T / Total time over which construction occurs	s	7,200,000 8 hr/day for 250 days
A_R / Surface area of contaminated road segment	m^2	1185 $L_R \times W_R \times 0.0929\ ft^2/m^2$
L_R / Length of contaminated road segment	ft	638 Square root of A_c
W_R / Width of contaminated road segment	ft	20 USEPA, 2002
W / Mean vehicle weight	tons	10 Calculated - see below
p / Number of days per year with at least 0.01 inches of precipitation	unitless	130 USEPA, 2002
VKT / Sum of kilometers travelled by all vehicles during time of construction	Km	51 Calculated - see below

Source: USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

Notes:

Units for A, B, and C constants are not presented in USEPA (2002).

Calculation of W and VKT parameter values

Vehicle	Number per day	Weight (tons)	Km travelled per vehicle on-site per day
Car/pickup truck	5	2	0.1
Dump truck (loaded)	2	30	0.1
W =	10	tons	
VKT =	50.5	Km over 250 days	

US EPA ARCHIVE DOCUMENT

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source	Date Verified
VOLATILES										
1,2-Dichloroethene (cis)	chronic	2.0E-03	mg/kg/day	100%	2.0E-03	mg/kg/day	Hematological	3,000	IRIS	April-12
	subchronic	3.0E-01	mg/kg/day	100%	3.0E-01	mg/kg/day	Hematological	100/1	MRL	April-12
1,2,4-Trimethylbenzene	chronic	ND			ND					April-12
	subchronic	ND			ND					April-12
4-iso-Propyltoluene	chronic	ND			ND					April-12
	subchronic	ND			ND					April-12
Benzene	chronic	4.0E-03	mg/kg/day	100%	4.0E-03	mg/kg/day	Immune system; decreased lymphocyte count	300	IRIS	April-12
	subchronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day	Immune system; decreased lymphocyte count	100	PPRTV	April-12
Butylbenzene, sec-	chronic	ND			ND					April-12
	subchronic	ND			ND					April-12
Chlorobenzene	chronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Liver; hepatic changes	1,000/1	IRIS	April-12
	subchronic	7.0E-02	mg/kg/day	100%	7.0E-02	mg/kg/day	Liver; hepatic changes; gastro intestinal; bone marrow	300	PPRTV	April-12
Ethylbenzene	chronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Liver and kidney; liver and kidney toxicity	1,000/1	IRIS	April-12
	subchronic	5.0E-02	mg/kg/day	100%	5.0E-02	mg/kg/day	Liver	1,000	PPRTV	April-12
Tetrachloroethene	chronic	6.0E-03	mg/kg/day	100%	6.0E-03	mg/kg/day	Neurotoxicity	1,000/1	IRIS	April-12
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Liver; hepatotoxicity	100/1	HEAST	April-12
Trichloroethene	chronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Immunological effects, development immunotoxicity	1,000	IRIS	April-12
	subchronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Immunological effects, development immunotoxicity		Chronic	April-12
Vinyl Chloride	chronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	Liver; liver cell polymorphism	30/1	IRIS	April-12
	subchronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	Liver; liver cell polymorphism	30/1	Chronic	April-12
Xylenes (total)	chronic	2.0E-01	mg/kg/day	100%	2.0E-01	mg/kg/day	General toxicity; increased mortality	1,000/1	IRIS	April-12
	subchronic	4.0E-01	mg/kg/day	100%	4.0E-01	mg/kg/day	decreased body weight	1,000	PPRTV	April-12
SEMIVOLATILES										
1,2,3-Trichlorobenzene	chronic	8.0E-04	mg/kg/day	100%	8.0E-04	mg/kg/day	NOAEL	10,000	PPRTV SL	April-12
	subchronic	8.0E-03	mg/kg/day	100%	8.0E-03	mg/kg/day	Liver; kidney; decreased body weight gain	1,000	PPRTV	April-12
1,2,4-Trichlorobenzene	chronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day	Endocrine; increased adrenal weights	1,000/1	IRIS	April-12
	subchronic	9.0E-02	mg/kg/day	100%	9.0E-02	mg/kg/day	Liver	100	PPRTV	April-12
1,2-Dichlorobenzene	chronic	9.0E-02	mg/kg/day	100%	9.0E-02	mg/kg/day	Liver / NOAEL	1,000/1	IRIS	April-12
	subchronic	6.0E-01	mg/kg/day	100%	6.0E-01	mg/kg/day	Renal	100	MRL	April-12
1,3-Dichlorobenzene	chronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Endocrine		subchronic	April-12
	subchronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Endocrine	100	MRL	April-12
1,4-Dichlorobenzene	chronic	7.0E-02	mg/kg/day	100%	7.0E-02	mg/kg/day	Hepatic	100	MRL	April-12
	subchronic	7.0E-02	mg/kg/day	100%	7.0E-02	mg/kg/day	Hepatic	100	MRL	April-12
4-Chloroaniline	chronic	4.0E-03	mg/kg/day	100%	4.0E-03	mg/kg/day	Spleen; splenic capsule lesions	3,000/1	IRIS	April-12
	subchronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Blood Increased methemoglobin	3,000/1	PPRTV	April-12
Benzo(a)anthracene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12
Benzo(a)pyrene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12
Benzo(b)fluoranthene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12
Benzo(k)fluoranthene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12
Bis(2-ethylhexyl)phthalate (BEHP)	chronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Liver; increased liver weight	1,000/1	IRIS	April-12
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Reproductive	100	MRL	April-12
Bis(Chloromethyl)ether	chronic	ND			ND					April-12
	subchronic	ND			ND					April-12
Butylbenzylphthalate	chronic	2.0E-01	mg/kg/day	100%	2.0E-01	mg/kg/day	Liver; liver weight	1,000/1	IRIS	April-12
	subchronic	2.0E+00	mg/kg/day	100%	2.0E+00	mg/kg/day	Liver; liver weight	100/1	HEAST	April-12
Carbazole	chronic	ND			ND					
	subchronic	ND			ND					
Dibenzo(a,h)anthracene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12
Di-n-octylphthalate	chronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	liver/kidney	1,000	HEAST	March-11
	subchronic	4.0E-01	mg/kg/day	100%	4.0E-01	mg/kg/day	Hepatic	100	MRL	April-12
Indeno(1,2,3-cd)pyrene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney; renal tubular pathology	3,000/1	Surrogate (1)	April-12
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney; renal tubular pathology	300/1	Surrogate (1)	April-12

US EPA ARCHIVE DOCUMENT

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source	Date Verified
Naphthalene	chronic	2.0E-02	mg/kg/day	89%	2.0E-02	mg/kg/day	Decreased body weight	3,000/1	IRIS	April-12
	subchronic	6.0E-01	mg/kg/day	89%	6.0E-01	mg/kg/day	CNS	90	MRL	April-12
PESTICIDES/PCBs										
4,4'-DDE	chronic	5.0E-04	mg/kg/day	70%	5.0E-04	mg/kg/day	Liver; liver lesions		Surrogate (2)	April-12
	subchronic	5.0E-04	mg/kg/day	70%	5.0E-04	mg/kg/day	Liver; liver lesions		Surrogate (2)	
Aldrin	chronic	3.0E-05	mg/kg/day	70%	3.0E-05	mg/kg/day	Liver; hepatotoxicity	1,000/1	IRIS	April-12
	subchronic	4.0E-05	mg/kg/day	70%	4.0E-05	mg/kg/day	renal lesions	1,000	PPRTV	April-12
Chlordane (technical)	chronic	5.0E-04	mg/kg/day	80%	5.0E-04	mg/kg/day	Liver; hepatic necrosis	300/1	IRIS	April-12
	subchronic	6.0E-04	mg/kg/day	80%	6.0E-04	mg/kg/day	Liver	100	MRL	April-12
Dieldrin	chronic	5.0E-05	mg/kg/day	100%	5.0E-05	mg/kg/day	Liver; liver lesions	100/1	IRIS	April-12
	subchronic	1.0E-04	mg/kg/day	100%	1.0E-04	mg/kg/day	CNS	100	MRL	April-12
Endrin	chronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	Nervous system and liver; convulsions; liver lesions	100/1	IRIS	April-12
	subchronic	2.0E-03	mg/kg/day	100%	2.0E-03	mg/kg/day	CNS	100	MRL	April-12
Heptachlor	chronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Liver; increased liver weight	300/1	IRIS	April-12
	subchronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Liver; increased liver weight	300/1	HEAST97	April-12
Heptachlor Epoxide	chronic	1.3E-05	mg/kg/day	100%	1.3E-05	mg/kg/day	Liver; increased liver weight	1,000/1	IRIS	April-12
	subchronic	1.3E-05	mg/kg/day	100%	1.3E-05	mg/kg/day	Liver; increased liver weight	1,000/1	HEAST97	April-12
Aroclor 1232	chronic	2.0E-05	mg/kg/day	80%	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
	subchronic	5.0E-05	mg/kg/day	80%	5.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
Aroclor 1242	chronic	2.0E-05	mg/kg/day	80%	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
	subchronic	5.0E-05	mg/kg/day	80%	5.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
Aroclor 1248	chronic	2.0E-05	mg/kg/day	80%	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
	subchronic	5.0E-05	mg/kg/day	80%	5.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
Aroclor-1254	chronic	2.0E-05	mg/kg/day	80%	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	IRIS	April-12
	subchronic	3.0E-05	mg/kg/day	80%	3.0E-05	mg/kg/day	Immune system; immunotoxicity	1,000	MRL	April-12
Aroclor 1268	chronic	2.0E-05	mg/kg/day	80%	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
	subchronic	5.0E-05	mg/kg/day	80%	5.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate (3)	
INORGANICS/METALS										
Aluminum	chronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	LOAEL / CNS	100	PPRTV	April-12
	subchronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	CNS	30	MRL	April-12
Antimony	chronic	4.0E-04	mg/kg/day	15%	6.0E-05	mg/kg/day	Reduced lifespan; hematological; blood glucose and cholesterol	1,000/1	IRIS	April-12
	subchronic	4.0E-04	mg/kg/day	15%	6.0E-05	mg/kg/day	Reduced lifespan; hematological; blood glucose and cholesterol	1,000	PPRTV	April-12
Arsenic	chronic	3.0E-04	mg/kg/day	95%	3.0E-04	mg/kg/day	Skin; keratosis, hyperpigmentation and vascular complications	3/1	IRIS	April-12
	subchronic	3.0E-04	mg/kg/day	95%	3.0E-04	mg/kg/day	Skin; keratosis and hyperpigmentation	3/1	MRL	April-12
Cadmium (food)	chronic	1.0E-03	mg/kg/day	2.5%	2.5E-05	mg/kg/day	Kidney; proteinuria	10/1	IRIS	April-12
	subchronic	5.0E-04	mg/kg/day	2.5%	1.3E-05	mg/kg/day	Musculoskeletal effects	100	MRL	April-12
Chromium, total	chronic	1.5E+00	mg/kg/day	1.3%	2.0E-02	mg/kg/day	No effects observed	100/10	IRIS	April-12
	subchronic	1.0E+00	mg/kg/day	1.3%	1.3E-02	mg/kg/day	No effects observed	1,000/1	HEAST	April-12
Cobalt	chronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	LOAEL / Thyroid	3,000	PPRTV	April-12
	subchronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	LOAEL / Thyroid	300	PPRTV	April-12
Copper	chronic	4.0E-02	mg/kg/day	100%	4.0E-02	mg/kg/day			HEAST	April-12
	subchronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day	Gastrointestinal system	3	MRL	April-12
Lead	chronic	ND			ND				IRIS	April-12
	subchronic	ND			ND				IRIS	April-12
Manganese (soil)	chronic	4.7E-02	mg/kg/day	4%	1.9E-03	mg/kg/day	CNS; Impairment of neurobehavioral function	3/1	IRIS	April-12
	subchronic	4.7E-02	mg/kg/day	4%	1.9E-03	mg/kg/day	CNS; Impairment of neurobehavioral function	3/1	chronic	April-12
Mercury	chronic	3.0E-04	mg/kg/day	7%	2.1E-05	mg/kg/day	Immune system; autoimmune effects	1,000/1	IRIS	April-12
	subchronic	2.0E-03	mg/kg/day	7%	1.4E-04	mg/kg/day	Renal	100	MRL	April-12
Thallium	chronic	1.0E-05	mg/kg/day	100%	1.0E-05	mg/kg/day	No effects observed	3,000	PPRTV SL	April-12
	subchronic	8.0E-04	mg/kg/day	100%	8.0E-04	mg/kg/day	No effects observed	300/1	HEAST	April-12
Vanadium - Region 1	chronic	4.9E-03	mg/kg/day	2.6%	1.3E-04	mg/kg/day	Kidney	100/1	IRIS	
	subchronic	1.0E-02	mg/kg/day	2.6%	2.6E-04	mg/kg/day	Hematological	10/1	MRL	
Zinc	chronic	3.0E-01	mg/kg/day	100%	3.0E-01	mg/kg/day	Liver; decreased erythrocyte superoxide dismutase activity	3	IRIS	April-12
	subchronic	3.0E-01	mg/kg/day	100%	3.0E-01	mg/kg/day	Hematological	3	MRL	April-12
DIOXINS/FURANS										
2,3,7,8-tetrachlorobenzo-p-dioxin (TCDD)	chronic	7.0E-10	mg/kg/day	100%	7.0E-10	mg/kg/day	Decreased sperm count and motility		IRIS	April-12
	subchronic	2.0E-05	mg/kg/day	100%	2.0E-05	mg/kg/day	Decreased sperm count and motility		MRL	April-12

US EPA ARCHIVE DOCUMENT

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source	Date Verified

Notes:

Prepared by/ Date: BJR 4/30/12
Checked by/ Date:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:
Tier 1:
IRIS = Integrated Risk Information System: Obtained from: http://www.epa.gov/IRIS/
Tier 2:
PPRTV = Preliminary Peer-Reviewed Toxicity Value: Obtained from: http://hhpprtv.ornl.gov/
Tier 3:
HEAST= Health Effects Assessment Summary Tables Obtained from: USEPA Solid Waste and Emergency Response, FY 1997 Update. EPA-540-R-97-036. July 1997.
MRL = Minimum Risk Level (ATSDR: chronic MRLs):
CalEPA = California Environmental Protection Agency Toxicity Criteria Database Obtained from: http://www.oehha.ca.gov/risk/chemicalDB/
In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:
PPRTV SL = Preliminary Peer-Reviewed Toxicity Value Screening Level Obtained from: http://hhpprtv.ornl.gov/

Subchronic RfDs are obtained from:
- PPRTV: provisional value
- ATSDR: Intermitent MRLs
- HEAST: subchronic RfDs
- Equal to chronic RfDs when no PPRTV, ATSDR or HEAST value is available

mg = milligram
kg = kilogram
NA = not listed in hierarchy sources
ND = no data available
chronic = the chronic value is used as the subchronic RfD

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Final) (EPA, 2004)
Per this guidance, a value of 100% is used for analytes without published values.
(2) Adjusted Dermal RfD = Oral RfD x Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

Per USEPA Region I "Risk Updates, No. 5", (August, 1999), Non-carcinogenic PAHs without published RfDs should be evaluated using the published RfD for a structurally similar PAH.
Surrogate (1) - Value for pyrene used as a surrogate
Surrogate (2) - RfD for DDT used as surrogate for DDE
Surrogate (3) - RfD for Aroclor 1254 used as surrogate for other PCB congeners with no published RfDs
For manganese in non-drinking water media: As recommended by USEPA Region I Risk Update, a non-dietary RfD is obtained by subtracting typical dietary intake of manganese (5 mg/day) from critical dose (10 mg/day). A modifying factor of 1 is then applied, per USEPA Region 1.
Vanadium - Region 1 - RfD for vanadium is the RfD for Vanadium pentoxide of 9E-3, adjusted for the amount of vanadium in vanadium pentoxide (56%), per USEPA Region I.

US EPA ARCHIVE DOCUMENT

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source	Date Verified
VOLATILES									
1,2-Dichloroethene (cis)	chronic	ND		ND				IRIS	April-12
	subchronic	ND		ND					April-12
1,2,4-Trimethylbenzene	chronic	7.0E-03	mg/m3	1.7E-03	mg/kg/day	Blood; pulmonary lesions	3,000	PPRTV	April-12
	subchronic	7.0E-02	mg/m3	1.7E-03	mg/kg/day	Blood; pulmonary lesions	300	PPRTV	April-12
4-iso-Propyltoluene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Benzene	chronic	3.0E-02	mg/m3	8.6E-03	mg/kg/day	Immune system; decreased lymphocyte count	300/1	IRIS	April-12
	subchronic	8.0E-02	mg/m3	2.3E-02	mg/kg/day	Immune system; decreased lymphocyte count	100	PPRTV	April-12
Butylbenzene, sec-	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Chlorobenzene	chronic	5.0E-02	mg/m3	1.4E-02	mg/kg/day	Liver; kidney	1,000	PPRTV	April-12
	subchronic	5.0E-01	mg/m3	1.4E-01	mg/kg/day	Liver; kidney	100	PPRTV	April-12
Ethylbenzene	chronic	1.0E+00	mg/m3	2.9E-01	mg/kg/day	Developmental; developmental toxicity	300/1	IRIS	April-12
	subchronic	9.0E+00	mg/m3	2.6E+00	mg/kg/day	ototoxicity	100	PPRTV	April-12
Tetrachloroethene	chronic	4.0E-02	mg/m3	1.1E-02	mg/kg/day	Neurotoxicity	1,000	IRIS	April-12
	subchronic	4.0E-02	mg/m3	1.1E-02	mg/kg/day	Neurotoxicity	1,000	Chronic	
Trichloroethene	chronic	2.0E-03	mg/m3	5.7E-04	mg/kg/day	Kidney; Immune system	100	IRIS	April-12
	subchronic	5.4E-01	mg/m3	1.5E-01	mg/kg/day	Nervous system	300	MRL	April-12
Vinyl Chloride	chronic	1.0E-01	mg/m3	2.9E-02	mg/kg/day	Liver; liver cell polymorphism	30/1	IRIS	April-12
	subchronic	1.0E-01	mg/m3	2.9E-02	mg/kg/day	Liver; liver cell polymorphism	30/1	Chronic	
Xylenes (total)	chronic	1.0E-01	mg/m3	2.9E-02	mg/kg/day	CNS; impaired motor coordination	300/1	IRIS	April-12
	subchronic	4.0E-01	mg/m3	1.1E-01	mg/kg/day	CNS; impaired motor coordination	100	PPRTV	April-12
SEMIVOLATILES									
1,2,3-Trichlorobenzene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
1,2,4-Trichlorobenzene	chronic	2.0E-03	mg/m3	5.7E-04	mg/kg/day	urinary	3,000	PPRTV	April-12
	subchronic	2.0E-02	mg/m3	5.7E-03	mg/kg/day	urinary	300	PPRTV	April-12
1,2-Dichlorobenzene	chronic	2.0E-01	mg/m3	5.7E-02	mg/kg/day	Body weight	1,000/1	HEAST	April-12
	subchronic	2.0E+00	mg/m3	5.7E-01	mg/kg/day	Body weight	100/1	HEAST	April-12
1,3-Dichlorobenzene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
1,4-Dichlorobenzene	chronic	8.0E-01	mg/m3	2.3E-01	mg/kg/day	Developmental; increased liver weight	100/1	IRIS	April-12
	subchronic	1.2E+00	mg/m3	3.4E-01	mg/kg/day	Hepatic	100	MRL	April-12
4-Chloroaniline	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Benzo(a)anthracene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Benzo(a)pyrene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Benzo(b)fluoranthene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Benzo(k)fluoranthene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Bis(2-ethylhexyl)phthalate (BEHP)	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
bis(Chloromethyl)ether	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Butylbenzylphthalate	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Carbazole	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Dibenzo(a,h)anthracene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Di-n-octylphthalate	chronic	NA		NA					April-12
	subchronic	NA		NA					April-12
Indeno(1,2,3-cd)pyrene	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Naphthalene	chronic	3.0E-03	mg/m3	8.6E-04	mg/kg/day	Lung/Hyperplasia and metaplasia of epithelial cells	3,000/1	IRIS	April-12

US EPA ARCHIVE DOCUMENT

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source	Date Verified
	subchronic	3.0E-03	mg/m3	8.6E-04	mg/kg/day	Lung/Hyperplasia and metaplasia of epithelial cells	3,000/1	Chronic	April-12
PESTICIDES/PCBs									
4,4'-DDE	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aldrin	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Chlordane (technical)	chronic	7.0E-04	mg/m3	2.0E-04	mg/kg/day	Hepatic effects	1,000/1	IRIS	April-12
	subchronic	2.0E-04	mg/m3	5.7E-05	mg/kg/day	Hepatic effects	1,000	MRL	April-12
Dieldrin	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Endrin	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Heptachlor	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aroclor 1232	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aroclor 1242	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aroclor 1248	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aroclor-1254	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Aroclor 1268	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
INORGANICS/METALS									
Aluminum	chronic	5.0E-03	mg/m3	1.4E-03	mg/kg/day	LOAEL / CNS	300	PPRTV	April-12
	subchronic	5.0E-03	mg/m3	1.4E-03	mg/kg/day	LOAEL / CNS	300	chronic	April-12
Antimony	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Arsenic	chronic	1.5E-05	mg/m3	4.3E-06	mg/kg/day	Developmental; cardiovascular; CNS		CalEPA	April-12
	subchronic	1.5E-05	mg/m3	4.3E-06	mg/kg/day	Developmental; cardiovascular; CNS		chronic	April-12
Cadmium	chronic	1.0E-05	mg/m3	2.9E-06	mg/kg/day	Renal	9	MRL	April-12
	subchronic	1.0E-05	mg/m3	2.9E-06	mg/kg/day	Renal	9	Chronic	April-12
Chromium, total	chronic	ND		ND				IRIS	April-12
	subchronic	5.0E-03	mg/m3	1.4E-03	mg/kg/day	Respiratory system	90	MRL	April-12
Cobalt	chronic	6.0E-06	mg/m3	1.7E-06	mg/kg/day	Respiratory tract / Lung / NOAEL	300	PPRTV	April-12
	subchronic	2.0E-05	mg/m3	5.7E-06	mg/kg/day	Respiratory tract / Lung / NOAEL	100	PPRTV	April-12
Copper	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Lead	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Manganese	chronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS; impairment of neurobehavioral function	1,000/1	IRIS	April-12
	subchronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS; impairment of neurobehavioral function	1,000/1	chronic	April-12
Mercury	chronic	3.0E-04	mg/m3	8.6E-05	mg/kg/day	CNS; tremors, memory; autonomic dysfunction	30/1	IRIS	April-12
	subchronic	3.0E-04	mg/m3	8.6E-05	mg/kg/day	CNS; neurotoxicity	30/1	HEAST	April-12
Thallium	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
Vanadium	chronic	1.0E-04	mg/m3	2.9E-05	mg/kg/day	Respiratory	30	MRL	April-12
	subchronic	1.0E-04	mg/m3	2.9E-05	mg/kg/day	Respiratory	30	Chronic	April-12
Zinc	chronic	ND		ND					April-12
	subchronic	ND		ND					April-12
DIOXINS/FURANS									
2,3,7,8-tetrachlorobenzo-p-dioxin (TCDD)	chronic	4.0E-08	mg/m3	1.1E-08	mg/kg/day	Liver; reproductive; endocrine; respiratory; hematological		REL	April-12
	subchronic	4.0E-08	mg/m3	1.1E-08	mg/kg/day	Liver; reproductive; endocrine; respiratory; hematological		Chronic	April-12

US EPA ARCHIVE DOCUMENT

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source	Date Verified

Notes:

Prepared by/ Date: BJR 5/1/12
Checked by/ Date:

In accordance with OSWER 9285.7-53, chronic RfCs are identified from the following heirarchy of sources:

Tier 1:
IRIS = Integrated Risk Information System: Obtained from: http://www.epa.gov/IRIS/

Tier 2:
PPRTV = Preliminary Peer-Reviewed Toxicity Value: Obtained from: http://hhpprtv.ornl.gov/

Tier 3:
HEAST= Health Effects Assessment Summary Tables Obtained from: USEPA Solid Waste and Emergency Response, FY 1997 Update. EPA-540-R-97-036. July 1997.
MRL = Minimum Risk Level (ATSDR: chronic MRLs):
CalEPA = California Environmental Protection Agency Toxicity Criteria Database Obtained from: http://www.oehha.ca.gov/risk/chemicalDB/

Subchronic RfCs are obtained from:
- PPRTV: provisional value
- ATSDR: Intermitent MRLs
- HEAST: subchronic RfDs
- Equal to chronic RfDs when no PPRTV, ATSDR or HEAST value is available

kg = kilogram
ug - microgram
m^3 - cubic meter
NA = not listed in hierarchy sources
ND = no data available
chronic = the chronic value is used as the subchronic RfD

(1) - Inhalation non-cancer dose-response values are typically published as RfC values. RfC values may be converted to RfDs using the following equation (HEAST, 1997):
RfD (mg/kg-d) = RfC (mg/m^3) x 20 m^3/d / 70 kg, unless otherwise indicated

US EPA ARCHIVE DOCUMENT

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source	Date Verified
VOLATILES								
1,2-Dichloroethene (cis)	ND			ND		D	IRIS	April-12
1,2,4-Trimethylbenzene	ND			ND		Inadequate evidence	PPRTV	April-12
4-iso-Propyltoluene	ND			ND		Inadequate evidence	PPRTV	April-12
Benzene	5.5E-02	$(mg/kg/day)^{-1}$	100%	5.5E-02	$(mg/kg/day)^{-1}$	Known carcinogen	IRIS	April-12
Butylbenzene, sec-	ND			ND		Inadequate evidence	PPRTV	April-12
Chlorobenzene	ND			ND		D	IRIS	April-12
Ethylbenzene	1.1E-02	$(mg/kg/day)^{-1}$			$(mg/kg/day)^{-1}$	D	CALEPA	April-12
Tetrachloroethene	2.1E-03	$(mg/kg/day)^{-1}$	100%	2.1E-03	$(mg/kg/day)^{-1}$	Likely Carcinogenic	IRIS	April-12
Trichloroethene [b]	4.6E-02	$(mg/kg/day)^{-1}$	100%	4.6E-02	$(mg/kg/day)^{-1}$	Carcinogenic to humans	IRIS	April-12
Vinyl Chloride (child and adult)	1.4E+00	$(mg/kg/day)^{-1}$	100%	1.4E+00	$(mg/kg/day)^{-1}$	Known carcinogen	IRIS	April-12
Xylenes (total)	NA			NA		Inadequate evidence	IRIS	April-12
SEMIVOLATILES								
1,2,3-Trichlorobenzene	ND			ND		ND		April-12
1,2,4-Trichlorobenzene	2.9E-02	$(mg/kg/day)^{-1}$	100%	2.9E-02	$(mg/kg/day)^{-1}$	NA	PPRTV	April-12
1,2-Dichlorobenzene	NA			NA		D	IRIS	April-12
1,3-Dichlorobenzene	NA			NA		D	IRIS	April-12
1,4-Dichlorobenzene	5.4E-03	$(mg/kg/day)^{-1}$	100%	5.4E-03	$(mg/kg/day)^{-1}$	Possibly carcinogenic to humans	CALEPA	April-12
4-Chloroaniline	2.0E-01	$(mg/kg/day)^{-1}$	100%	2.0E-01	$(mg/kg/day)^{-1}$	Likely Carcinogenic	PPRTV	April-12
Benzo(a)anthracene [a] [b]	7.3E-01	$(mg/kg/day)^{-1}$	89%	7.3E-01	$(mg/kg/day)^{-1}$	B2	NCEA	April-12
Benzo(a)pyrene [a] [b]	7.3E+00	$(mg/kg/day)^{-1}$	89%	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Benzo(b)fluoranthene [a] [b]	7.3E-01	$(mg/kg/day)^{-1}$	89%	7.3E-01	$(mg/kg/day)^{-1}$	B2	NCEA	April-12
Benzo(k)fluoranthene [a] [b]	7.3E-02	$(mg/kg/day)^{-1}$	89%	7.3E-02	$(mg/kg/day)^{-1}$	B2	NCEA	April-12
Bis(2-ethylhexyl)phthalate (BEHP)	1.4E-02	$(mg/kg/day)^{-1}$	100%	1.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Bis(Chloromethyl)ether	2.2E+02	$(mg/kg/day)^{-1}$	100%	2.2E+02	$(mg/kg/day)^{-1}$	A	IRIS	April-12
Butylbenzylphthalate	1.9E-03	$(mg/kg/day)^{-1}$	100%	1.9E-03	$(mg/kg/day)^{-1}$	C	PPRTV	April-12
Carbazole	2.0E-02	$(mg/kg/day)^{-1}$	100%	2.0E-02	$(mg/kg/day)^{-1}$	B2	HEAST	April-12
Dibenzo(a,h)anthracene [a] [b]	7.3E+00	$(mg/kg/day)^{-1}$	89%	7.3E+00	$(mg/kg/day)^{-1}$	B2	NCEA	April-12
Di-n-octylphthalate	NA			NA				April-12
Indeno(1,2,3-cd)pyrene [a] [b]	7.3E-01	$(mg/kg/day)^{-1}$	89%	7.3E-01	$(mg/kg/day)^{-1}$	B2	NCEA	April-12
Naphthalene	NA		89%	NA		Cannot be determined	IRIS	April-12
PESTICIDES/PCBs								
4,4'-DDE	3.4E-01	$(mg/kg/day)^{-1}$	70%	3.4E-01	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Aldrin	1.7E+01	$(mg/kg/day)^{-1}$	100%	1.7E+01	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Chlordane (technical)	3.5E-01	$(mg/kg/day)^{-1}$	80%	3.5E-01	$(mg/kg/day)^{-1}$	Likely Carcinogenic	IRIS	April-12
Dieldrin [b]	1.6E+01	$(mg/kg/day)^{-1}$	100%	1.6E+01	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Endrin	ND			ND		D	IRIS	April-12
Heptachlor	4.5E+00	$(mg/kg/day)^{-1}$	100%	4.5E+00	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Aroclor 1232	2.0E+00	$(mg/kg/day)^{-1}$	80%	2.0E+00	$(mg/kg/day)^{-1}$	Surrogate (1)		April-12
Aroclor 1242	2.0E+00	$(mg/kg/day)^{-1}$	80%	2.0E+00	$(mg/kg/day)^{-1}$	Surrogate (1)		April-12
Aroclor 1248	2.0E+00	$(mg/kg/day)^{-1}$	80%	2.0E+00	$(mg/kg/day)^{-1}$	Surrogate (1)		April-12
Aroclor-1254	2.0E+00	$(mg/kg/day)^{-1}$	80%	2.0E+00	$(mg/kg/day)^{-1}$	Surrogate (1)		April-12
Aroclor 1268	2.0E+00	$(mg/kg/day)^{-1}$	80%	2.0E+00	$(mg/kg/day)^{-1}$	Surrogate (1)		April-12

US EPA ARCHIVE DOCUMENT

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source	Date Verified
INORGANICS/METALS								
Aluminum	ND			ND		Inadequate evidence		April-12
Antimony	ND			ND		ND	IRIS	April-12
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	95%	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	April-12
Cadmium	ND			ND		ND	IRIS	April-12
Chromium, total	NA			NA		Inadequate evidence	IRIS	December-10
Cobalt	ND			ND			PPRTV	April-12
Copper	NA			NA		D	IRIS	April-12
Lead	ND			ND		B2	IRIS	April-12
Manganese	ND			ND		D	IRIS	April-12
Mercury (as elemental mercury)	NA			NA		D	IRIS	April-12
Thallium	ND			ND		Inadequate evidence	IRIS	April-12
Vanadium	ND			ND		ND		April-12
Zinc	NA			NA		Inadequate evidence	IRIS	April-12
DIOXINS/FURANS								
2,3,7,8-tetrachlorobenzo-p-dioxin (TCDD)	1.5E+05	$(mg/kg/day)^{-1}$	70%	1.5E+05	$(mg/kg/day)^{-1}$	B2	HEAST	April-12

Notes:

Prepared by/ Date: BJR 5/1/12
Checked by/ Date:

In accordance with OSWER 9285.7-53, slope factors are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: Obtained from: http://www.epa.gov/IRIS/

Tier 2:

PPRTV = Preliminary Peer-Reviewed Toxicity Value: Obtained from: http://hhpprtv.ornl.gov/

Tier 3:

HEAST= Health Effects Assessment Summary Tables Obtained from: USEPA Solid Waste and Emergency Response, FY 1997 Update. EPA-540-R-97-036. July 1997.

CalEPA = California Environmental Protection Agency Toxicity Criteria Database Obtained from: http://www.oehha.ca.gov/risk/chemicalDB/

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment: Obtained from RSL Table November 2011.

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Final) (EPA, 2004)
Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal SF = Oral SF / Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

[a] - Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs, adjusted by Relative Potency Factors of 1.0 [benzo(a)pyrene,dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].

[b] - Slope factors are developed in accordance with the EPA Memorandum: "Implementation of the Cancer Guidelines and Accompanying Supplemental Guidance - Science Policy Council Cancer Guidelines Implementation Workgroup Communication II: Performing Risk Assessments that include Carcinogens Described in the Supplemental Guidance as having a Mutagenic Mode of Action (June 14, 2006)
The EPA-published slope factor is multiplied by generic age-dependant adjustment factors (ADAFs) as follows:
Young children (1-6 yrs of age): ADAF of 4.2 calculated as an age-weighted ADAF for children 0<2 (ADAF=10) and children 2<6 (ADAF=3), as follows: [(1 yrs x 10) + (5 yrs x 3)] / 6 yrs = 4.2
Older children (6 < 18 yrs of age): ADAF of 2.5 calculated as an age-weighted ADAF for children 6<16 (ADAF=3), as follows: [(9 yrs x 3) + (3 yrs x 1)] / 12 yrs = 2.5
Adults (>16 yrs of age): ADAF of 1 is the applicable value for this age range.

Surrogate (1) - PCB slope factors used as a surrogate.

US EPA ARCHIVE DOCUMENT

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

SOURCE AREA RISK ASSESSMENT

CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE

NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source	Date Verified

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

kg = kilogram

mg = milligram

NA = not listed in hierarchy sources

ND = no data available

US EPA ARCHIVE DOCUMENT

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor (1)		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units	Value	Units		Source	Date Verified
VOLATILES							
1,2-Dichloroethene (cis)	NA		NA		D	IRIS	April-12
1,2,4-Trimethylbenzene	ND		ND		ND		April-12
4-iso-Propyltoluene	ND		ND		Inadequate data	PPRTV	April-12
Benzene	7.80E-06	$(ug/m^3)^{-1}$	2.8E-02	$(mg/kg/day)^{-1}$	Known human carcinogen	IRIS	April-12
Butylbenzene, sec-	NA		NA		Inadequate data	PPRTV	April-12
Chlorobenzene	NA		NA		D	IRIS	April-12
Ethylbenzene	2.5E-06	$(ug/m^3)^{-1}$	8.9E-03	$(mg/kg/day)^{-1}$	D	CALEPA	April-12
Tetrachloroethene	2.60E-07	$(ug/m^3)^{-1}$	9.2E-04	$(mg/kg/day)^{-1}$	Likely carcinogenic in humans	IRIS	April-12
Trichloroethene	4.10E-06	$(ug/m^3)^{-1}$	1.5E-02	$(mg/kg/day)^{-1}$	Carcinogenic to humans	IRIS	April-12
Vinyl Chloride (adult and child)	8.80E-06	$(ug/m^3)^{-1}$	3.10E-02	$(mg/kg/day)^{-1}$	Known human carcinogen	IRIS	April-12
Xylenes (total)	NA		NA		Inadequate data	IRIS	April-12
SEMIVOLATILES							
1,2,3-Trichlorobenzene	ND		ND		ND		April-12
1,2,4-Trichlorobenzene	NA		NA		D	IRIS	April-12
1,2-Dichlorobenzene	NA		NA		D	IRIS	April-12
1,3-Dichlorobenzene	NA		NA		D	IRIS	April-12
1,4-Dichlorobenzene	1.10E-05	$(ug/m^3)^{-1}$	3.9E-02	$(mg/kg/day)^{-1}$	Possibly carcinogenic to humans	CALEPA	April-12
4-Chloroaniline	ND		ND		ND	IRIS	April-12
Benzo(a)anthracene	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Benzo(a)pyrene	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Benzo(b)fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Benzo(k)fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
bis(2-ethylhexyl)phthalate (BEHP)	2.4E-06	$(ug/m^3)^{-1}$	8.4E-03	$(mg/kg/day)^{-1}$	NA	CALEPA	April-12
bis(Chloromethyl)ether	6.20E-02	$(ug/m^3)^{-1}$	2.20E+02	$(mg/kg/day)^{-1}$	A	IRIS	April-12
Butylbenzylphthalate	NA		NA		C	IRIS	April-12
Carbazole	ND		ND		Inadequate data	PPRTV	April-12
Dibenzo(a,h)anthracene	1.2E-03	$(ug/m^3)^{-1}$	4.1E+00	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Di-n-octylphthalate	NA		NA				April-12
Indeno(1,2,3-cd)pyrene	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Naphthalene	3.4E-05		1.2E-01		Possibly carcinogenic to humans	CALEPA	April-12
PESTICIDES/PCBs							
4,4'-DDE	9.7E-05	$(ug/m^3)^{-1}$	3.4E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12
Aldrin	4.9E-03	$(ug/m^3)^{-1}$	1.7E+01	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Chlordane (technical)	1.0E-04	$(ug/m^3)^{-1}$	1.9E+00	$(mg/kg/day)^{-1}$	Likely carcinogenic in humans	IRIS	April-12
Dieldrin	4.6E-03	$(ug/m^3)^{-1}$	1.6E+01	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Endrin	NA		NA		D	IRIS	April-12
Heptachlor	1.3E-03	$(ug/m^3)^{-1}$	4.6E+00	$(mg/kg/day)^{-1}$	B2	IRIS	April-12
Aroclor 1232	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2	Surrogate (1)	April-12
Aroclor 1242	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2	Surrogate (1)	April-12
Aroclor 1248	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2	Surrogate (1)	April-12
Aroclor 1254	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2	Surrogate (1)	April-12
Aroclor 1268	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2	Surrogate (1)	April-12
INORGANICS/METALS							
Aluminum	ND		ND		Inadequate data	PPRTV	April-12
Antimony	ND		ND		Inadequate data	IRIS	April-12
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A	IRIS	April-12
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	6.4E+00	$(mg/kg/day)^{-1}$	B1	IRIS	April-12
Chromium, total	NA		NA		Inadequate data	IRIS	April-12
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	Likely carcinogenic in humans	PPRTV	April-12
Copper	NA		NA		D	IRIS	April-12

US EPA ARCHIVE DOCUMENT

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor (1)		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units	Value	Units		Source	Date Verified
Lead	ND		ND		B2	IRIS	April-12
Manganese	ND		ND		D	IRIS	April-12
Mercury (as elemental mercury)	NA		NA		D	IRIS	April-12
Thallium	ND		ND		Inadequate evidence	IRIS	April-12
Vanadium	ND		ND		ND		April-12
Zinc	NA		NA		Inadequate evidence	IRIS	April-12
DIOXINS/FURANS							
2,3,7,8-TCDD	3.80E+01	$(ug/m^3)^{-1}$	1.35E+05	$(mg/kg/day)^{-1}$	B2	CALEPA	April-12

Notes:

Prepared by/ Date: BJR 5/1/12

Checked by/ Date:

In accordance with OSWER 9285.7-53, unit risk values are identified from the following heirarchy of sources:
Tier 1:
IRIS = Integrated Risk Information System: Obtained from: http://www.epa.gov/IRIS/
Tier 2:
PPRTV = Preliminary Peer-Reviewed Toxicity Value: Obtained from: http://hhpprtv.ornl.gov/
Tier 3:
HEAST= Health Effects Assessment Summary Tables Obtained from: USEPA Solid Waste and Emergency Response, FY 1997 Update. EPA-540-R-97-036. July 1997.
CalEPA = California Environmental Protection Agency Toxicity Criteria Database Obtained from: http://www.oehha.ca.gov/risk/chemicalDB/

(1) - Inhalation cancer dose-response values are typically published as unit risk values. Unit risk values may be converted to slope factors using the following equation (HEAST, 1997):

Adjustment = 70 kg [adult body weight] * 1000 ug/mg [conversion factor] / 20 m3/day [inhalation rate] and Inhalation Slope Factor = Unit Risk * Adjustment
Surrogate (1) - PCB slope factors used as a surrogate.

Weight of Evidence:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen

mg = milligram
ug = microgram
kg = kilogram
m^3 = cubic meter
NA = not listed in hierarchy sources
ND = no data available

US EPA ARCHIVE DOCUMENT

TABLE 7.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			2.3E-03	mg/kg/day	8.0E-04	mg/kg/day	3.E+00
				1,2,4-trichlorobenzene	340	mg/kg	3.7E-04	mg/kg/day	2.9E-02	(mg/kg/day)-1	1.E-05	4.3E-03	mg/kg/day	1.0E-02	mg/kg/day	4.E-01
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			1.1E-03	mg/kg/day	ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			1.9E-02	mg/kg/day	9.0E-02	mg/kg/day	2.E-01
				1,4-dichlorobenzene	31	mg/kg	3.4E-05	mg/kg/day	5.4E-03	(mg/kg/day)-1	2.E-07	4.0E-04	mg/kg/day	7.0E-02	mg/kg/day	6.E-03
				Benzene	0.069	mg/kg	7.6E-08	mg/kg/day	5.5E-02	(mg/kg/day)-1	4.E-09	8.8E-07	mg/kg/day	4.0E-03	mg/kg/day	2.E-04
				Chlorobenzene	324	mg/kg	NC		NC			4.1E-03	mg/kg/day	2.0E-02	mg/kg/day	2.E-01
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			2.3E-03	mg/kg/day	2.0E-03	mg/kg/day	1.E+00
				Ethyl benzene	35	mg/kg	3.8E-05	mg/kg/day	1.1E-02	(mg/kg/day)-1	4.E-07	4.5E-04	mg/kg/day	1.0E-01	mg/kg/day	4.E-03
				Naphthalene	46	mg/kg	NC		NC			5.9E-04	mg/kg/day	2.0E-02	mg/kg/day	3.E-02
				Tetrachloroethene	724	mg/kg	7.9E-04	mg/kg/day	2.1E-03	(mg/kg/day)-1	2.E-06	9.3E-03	mg/kg/day	6.0E-03	mg/kg/day	2.E+00
				Trichloroethene	566	mg/kg	6.2E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	3.E-05	7.2E-03	mg/kg/day	5.0E-04	mg/kg/day	1.E+01
				Xylenes, Total	160	mg/kg	NC		NC			2.0E-03	mg/kg/day	2.0E-01	mg/kg/day	1.E-02
				4-chloroaniline	280	mg/kg	3.1E-04	mg/kg/day	2.0E-01	(mg/kg/day)-1	6.E-05	3.6E-03	mg/kg/day	4.0E-03	mg/kg/day	9.E-01
				Benzo(a)anthracene	3.5	mg/kg	1.6E-05	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-05	4.5E-05	mg/kg/day	3.0E-02	mg/kg/day	2.E-03
				Benzo(a)pyrene	2.9	mg/kg	1.3E-05	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-04	3.7E-05	mg/kg/day	3.0E-02	mg/kg/day	1.E-03
				Benzo(b)fluoranthene	3.4	mg/kg	1.6E-05	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-05	4.3E-05	mg/kg/day	3.0E-02	mg/kg/day	1.E-03
				Benzo(k)fluoranthene	2.0	mg/kg	9.3E-06	mg/kg/day	7.3E-02	(mg/kg/day)-1	7.E-07	2.6E-05	mg/kg/day	3.0E-02	mg/kg/day	9.E-04
				Bis(2-ethylhexyl)phthalate	163	mg/kg	1.8E-04	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-06	2.1E-03	mg/kg/day	2.0E-02	mg/kg/day	1.E-01
				Carbazole	0.47	mg/kg	5.1E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	1.E-08	6.0E-06	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	2.6E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-05	7.2E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			3.6E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	6.3E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-06	1.7E-05	mg/kg/day	3.0E-02	mg/kg/day	6.E-04
				4,4`-DDE	0.93	mg/kg	1.0E-06	mg/kg/day	3.4E-01	(mg/kg/day)-1	3.E-07	1.2E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Chlordane	4.0	mg/kg	4.3E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-06	5.1E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Dieldrin	0.22	mg/kg	2.4E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-06	2.8E-06	mg/kg/day	5.0E-05	mg/kg/day	6.E-02
				Endrin	0.30	mg/kg	NC		NC			3.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Heptachlor	0.81	mg/kg	8.9E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	4.E-06	1.0E-05	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Aroclor-1232	250	mg/kg	2.7E-04	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-04	3.2E-03	mg/kg/day	2.0E-05	mg/kg/day	2.E+02
				Aroclor-1242	8.0	mg/kg	8.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	1.0E-04	mg/kg/day	2.0E-05	mg/kg/day	5.E+00
				Aroclor-1248	0.59	mg/kg	6.5E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	7.6E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Aroclor-1254	64	mg/kg	7.0E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	8.1E-04	mg/kg/day	2.0E-05	mg/kg/day	4.E+01
				Aroclor-1268	4.3	mg/kg	4.8E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	5.6E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aluminum	8168	mg/kg	NC		NC			1.0E-01	mg/kg/day	1.0E+00	mg/kg/day	1.E-01
				Antimony	4.2	mg/kg	NC		NC			5.3E-05	mg/kg/day	4.0E-04	mg/kg/day	1.E-01
				Arsenic	6.0	mg/kg	6.6E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-05	7.7E-05	mg/kg/day	3.0E-04	mg/kg/day	3.E-01
				Cadmium	4.1	mg/kg	NC		NC			5.3E-05	mg/kg/day	1.0E-03	mg/kg/day	5.E-02
				Chromium	118	mg/kg	NC		NC			1.5E-03	mg/kg/day	1.5E+00	mg/kg/day	1.E-03
				Cobalt	8.3	mg/kg	NC		NC			1.1E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01
				Copper	118	mg/kg	NC		NC			1.5E-03	mg/kg/day	4.0E-02	mg/kg/day	4.E-02
				Manganese	456	mg/kg	NC		NC			5.8E-03	mg/kg/day	4.7E-02	mg/kg/day	1.E-01
				Mercury	2.5	mg/kg	NC		NC			3.1E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01
				Thallium	6.2	mg/kg	NC		NC			7.9E-05	mg/kg/day	1.0E-05	mg/kg/day	8.E+00
				Vanadium	40	mg/kg	NC		NC			5.1E-04	mg/kg/day	4.9E-03	mg/kg/day	1.E-01
				Zinc	379	mg/kg	NC		NC			4.8E-03	mg/kg/day	3.0E-01	mg/kg/day	2.E-02
				HCX	0.0000069	mg/kg	7.6E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-06	8.8E-11	mg/kg/day	7.0E-10	mg/kg/day	1.E-01
				Dioxin-TEQ-M	0.008	mg/kg	8.3E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-03	9.7E-08	mg/kg/day	7.0E-10	mg/kg/day	1.E+02
			EXPOSURE ROUTE TOTAL								2.E-03					4.E+02

US EPA ARCHIVE DOCUMENT

TABLE 7.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	CSF/UNIT RISK VALUE	CSF UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	RfD/RfC (1) VALUE	RfD/RfC UNITS	HAZARD QUOTIENT
SOIL	SURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	340	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,4-dichlorobenzene	31	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	0.069	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	324	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	35	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	46	mg/kg	NC		NC			2.1E-04	mg/kg/day	2.0E-02	mg/kg/day	1.E-02
				Tetrachloroethene	724	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	566	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Xylenes, Total	160	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	280	mg/kg	8.6E-05	mg/kg/day	2.0E-01	(mg/kg/day)-1	2.E-05	1.0E-03	mg/kg/day	4.0E-03	mg/kg/day	3.E-01
				Benzo(a)anthracene	3.5	mg/kg	5.9E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-06	1.6E-05	mg/kg/day	3.0E-02	mg/kg/day	5.E-04
				Benzo(a)pyrene	2.9	mg/kg	4.9E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-05	1.3E-05	mg/kg/day	3.0E-02	mg/kg/day	4.E-04
				Benzo(b)fluoranthene	3.4	mg/kg	5.7E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-06	1.6E-05	mg/kg/day	3.0E-02	mg/kg/day	5.E-04
				Benzo(k)fluoranthene	2.0	mg/kg	3.4E-06	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-07	9.4E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Bis(2-ethylhexyl)phthalate	163	mg/kg	5.0E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	7.E-07	5.8E-04	mg/kg/day	2.0E-02	mg/kg/day	3.E-02
				Carbazole	0.47	mg/kg	1.4E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-09	1.7E-06	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	9.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.E-06	2.6E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			1.0E-05	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	2.3E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	6.4E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				4,4`-DDE	0.93	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Chlordane	4.0	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	0.22	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.30	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.81	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	250	mg/kg	1.1E-04	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-04	1.3E-03	mg/kg/day	2.0E-05	mg/kg/day	6.E+01
				Aroclor-1242	8.0	mg/kg	3.5E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-06	4.0E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1248	0.59	mg/kg	2.6E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-07	3.0E-06	mg/kg/day	2.0E-05	mg/kg/day	1.E-01
				Aroclor-1254	64	mg/kg	2.7E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-05	3.2E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1268	4.3	mg/kg	1.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	2.2E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Aluminum	8168	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	4.2	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	6.0	mg/kg	5.6E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	8.E-07	6.5E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	4.1	mg/kg	NC		NC			1.5E-07	mg/kg/day	2.5E-05	mg/kg/day	6.E-03
				Chromium	118	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	8.3	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	118	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	456	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	2.5	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	6.2	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	40	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	379	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000069	mg/kg	6.4E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	7.4E-12	mg/kg/day	7.0E-10	mg/kg/day	1.E-02
				Dioxin-TEQ-M	0.008	mg/kg	7.0E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	8.1E-09	mg/kg/day	7.0E-10	mg/kg/day	1.E+01
			EXPOSURE ROUTE TOTAL								5.E-04					9.E+01
		EXPOSURE POINT TOTAL									3.E-03					5.E+02
	EXPOSURE MEDIUM TOTAL										3.E-03					5.E+02

US EPA ARCHIVE DOCUMENT

TABLE 7.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				1,2,4-trichlorobenzene	340	mg/kg	NC		NC			2.5E-04	ug/m3	2.0E+00	ug/m3	1.E-04
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			6.1E-05	ug/m3	7.0E+00	ug/m3	9.E-06
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			1.1E-03	ug/m3	2.0E+02	ug/m3	5.E-06
				1,4-dichlorobenzene	31	mg/kg	1.9E-06	ug/m3	1.1E-05	(ug/m3)-1	2.E-11	2.3E-05	ug/m3	8.0E+02	ug/m3	3.E-08
				Benzene	0.069	mg/kg	4.3E-09	ug/m3	7.8E-06	(ug/m3)-1	3.E-14	5.0E-08	ug/m3	3.0E+01	ug/m3	2.E-09
				Chlorobenzene	324	mg/kg	NC		NC			2.4E-04	ug/m3	5.0E+01	ug/m3	5.E-06
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				Ethyl benzene	35	mg/kg	2.2E-06	ug/m3	2.5E-06	(ug/m3)-1	5.E-12	2.5E-05	ug/m3	1.0E+03	ug/m3	3.E-08
				Naphthalene	46	mg/kg	NC		NC			3.3E-05	ug/m3	3.0E+00	ug/m3	1.E-05
				Tetrachloroethene	724	mg/kg	4.5E-05	ug/m3	2.6E-07	(ug/m3)-1	1.E-11	5.3E-04	ug/m3	4.0E+01	ug/m3	1.E-05
				Trichloroethene	566	mg/kg	3.5E-05	ug/m3	4.1E-06	(ug/m3)-1	1.E-10	4.1E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Xylenes, Total	160	mg/kg	NC		NC			1.2E-04	ug/m3	1.0E+02	ug/m3	1.E-06
				4-chloroaniline	280	mg/kg	NC		NC			2.0E-04	ug/m3	ND		
				Benzo(a)anthracene	3.5	mg/kg	9.3E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-10	2.6E-06	ug/m3	ND		
				Benzo(a)pyrene	2.9	mg/kg	7.6E-07	ug/m3	1.1E-03	(ug/m3)-1	8.E-10	2.1E-06	ug/m3	ND		
				Benzo(b)fluoranthene	3.4	mg/kg	8.8E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-10	2.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	2.0	mg/kg	5.3E-07	ug/m3	1.1E-04	(ug/m3)-1	6.E-11	1.5E-06	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	163	mg/kg	1.0E-05	ug/m3	2.4E-06	(ug/m3)-1	2.E-11	1.2E-04	ug/m3	ND		
				Carbazole	0.47	mg/kg	NC		NC			3.4E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	1.5E-07	ug/m3	1.2E-03	(ug/m3)-1	2.E-10	4.1E-07	ug/m3	ND		
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			2.0E-06	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	3.6E-07	ug/m3	1.1E-04	(ug/m3)-1	4.E-11	9.9E-07	ug/m3	ND		
				4,4`-DDE	0.93	mg/kg	5.8E-08	ug/m3	9.7E-05	(ug/m3)-1	6.E-12	6.7E-07	ug/m3	ND		
				Chlordane	4.0	mg/kg	2.5E-07	ug/m3	1.0E-04	(ug/m3)-1	2.E-11	2.9E-06	ug/m3	7.0E-01	ug/m3	4.E-06
				Dieldrin	0.22	mg/kg	1.4E-08	ug/m3	4.6E-03	(ug/m3)-1	6.E-11	1.6E-07	ug/m3	ND		
				Endrin	0.30	mg/kg	NC		NC			2.2E-07	ug/m3	ND		
				Heptachlor	0.81	mg/kg	5.1E-08	ug/m3	1.3E-03	(ug/m3)-1	7.E-11	5.9E-07	ug/m3	ND		
				Aroclor-1232	250	mg/kg	1.6E-05	ug/m3	5.7E-04	(ug/m3)-1	9.E-09	1.8E-04	ug/m3	ND		
				Aroclor-1242	8.0	mg/kg	5.0E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	5.8E-06	ug/m3	ND		
				Aroclor-1248	0.59	mg/kg	3.7E-08	ug/m3	5.7E-04	(ug/m3)-1	2.E-11	4.3E-07	ug/m3	ND		
				Aroclor-1254	64	mg/kg	4.0E-06	ug/m3	5.7E-04	(ug/m3)-1	2.E-09	4.6E-05	ug/m3	ND		
				Aroclor-1268	4.3	mg/kg	2.7E-07	ug/m3	5.7E-04	(ug/m3)-1	2.E-10	3.2E-06	ug/m3	ND		
				Aluminum	8168	mg/kg	NC		NC			5.9E-03	ug/m3	5.0E+00	ug/m3	1.E-03
				Antimony	4.2	mg/kg	NC		NC			3.0E-06	ug/m3	ND		
				Arsenic	6.0	mg/kg	3.8E-07	ug/m3	4.3E-03	(ug/m3)-1	2.E-09	4.4E-06	ug/m3	1.5E-02	ug/m3	3.E-04
				Cadmium	4.1	mg/kg	2.6E-07	ug/m3	1.8E-03	(ug/m3)-1	5.E-10	3.0E-06	ug/m3	1.0E-02	ug/m3	3.E-04
				Chromium	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Cobalt	8.3	mg/kg	5.2E-07	ug/m3	9.0E-03	(ug/m3)-1	5.E-09	6.1E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Manganese	456	mg/kg	NC		NC			3.3E-04	ug/m3	5.0E-02	ug/m3	7.E-03
				Mercury	2.5	mg/kg	NC		NC			1.8E-06	ug/m3	3.0E-01	ug/m3	6.E-06
				Thallium	6.2	mg/kg	NC		NC			4.5E-06	ug/m3	ND		
				Vanadium	40	mg/kg	NC		NC			2.9E-05	ug/m3	1.0E-01	ug/m3	3.E-04
				Zinc	379	mg/kg	NC		NC			2.8E-04	ug/m3	ND		
				HCX	0.0000069	mg/kg	4.3E-13	ug/m3	3.8E+01	(ug/m3)-1	2.E-11	5.0E-12	ug/m3	4.0E-05	ug/m3	1.E-07
				Dioxin-TEQ-M	0.008	mg/kg	4.7E-10	ug/m3	3.8E+01	(ug/m3)-1	2.E-08	5.5E-09	ug/m3	4.0E-05	ug/m3	1.E-04
			EXPOSURE ROUTE TOTAL								4.E-08					1.E-02
		EXPOSURE POINT TOTAL									4.E-08					1.E-02
	EXPOSURE MEDIUM TOTAL										4.E-08					1.E-02
OIL TOTAL											**3.E-03**					**5.E+02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											3.E-03					**5.E+02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			3.8E-04	mg/kg/day	8.0E-04	mg/kg/day	5.E-01
				1,2,4-trichlorobenzene	340	mg/kg	1.2E-04	mg/kg/day	2.9E-02	(mg/kg/day)-1	4.E-06	7.2E-04	mg/kg/day	1.0E-02	mg/kg/day	7.E-02
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			1.8E-04	mg/kg/day	ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			3.2E-03	mg/kg/day	9.0E-02	mg/kg/day	4.E-02
				1,4-dichlorobenzene	31	mg/kg	1.1E-05	mg/kg/day	5.4E-03	(mg/kg/day)-1	6.E-08	6.6E-05	mg/kg/day	7.0E-02	mg/kg/day	9.E-04
				Benzene	0.069	mg/kg	2.5E-08	mg/kg/day	5.5E-02	(mg/kg/day)-1	1.E-09	1.5E-07	mg/kg/day	4.0E-03	mg/kg/day	4.E-05
				Chlorobenzene	324	mg/kg	NC		NC			6.9E-04	mg/kg/day	2.0E-02	mg/kg/day	3.E-02
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			3.8E-04	mg/kg/day	2.0E-03	mg/kg/day	2.E-01
				Ethyl benzene	35	mg/kg	1.3E-05	mg/kg/day	1.1E-02	(mg/kg/day)-1	1.E-07	7.5E-05	mg/kg/day	1.0E-01	mg/kg/day	7.E-04
				Naphthalene	46	mg/kg	NC		NC			9.8E-05	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				Tetrachloroethene	724	mg/kg	2.6E-04	mg/kg/day	2.1E-03	(mg/kg/day)-1	6.E-07	1.5E-03	mg/kg/day	6.0E-03	mg/kg/day	3.E-01
				Trichloroethene	566	mg/kg	2.1E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	1.E-05	1.2E-03	mg/kg/day	5.0E-04	mg/kg/day	2.E+00
				Xylenes, Total	160	mg/kg	NC		NC			3.4E-04	mg/kg/day	2.0E-01	mg/kg/day	2.E-03
				4-chloroaniline	280	mg/kg	1.0E-04	mg/kg/day	2.0E-01	(mg/kg/day)-1	2.E-05	6.0E-04	mg/kg/day	4.0E-03	mg/kg/day	1.E-01
				Benzo(a)anthracene	3.5	mg/kg	3.2E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	7.6E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(a)pyrene	2.9	mg/kg	2.6E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-05	6.2E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(b)fluoranthene	3.4	mg/kg	3.1E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	7.2E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(k)fluoranthene	2.0	mg/kg	1.8E-06	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-07	4.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Bis(2-ethylhexyl)phthalate	163	mg/kg	5.9E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	8.E-07	3.5E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Carbazole	0.47	mg/kg	1.7E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-09	1.0E-06	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	5.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-06	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			6.0E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	1.2E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-07	2.9E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4`-DDE	0.93	mg/kg	3.4E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	1.E-07	2.0E-06	mg/kg/day	5.0E-04	mg/kg/day	4.E-03
				Chlordane	4.0	mg/kg	1.4E-06	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-07	8.5E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Dieldrin	0.22	mg/kg	8.1E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-06	4.7E-07	mg/kg/day	5.0E-05	mg/kg/day	9.E-03
				Endrin	0.30	mg/kg	NC		NC			6.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Heptachlor	0.81	mg/kg	3.0E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	1.E-06	1.7E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Aroclor-1232	250	mg/kg	9.1E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-04	5.3E-04	mg/kg/day	2.0E-05	mg/kg/day	3.E+01
				Aroclor-1242	8.0	mg/kg	2.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	1.7E-05	mg/kg/day	2.0E-05	mg/kg/day	9.E-01
				Aroclor-1248	0.59	mg/kg	2.2E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-07	1.3E-06	mg/kg/day	2.0E-05	mg/kg/day	6.E-02
				Aroclor-1254	64	mg/kg	2.3E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-05	1.4E-04	mg/kg/day	2.0E-05	mg/kg/day	7.E+00
				Aroclor-1268	4.3	mg/kg	1.6E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	9.3E-06	mg/kg/day	2.0E-05	mg/kg/day	5.E-01
				Aluminum	8168	mg/kg	NC		NC			1.7E-02	mg/kg/day	1.0E+00	mg/kg/day	2.E-02
				Antimony	4.2	mg/kg	NC		NC			8.9E-06	mg/kg/day	4.0E-04	mg/kg/day	2.E-02
				Arsenic	6.0	mg/kg	2.2E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-06	1.3E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Cadmium	4.1	mg/kg	NC		NC			8.8E-06	mg/kg/day	1.0E-03	mg/kg/day	9.E-03
				Chromium	118	mg/kg	NC		NC			2.5E-04	mg/kg/day	1.5E+00	mg/kg/day	2.E-04
				Cobalt	8.3	mg/kg	NC		NC			1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.E-02
				Copper	118	mg/kg	NC		NC			2.5E-04	mg/kg/day	4.0E-02	mg/kg/day	6.E-03
				Manganese	456	mg/kg	NC		NC			9.7E-04	mg/kg/day	4.7E-02	mg/kg/day	2.E-02
				Mercury	2.5	mg/kg	NC		NC			5.2E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Thallium	6.2	mg/kg	NC		NC			1.3E-05	mg/kg/day	1.0E-05	mg/kg/day	1.E+00
				Vanadium	40	mg/kg	NC		NC			8.5E-05	mg/kg/day	4.9E-03	mg/kg/day	2.E-02
				Zinc	379	mg/kg	NC		NC			8.1E-04	mg/kg/day	3.0E-01	mg/kg/day	3.E-03
				HCX	0.0000069	mg/kg	2.5E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-07	1.5E-11	mg/kg/day	7.0E-10	mg/kg/day	2.E-02
				Dioxin-TEQ-M	0.008	mg/kg	2.8E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	1.6E-08	mg/kg/day	7.0E-10	mg/kg/day	2.E+01
			EXPOSURE ROUTE TOTAL								7.E-04					6.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	340	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,4-dichlorobenzene	31	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	0.069	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	324	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	35	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	46	mg/kg	NC		NC			1.2E-04	mg/kg/day	2.0E-02	mg/kg/day	6.E-03
				Tetrachloroethene	724	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	566	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Xylenes, Total	160	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	280	mg/kg	9.8E-05	mg/kg/day	2.0E-01	(mg/kg/day)-1	2.E-05	5.7E-04	mg/kg/day	4.0E-03	mg/kg/day	1.E-01
				Benzo(a)anthracene	3.5	mg/kg	4.0E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-06	9.4E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(a)pyrene	2.9	mg/kg	3.3E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-05	7.7E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(b)fluoranthene	3.4	mg/kg	3.9E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-06	9.0E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(k)fluoranthene	2.0	mg/kg	2.3E-06	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-07	5.4E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Bis(2-ethylhexyl)phthalate	163	mg/kg	5.7E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	8.E-07	3.3E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Carbazole	0.47	mg/kg	1.6E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-09	9.6E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	6.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-06	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			5.7E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	1.6E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-06	3.6E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				4,4`-DDE	0.93	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Chlordane	4.0	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	0.22	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.30	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.81	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	250	mg/kg	1.2E-04	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-04	7.2E-04	mg/kg/day	2.0E-05	mg/kg/day	4.E+01
				Aroclor-1242	8.0	mg/kg	4.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-06	2.3E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Aroclor-1248	0.59	mg/kg	2.9E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-07	1.7E-06	mg/kg/day	2.0E-05	mg/kg/day	9.E-02
				Aroclor-1254	64	mg/kg	3.1E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-05	1.8E-04	mg/kg/day	2.0E-05	mg/kg/day	9.E+00
				Aroclor-1268	4.3	mg/kg	2.1E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	1.2E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Aluminum	8168	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	4.2	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	6.0	mg/kg	6.4E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	3.7E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Cadmium	4.1	mg/kg	NC		NC			8.5E-08	mg/kg/day	2.5E-05	mg/kg/day	3.E-03
				Chromium	118	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	8.3	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	118	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	456	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	2.5	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	6.2	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	40	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	379	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000069	mg/kg	7.3E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	4.2E-12	mg/kg/day	7.0E-10	mg/kg/day	6.E-03
				Dioxin-TEQ-M	0.008	mg/kg	8.0E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	4.6E-09	mg/kg/day	7.0E-10	mg/kg/day	7.E+00
			EXPOSURE ROUTE TOTAL								5.E-04					5.E+01
		EXPOSURE POINT TOTAL									1.E-03					1.E+02
	EXPOSURE MEDIUM TOTAL										1.E-03					1.E+02

US EPA ARCHIVE DOCUMENT

TABLE 7.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				1,2,4-trichlorobenzene	340	mg/kg	NC		NC			2.5E-04	ug/m3	2.0E+00	ug/m3	1.E-04
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			6.1E-05	ug/m3	7.0E+00	ug/m3	9.E-06
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			1.1E-03	ug/m3	2.0E+02	ug/m3	5.E-06
				1,4-dichlorobenzene	31	mg/kg	3.9E-06	ug/m3	1.1E-05	(ug/m3)-1	4.E-11	2.3E-05	ug/m3	8.0E+02	ug/m3	3.E-08
				Benzene	0.069	mg/kg	8.6E-09	ug/m3	7.8E-06	(ug/m3)-1	7.E-14	5.0E-08	ug/m3	3.0E+01	ug/m3	2.E-09
				Chlorobenzene	324	mg/kg	NC		NC			2.4E-04	ug/m3	5.0E+01	ug/m3	5.E-06
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				Ethyl benzene	35	mg/kg	4.4E-06	ug/m3	2.5E-06	(ug/m3)-1	1.E-11	2.5E-05	ug/m3	1.0E+03	ug/m3	3.E-08
				Naphthalene	46	mg/kg	NC		NC			3.3E-05	ug/m3	3.0E+00	ug/m3	1.E-05
				Tetrachloroethene	724	mg/kg	9.0E-05	ug/m3	2.6E-07	(ug/m3)-1	2.E-11	5.3E-04	ug/m3	4.0E+01	ug/m3	1.E-05
				Trichloroethene	566	mg/kg	7.1E-05	ug/m3	4.1E-06	(ug/m3)-1	3.E-10	4.1E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Xylenes, Total	160	mg/kg	NC		NC			1.2E-04	ug/m3	1.0E+02	ug/m3	1.E-06
				4-chloroaniline	280	mg/kg	NC		NC			2.0E-04	ug/m3	ND		
				Benzo(a)anthracene	3.5	mg/kg	1.1E-06	ug/m3	1.1E-04	(ug/m3)-1	1.E-10	2.6E-06	ug/m3	ND		
				Benzo(a)pyrene	2.9	mg/kg	9.0E-07	ug/m3	1.1E-03	(ug/m3)-1	1.E-09	2.1E-06	ug/m3	ND		
				Benzo(b)fluoranthene	3.4	mg/kg	1.1E-06	ug/m3	1.1E-04	(ug/m3)-1	1.E-10	2.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	2.0	mg/kg	6.3E-07	ug/m3	1.1E-04	(ug/m3)-1	7.E-11	1.5E-06	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	163	mg/kg	2.0E-05	ug/m3	2.4E-06	(ug/m3)-1	5.E-11	1.2E-04	ug/m3	ND		
				Carbazole	0.47	mg/kg	NC		NC			3.4E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	1.8E-07	ug/m3	1.2E-03	(ug/m3)-1	2.E-10	4.1E-07	ug/m3	ND		
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			2.0E-06	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	4.3E-07	ug/m3	1.1E-04	(ug/m3)-1	5.E-11	9.9E-07	ug/m3	ND		
				4,4`-DDE	0.93	mg/kg	1.2E-07	ug/m3	9.7E-05	(ug/m3)-1	1.E-11	6.7E-07	ug/m3	ND		
				Chlordane	4.0	mg/kg	4.9E-07	ug/m3	1.0E-04	(ug/m3)-1	5.E-11	2.9E-06	ug/m3	7.0E-01	ug/m3	4.E-06
				Dieldrin	0.22	mg/kg	2.8E-08	ug/m3	4.6E-03	(ug/m3)-1	1.E-10	1.6E-07	ug/m3	ND		
				Endrin	0.30	mg/kg	NC		NC			2.2E-07	ug/m3	ND		
				Heptachlor	0.81	mg/kg	1.0E-07	ug/m3	1.3E-03	(ug/m3)-1	1.E-10	5.9E-07	ug/m3	ND		
				Aroclor-1232	250	mg/kg	3.1E-05	ug/m3	5.7E-04	(ug/m3)-1	2.E-08	1.8E-04	ug/m3	ND		
				Aroclor-1242	8.0	mg/kg	1.0E-06	ug/m3	5.7E-04	(ug/m3)-1	6.E-10	5.8E-06	ug/m3	ND		
				Aroclor-1248	0.59	mg/kg	7.4E-08	ug/m3	5.7E-04	(ug/m3)-1	4.E-11	4.3E-07	ug/m3	ND		
				Aroclor-1254	64	mg/kg	7.9E-06	ug/m3	5.7E-04	(ug/m3)-1	5.E-09	4.6E-05	ug/m3	ND		
				Aroclor-1268	4.3	mg/kg	5.4E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	3.2E-06	ug/m3	ND		
				Aluminum	8168	mg/kg	NC		NC			5.9E-03	ug/m3	5.0E+00	ug/m3	1.E-03
				Antimony	4.2	mg/kg	NC		NC			3.0E-06	ug/m3	ND		
				Arsenic	6.0	mg/kg	7.5E-07	ug/m3	4.3E-03	(ug/m3)-1	3.E-09	4.4E-06	ug/m3	1.5E-02	ug/m3	3.E-04
				Cadmium	4.1	mg/kg	5.2E-07	ug/m3	1.8E-03	(ug/m3)-1	9.E-10	3.0E-06	ug/m3	1.0E-02	ug/m3	3.E-04
				Chromium	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Cobalt	8.3	mg/kg	1.0E-06	ug/m3	9.0E-03	(ug/m3)-1	9.E-09	6.1E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Manganese	456	mg/kg	NC		NC			3.3E-04	ug/m3	5.0E-02	ug/m3	7.E-03
				Mercury	2.5	mg/kg	NC		NC			1.8E-06	ug/m3	3.0E-01	ug/m3	6.E-06
				Thallium	6.2	mg/kg	NC		NC			4.5E-06	ug/m3	ND		
				Vanadium	40	mg/kg	NC		NC			2.9E-05	ug/m3	1.0E-01	ug/m3	3.E-04
				Zinc	379	mg/kg	NC		NC			2.8E-04	ug/m3	ND		
				HCX	0.0000069	mg/kg	8.6E-13	ug/m3	3.8E+01	(ug/m3)-1	3.E-11	5.0E-12	ug/m3	4.0E-05	ug/m3	1.E-07
				Dioxin-TEQ-M	0.008	mg/kg	9.4E-10	ug/m3	3.8E+01	(ug/m3)-1	4.E-08	5.5E-09	ug/m3	4.0E-05	ug/m3	1.E-04
			EXPOSURE ROUTE TOTAL								7.E-08					1.E-02
		EXPOSURE POINT TOTAL									7.E-08					1.E-02
	EXPOSURE MEDIUM TOTAL										7.E-08					1.E-02
OIL TOTAL											**1.E-03**					**1.E+02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											1.E-03					**1.E+02**

OTES:

) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			2.5E-04	mg/kg/day	8.0E-04	mg/kg/day	3.E-01
				1,2,4-trichlorobenzene	340	mg/kg	8.0E-05	mg/kg/day	2.9E-02	(mg/kg/day)-1	2.E-06	4.7E-04	mg/kg/day	1.0E-02	mg/kg/day	5.E-02
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			1.2E-04	mg/kg/day	ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			2.1E-03	mg/kg/day	9.0E-02	mg/kg/day	2.E-02
				1,4-dichlorobenzene	31	mg/kg	7.3E-06	mg/kg/day	5.4E-03	(mg/kg/day)-1	4.E-08	4.2E-05	mg/kg/day	7.0E-02	mg/kg/day	6.E-04
				Benzene	0.069	mg/kg	1.6E-08	mg/kg/day	5.5E-02	(mg/kg/day)-1	9.E-10	9.5E-08	mg/kg/day	4.0E-03	mg/kg/day	2.E-05
				Chlorobenzene	324	mg/kg	NC		NC			4.4E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			2.5E-04	mg/kg/day	2.0E-03	mg/kg/day	1.E-01
				Ethyl benzene	35	mg/kg	8.2E-06	mg/kg/day	1.1E-02	(mg/kg/day)-1	9.E-08	4.8E-05	mg/kg/day	1.0E-01	mg/kg/day	5.E-04
				Naphthalene	46	mg/kg	NC		NC			6.3E-05	mg/kg/day	2.0E-02	mg/kg/day	3.E-03
				Tetrachloroethene	724	mg/kg	1.7E-04	mg/kg/day	2.1E-03	(mg/kg/day)-1	4.E-07	9.9E-04	mg/kg/day	6.0E-03	mg/kg/day	2.E-01
				Trichloroethene	566	mg/kg	1.3E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	6.E-06	7.8E-04	mg/kg/day	5.0E-04	mg/kg/day	2.E+00
				Xylenes, Total	160	mg/kg	NC		NC			2.2E-04	mg/kg/day	2.0E-01	mg/kg/day	1.E-03
				4-chloroaniline	280	mg/kg	6.6E-05	mg/kg/day	2.0E-01	(mg/kg/day)-1	1.E-05	3.8E-04	mg/kg/day	4.0E-03	mg/kg/day	1.E-01
				Benzo(a)anthracene	3.5	mg/kg	8.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-07	4.9E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	2.9	mg/kg	6.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-06	4.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(b)fluoranthene	3.4	mg/kg	7.9E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-07	4.6E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(k)fluoranthene	2.0	mg/kg	4.7E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-08	2.8E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Bis(2-ethylhexyl)phthalate	163	mg/kg	3.8E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	5.E-07	2.2E-04	mg/kg/day	2.0E-02	mg/kg/day	1.E-02
				Carbazole	0.47	mg/kg	1.1E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	2.E-09	6.4E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	1.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	7.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			3.8E-06	mg/kg/day	2.0E-02	mg/kg/day	2.E-04
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	3.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				4,4`-DDE	0.93	mg/kg	2.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	7.E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Chlordane	4.0	mg/kg	9.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	3.E-07	5.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Dieldrin	0.22	mg/kg	5.2E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	8.E-07	3.0E-07	mg/kg/day	5.0E-05	mg/kg/day	6.E-03
				Endrin	0.30	mg/kg	NC		NC			4.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.E-03
				Heptachlor	0.81	mg/kg	1.9E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	9.E-07	1.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1232	250	mg/kg	5.9E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-04	3.4E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aroclor-1242	8.0	mg/kg	1.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	1.1E-05	mg/kg/day	2.0E-05	mg/kg/day	6.E-01
				Aroclor-1248	0.59	mg/kg	1.4E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-07	8.1E-07	mg/kg/day	2.0E-05	mg/kg/day	4.E-02
				Aroclor-1254	64	mg/kg	1.5E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-05	8.7E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Aroclor-1268	4.3	mg/kg	1.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	6.0E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				Aluminum	8168	mg/kg	NC		NC			1.1E-02	mg/kg/day	1.0E+00	mg/kg/day	1.E-02
				Antimony	4.2	mg/kg	NC		NC			5.7E-06	mg/kg/day	4.0E-04	mg/kg/day	1.E-02
				Arsenic	6.0	mg/kg	1.4E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-06	8.3E-06	mg/kg/day	3.0E-04	mg/kg/day	3.E-02
				Cadmium	4.1	mg/kg	NC		NC			5.7E-06	mg/kg/day	1.0E-03	mg/kg/day	6.E-03
				Chromium	118	mg/kg	NC		NC			1.6E-04	mg/kg/day	1.5E+00	mg/kg/day	1.E-04
				Cobalt	8.3	mg/kg	NC		NC			1.1E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Copper	118	mg/kg	NC		NC			1.6E-04	mg/kg/day	4.0E-02	mg/kg/day	4.E-03
				Manganese	456	mg/kg	NC		NC			6.2E-04	mg/kg/day	4.7E-02	mg/kg/day	1.E-02
				Mercury	2.5	mg/kg	NC		NC			3.4E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02
				Thallium	6.2	mg/kg	NC		NC			8.5E-06	mg/kg/day	1.0E-05	mg/kg/day	9.E-01
				Vanadium	40	mg/kg	NC		NC			5.5E-05	mg/kg/day	4.9E-03	mg/kg/day	1.E-02
				Zinc	379	mg/kg	NC		NC			5.2E-04	mg/kg/day	3.0E-01	mg/kg/day	2.E-03
				HCX	0.0000069	mg/kg	1.6E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	9.5E-12	mg/kg/day	7.0E-10	mg/kg/day	1.E-02
				Dioxin-TEQ-M	0.008	mg/kg	1.8E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-04	1.0E-08	mg/kg/day	7.0E-10	mg/kg/day	1.E+01
			EXPOSURE ROUTE TOTAL								5.E-04					4.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	340	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,4-dichlorobenzene	31	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	0.069	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	324	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	35	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	46	mg/kg	NC		NC			3.3E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Tetrachloroethene	724	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	566	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Xylenes, Total	160	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	280	mg/kg	2.6E-05	mg/kg/day	2.0E-01	(mg/kg/day)-1	5.E-06	1.5E-04	mg/kg/day	4.0E-03	mg/kg/day	4.E-02
				Benzo(a)anthracene	3.5	mg/kg	4.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	2.5E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				Benzo(a)pyrene	2.9	mg/kg	3.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-06	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	7.E-05
				Benzo(b)fluoranthene	3.4	mg/kg	4.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				Benzo(k)fluoranthene	2.0	mg/kg	2.5E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	2.E-08	1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Bis(2-ethylhexyl)phthalate	163	mg/kg	1.5E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	2.E-07	8.9E-05	mg/kg/day	2.0E-02	mg/kg/day	4.E-03
				Carbazole	0.47	mg/kg	4.4E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	9.E-10	2.6E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	6.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-07	4.0E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			1.5E-06	mg/kg/day	2.0E-02	mg/kg/day	8.E-05
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	1.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				4,4`-DDE	0.93	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Chlordane	4.0	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	0.22	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.30	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.81	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	250	mg/kg	3.3E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	7.E-05	1.9E-04	mg/kg/day	2.0E-05	mg/kg/day	1.E+01
				Aroclor-1242	8.0	mg/kg	1.1E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	6.2E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				Aroclor-1248	0.59	mg/kg	7.8E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	4.5E-07	mg/kg/day	2.0E-05	mg/kg/day	2.E-02
				Aroclor-1254	64	mg/kg	8.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	4.9E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1268	4.3	mg/kg	5.7E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	3.3E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				Aluminum	8168	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	4.2	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	6.0	mg/kg	1.7E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-07	9.9E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03
				Cadmium	4.1	mg/kg	NC		NC			2.3E-08	mg/kg/day	2.5E-05	mg/kg/day	9.E-04
				Chromium	118	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	8.3	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	118	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	456	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	2.5	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	6.2	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	40	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	379	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000069	mg/kg	1.9E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-08	1.1E-12	mg/kg/day	7.0E-10	mg/kg/day	2.E-03
				Dioxin-TEQ-M	0.008	mg/kg	2.1E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	1.2E-09	mg/kg/day	7.0E-10	mg/kg/day	2.E+00
			EXPOSURE ROUTE TOTAL								1.E-04					1.E+01
		EXPOSURE POINT TOTAL									6.E-04					5.E+01
	EXPOSURE MEDIUM TOTAL										6.E-04					5.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				1,2,4-trichlorobenzene	340	mg/kg	NC		NC			2.5E-04	ug/m3	2.0E+00	ug/m3	1.E-04
				1,2,4-trimethylbenzene	84	mg/kg	NC		NC			6.1E-05	ug/m3	7.0E+00	ug/m3	9.E-06
				1,2-dichlorobenzene	1500	mg/kg	NC		NC			1.1E-03	ug/m3	2.0E+02	ug/m3	5.E-06
				1,4-dichlorobenzene	31	mg/kg	3.9E-06	ug/m3	1.1E-05	(ug/m3)-1	4.E-11	2.3E-05	ug/m3	8.0E+02	ug/m3	3.E-08
				Benzene	0.069	mg/kg	8.6E-09	ug/m3	7.8E-06	(ug/m3)-1	7.E-14	5.0E-08	ug/m3	3.0E+01	ug/m3	2.E-09
				Chlorobenzene	324	mg/kg	NC		NC			2.4E-04	ug/m3	5.0E+01	ug/m3	5.E-06
				Cis-1,2-dichloroethene	180	mg/kg	NC		NC			1.3E-04	ug/m3	ND		
				Ethyl benzene	35	mg/kg	4.4E-06	ug/m3	2.5E-06	(ug/m3)-1	1.E-11	2.5E-05	ug/m3	1.0E+03	ug/m3	3.E-08
				Naphthalene	46	mg/kg	NC		NC			3.3E-05	ug/m3	3.0E+00	ug/m3	1.E-05
				Tetrachloroethene	724	mg/kg	9.0E-05	ug/m3	2.6E-07	(ug/m3)-1	2.E-11	5.3E-04	ug/m3	4.0E+01	ug/m3	1.E-05
				Trichloroethene	566	mg/kg	7.1E-05	ug/m3	4.1E-06	(ug/m3)-1	3.E-10	4.1E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Xylenes, Total	160	mg/kg	NC		NC			1.2E-04	ug/m3	1.0E+02	ug/m3	1.E-06
				4-chloroaniline	280	mg/kg	NC		NC			2.0E-04	ug/m3	ND		
				Benzo(a)anthracene	3.5	mg/kg	4.4E-07	ug/m3	1.1E-04	(ug/m3)-1	5.E-11	2.6E-06	ug/m3	ND		
				Benzo(a)pyrene	2.9	mg/kg	3.6E-07	ug/m3	1.1E-03	(ug/m3)-1	4.E-10	2.1E-06	ug/m3	ND		
				Benzo(b)fluoranthene	3.4	mg/kg	4.2E-07	ug/m3	1.1E-04	(ug/m3)-1	5.E-11	2.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	2.0	mg/kg	2.5E-07	ug/m3	1.1E-04	(ug/m3)-1	3.E-11	1.5E-06	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	163	mg/kg	2.0E-05	ug/m3	2.4E-06	(ug/m3)-1	5.E-11	1.2E-04	ug/m3	ND		
				Carbazole	0.47	mg/kg	NC		NC			3.4E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.57	mg/kg	7.0E-08	ug/m3	1.2E-03	(ug/m3)-1	8.E-11	4.1E-07	ug/m3	ND		
				Di-n-octylphthalate	2.8	mg/kg	NC		NC			2.0E-06	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	1.4	mg/kg	1.7E-07	ug/m3	1.1E-04	(ug/m3)-1	2.E-11	9.9E-07	ug/m3	ND		
				4,4`-DDE	0.93	mg/kg	1.2E-07	ug/m3	9.7E-05	(ug/m3)-1	1.E-11	6.7E-07	ug/m3	ND		
				Chlordane	4.0	mg/kg	4.9E-07	ug/m3	1.0E-04	(ug/m3)-1	5.E-11	2.9E-06	ug/m3	7.0E-01	ug/m3	4.E-06
				Dieldrin	0.22	mg/kg	2.8E-08	ug/m3	4.6E-03	(ug/m3)-1	1.E-10	1.6E-07	ug/m3	ND		
				Endrin	0.30	mg/kg	NC		NC			2.2E-07	ug/m3	ND		
				Heptachlor	0.81	mg/kg	1.0E-07	ug/m3	1.3E-03	(ug/m3)-1	1.E-10	5.9E-07	ug/m3	ND		
				Aroclor-1232	250	mg/kg	3.1E-05	ug/m3	5.7E-04	(ug/m3)-1	2.E-08	1.8E-04	ug/m3	ND		
				Aroclor-1242	8.0	mg/kg	1.0E-06	ug/m3	5.7E-04	(ug/m3)-1	6.E-10	5.8E-06	ug/m3	ND		
				Aroclor-1248	0.59	mg/kg	7.4E-08	ug/m3	5.7E-04	(ug/m3)-1	4.E-11	4.3E-07	ug/m3	ND		
				Aroclor-1254	64	mg/kg	7.9E-06	ug/m3	5.7E-04	(ug/m3)-1	5.E-09	4.6E-05	ug/m3	ND		
				Aroclor-1268	4.3	mg/kg	5.4E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	3.2E-06	ug/m3	ND		
				Aluminum	8168	mg/kg	NC		NC			5.9E-03	ug/m3	5.0E+00	ug/m3	1.E-03
				Antimony	4.2	mg/kg	NC		NC			3.0E-06	ug/m3	ND		
				Arsenic	6.0	mg/kg	7.5E-07	ug/m3	4.3E-03	(ug/m3)-1	3.E-09	4.4E-06	ug/m3	1.5E-02	ug/m3	3.E-04
				Cadmium	4.1	mg/kg	5.2E-07	ug/m3	1.8E-03	(ug/m3)-1	9.E-10	3.0E-06	ug/m3	1.0E-02	ug/m3	3.E-04
				Chromium	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Cobalt	8.3	mg/kg	1.0E-06	ug/m3	9.0E-03	(ug/m3)-1	9.E-09	6.1E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	118	mg/kg	NC		NC			8.6E-05	ug/m3	ND		
				Manganese	456	mg/kg	NC		NC			3.3E-04	ug/m3	5.0E-02	ug/m3	7.E-03
				Mercury	2.5	mg/kg	NC		NC			1.8E-06	ug/m3	3.0E-01	ug/m3	6.E-06
				Thallium	6.2	mg/kg	NC		NC			4.5E-06	ug/m3	ND		
				Vanadium	40	mg/kg	NC		NC			2.9E-05	ug/m3	1.0E-01	ug/m3	3.E-04
				Zinc	379	mg/kg	NC		NC			2.8E-04	ug/m3	ND		
				HCX	0.0000069	mg/kg	8.6E-13	ug/m3	3.8E+01	(ug/m3)-1	3.E-11	5.0E-12	ug/m3	4.0E-05	ug/m3	1.E-07
				Dioxin-TEQ-M	0.008	mg/kg	9.4E-10	ug/m3	3.8E+01	(ug/m3)-1	4.E-08	5.5E-09	ug/m3	4.0E-05	ug/m3	1.E-04
			EXPOSURE ROUTE TOTAL								7.E-08					1.E-02
		EXPOSURE POINT TOTAL									7.E-08					1.E-02
	EXPOSURE MEDIUM TOTAL										7.E-08					1.E-02
OIL TOTAL											**6.E-04**					**5.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											6.E-04					**5.E+01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			2.9E-04	mg/kg/day	8.0E-04	mg/kg/day	4.E-01
				1,2,4-trichlorobenzene	15.3	mg/kg	1.7E-05	mg/kg/day	2.9E-02	(mg/kg/day)-1	5.E-07	2.0E-04	mg/kg/day	1.0E-02	mg/kg/day	2.E-02
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			9.0E-04	mg/kg/day	ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			7.3E-03	mg/kg/day	9.0E-02	mg/kg/day	8.E-02
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			9.3E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-04
				1,4-dichlorobenzene	10.9	mg/kg	1.2E-05	mg/kg/day	5.4E-03	(mg/kg/day)-1	6.E-08	1.4E-04	mg/kg/day	7.0E-02	mg/kg/day	2.E-03
				Benzene	109	mg/kg	1.2E-04	mg/kg/day	5.5E-02	(mg/kg/day)-1	7.E-06	1.4E-03	mg/kg/day	4.0E-03	mg/kg/day	3.E-01
				Chlorobenzene	214	mg/kg	NC		NC			2.7E-03	mg/kg/day	2.0E-02	mg/kg/day	1.E-01
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			1.8E-03	mg/kg/day	2.0E-03	mg/kg/day	9.E-01
				Ethyl benzene	22.6	mg/kg	2.5E-05	mg/kg/day	1.1E-02	(mg/kg/day)-1	3.E-07	2.9E-04	mg/kg/day	1.0E-01	mg/kg/day	3.E-03
				Naphthalene	36.0	mg/kg	NC		NC			4.6E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			1.3E-07	mg/kg/day	ND		
				Tetrachloroethene	335	mg/kg	3.7E-04	mg/kg/day	2.1E-03	(mg/kg/day)-1	8.E-07	4.3E-03	mg/kg/day	6.0E-03	mg/kg/day	7.E-01
				Trichloroethene	470	mg/kg	5.2E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	2.E-05	6.0E-03	mg/kg/day	5.0E-04	mg/kg/day	1.E+01
				Vinyl Chloride	0.21	mg/kg	2.3E-07	mg/kg/day	1.4E+00	(mg/kg/day)-1	3.E-07	2.7E-06	mg/kg/day	3.0E-03	mg/kg/day	9.E-04
				Xylenes, Total	30	mg/kg	NC		NC			3.8E-04	mg/kg/day	2.0E-01	mg/kg/day	2.E-03
				4-chloroaniline	0.43	mg/kg	4.7E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	9.E-08	5.5E-06	mg/kg/day	4.0E-03	mg/kg/day	1.E-03
				Benzo(a)anthracene	1.3	mg/kg	5.9E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-06	1.6E-05	mg/kg/day	3.0E-02	mg/kg/day	5.E-04
				Benzo(a)pyrene	1.4	mg/kg	6.4E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	5.E-05	1.8E-05	mg/kg/day	3.0E-02	mg/kg/day	6.E-04
				Benzo(b)fluoranthene	2.1	mg/kg	9.8E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.E-06	2.7E-05	mg/kg/day	3.0E-02	mg/kg/day	9.E-04
				Benzo(k)fluoranthene	0.41	mg/kg	1.9E-06	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-07	5.2E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Bis(2-ethylhexyl)phthalate	91	mg/kg	1.0E-04	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-06	1.2E-03	mg/kg/day	2.0E-02	mg/kg/day	6.E-02
				Carbazole	0.22	mg/kg	2.5E-07	mg/kg/day	2.0E-02	(mg/kg/day)-1	5.E-09	2.9E-06	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	1.1E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.E-06	3.1E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			6.7E-06	mg/kg/day	2.0E-02	mg/kg/day	3.E-04
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	2.4E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	6.7E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				4,4`-DDE	0.66	mg/kg	7.2E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	2.E-07	8.4E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Aldrin	0.38	mg/kg	4.2E-07	mg/kg/day	1.7E+01	(mg/kg/day)-1	7.E-06	4.9E-06	mg/kg/day	3.0E-05	mg/kg/day	2.E-01
				Chlordane	0.12	mg/kg	1.3E-07	mg/kg/day	3.5E-01	(mg/kg/day)-1	5.E-08	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Dieldrin	2.4	mg/kg	2.6E-06	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.E-05	3.1E-05	mg/kg/day	5.0E-05	mg/kg/day	6.E-01
				Endrin	0.52	mg/kg	NC		NC			6.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Heptachlor	0.43	mg/kg	4.7E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	2.E-06	5.4E-06	mg/kg/day	5.0E-04	mg/kg/day	1.E-02
				Aroclor-1232	1.8	mg/kg	1.9E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-06	2.3E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Aroclor-1242	2.9	mg/kg	3.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	3.7E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1248	17.2	mg/kg	1.9E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-05	2.2E-04	mg/kg/day	2.0E-05	mg/kg/day	1.E+01
				Aroclor-1254	88	mg/kg	9.6E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-04	1.1E-03	mg/kg/day	2.0E-05	mg/kg/day	6.E+01
				Aluminum	6043	mg/kg	NC		NC			7.7E-02	mg/kg/day	1.0E+00	mg/kg/day	8.E-02
				Antimony	6.0	mg/kg	NC		NC			7.7E-05	mg/kg/day	4.0E-04	mg/kg/day	2.E-01
				Arsenic	9.9	mg/kg	1.1E-05	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-05	1.3E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01
				Cadmium	27	mg/kg	NC		NC			3.5E-04	mg/kg/day	1.0E-03	mg/kg/day	3.E-01
				Chromium	57	mg/kg	NC		NC			7.3E-04	mg/kg/day	1.5E+00	mg/kg/day	5.E-04
				Cobalt	9.1	mg/kg	NC		NC			1.2E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01
				Copper	200	mg/kg	NC		NC			2.6E-03	mg/kg/day	4.0E-02	mg/kg/day	6.E-02
				Manganese	293	mg/kg	NC		NC			3.7E-03	mg/kg/day	4.7E-02	mg/kg/day	8.E-02
				Mercury	0.842	mg/kg	NC		NC			1.1E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Thallium	4.7	mg/kg	NC		NC			6.1E-05	mg/kg/day	1.0E-05	mg/kg/day	6.E+00
				Vanadium	25	mg/kg	NC		NC			3.2E-04	mg/kg/day	4.9E-03	mg/kg/day	7.E-02
				Zinc	994	mg/kg	NC		NC			1.3E-02	mg/kg/day	3.0E-01	mg/kg/day	4.E-02
				HCX	0.0000041	mg/kg	4.4E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	7.E-07	5.2E-11	mg/kg/day	7.0E-10	mg/kg/day	7.E-02
				Dioxin-TEQ-M	0.0025	mg/kg	2.8E-09	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-04	3.2E-08	mg/kg/day	7.0E-10	mg/kg/day	5.E+01
			EXPOSURE ROUTE TOTAL								8.E-04					1.E+02

US EPA ARCHIVE DOCUMENT

TABLE 7.4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	15.3	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				1,4-dichlorobenzene	10.9	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	109	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	214	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	22.6	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	36.0	mg/kg	NC		NC			1.7E-04	mg/kg/day	2.0E-02	mg/kg/day	8.E-03
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			--		ND		
				Tetrachloroethene	335	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	470	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Vinyl Chloride	0.21	mg/kg	--		1.4E+00	(mg/kg/day)-1		--		3.0E-03	mg/kg/day	
				Xylenes, Total	30	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	0.43	mg/kg	1.3E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	3.E-08	1.5E-06	mg/kg/day	4.0E-03	mg/kg/day	4.E-04
				Benzo(a)anthracene	1.3	mg/kg	2.2E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	6.0E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(a)pyrene	1.4	mg/kg	2.3E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-05	6.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(b)fluoranthene	2.1	mg/kg	3.6E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-06	9.9E-06	mg/kg/day	3.0E-02	mg/kg/day	3.E-04
				Benzo(k)fluoranthene	0.41	mg/kg	6.9E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	5.E-08	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Bis(2-ethylhexyl)phthalate	91	mg/kg	2.8E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-07	3.3E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Carbazole	0.22	mg/kg	6.9E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	1.E-09	8.0E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	4.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	3.E-06	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			1.9E-06	mg/kg/day	2.0E-02	mg/kg/day	9.E-05
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	8.7E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-07	2.4E-06	mg/kg/day	3.0E-02	mg/kg/day	8.E-05
				4,4`-DDE	0.66	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aldrin	0.38	mg/kg	--		1.7E+01	(mg/kg/day)-1		--		3.0E-05	mg/kg/day	
				Chlordane	0.12	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	2.4	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.52	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.43	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	1.8	mg/kg	7.6E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	8.9E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Aroclor-1242	2.9	mg/kg	1.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	1.5E-05	mg/kg/day	2.0E-05	mg/kg/day	7.E-01
				Aroclor-1248	17.2	mg/kg	7.4E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	8.6E-05	mg/kg/day	2.0E-05	mg/kg/day	4.E+00
				Aroclor-1254	88	mg/kg	3.8E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-05	4.4E-04	mg/kg/day	2.0E-05	mg/kg/day	2.E+01
				Aluminum	6043	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	6.0	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.9	mg/kg	9.1E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-06	1.1E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Cadmium	27	mg/kg	NC		NC			9.7E-07	mg/kg/day	2.5E-05	mg/kg/day	4.E-02
				Chromium	57	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	9.1	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	200	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	293	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	0.842	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	4.7	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	25	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	994	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000041	mg/kg	3.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	4.4E-12	mg/kg/day	7.0E-10	mg/kg/day	6.E-03
				Dioxin-TEQ-M	0.0025	mg/kg	2.3E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	2.7E-09	mg/kg/day	7.0E-10	mg/kg/day	4.E+00
			EXPOSURE ROUTE TOTAL								2.E-04					3.E+01
		EXPOSURE POINT TOTAL									1.E-03					2.E+02
	EXPOSURE MEDIUM TOTAL										1.E-03					2.E+02

US EPA ARCHIVE DOCUMENT

TABLE 7.4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	CSF/UNIT RISK VALUE	CSF UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	RfD/RfC (1) VALUE	RfD/RfC UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			1.6E-05	ug/m3	ND		
				1,2,4-trichlorobenzene	15.3	mg/kg	NC		NC			1.1E-05	ug/m3	2.0E+00	ug/m3	6.E-06
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			5.1E-05	ug/m3	7.0E+00	ug/m3	7.E-06
				1,2-dichlorobenzene	570	mg/kg	NC		NC			4.1E-04	ug/m3	2.0E+02	ug/m3	2.E-06
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			5.3E-07	ug/m3	ND		
				1,4-dichlorobenzene	10.9	mg/kg	6.8E-07	ug/m3	1.1E-05	(ug/m3)-1	7.E-12	7.9E-06	ug/m3	8.0E+02	ug/m3	1.E-08
				Benzene	109	mg/kg	6.8E-06	ug/m3	7.8E-06	(ug/m3)-1	5.E-11	7.9E-05	ug/m3	3.0E+01	ug/m3	3.E-06
				Chlorobenzene	214	mg/kg	NC		NC			1.6E-04	ug/m3	5.0E+01	ug/m3	3.E-06
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			1.0E-04	ug/m3	ND		
				Ethyl benzene	22.6	mg/kg	1.4E-06	ug/m3	2.5E-06	(ug/m3)-1	4.E-12	1.6E-05	ug/m3	1.0E+03	ug/m3	2.E-08
				Naphthalene	36.0	mg/kg	NC		NC			2.6E-05	ug/m3	3.0E+00	ug/m3	9.E-06
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			7.3E-09	ug/m3	ND		
				Tetrachloroethene	335	mg/kg	2.1E-05	ug/m3	2.6E-07	(ug/m3)-1	5.E-12	2.4E-04	ug/m3	4.0E+01	ug/m3	6.E-06
				Trichloroethene	470	mg/kg	2.9E-05	ug/m3	4.1E-06	(ug/m3)-1	1.E-10	3.4E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Vinyl Chloride	0.21	mg/kg	1.3E-08	ug/m3	8.8E-06	(ug/m3)-1	1.E-13	1.5E-07	ug/m3	1.0E+02	ug/m3	2.E-09
				Xylenes, Total	30	mg/kg	NC		NC			2.2E-05	ug/m3	1.0E+02	ug/m3	2.E-07
				4-chloroaniline	0.43	mg/kg	NC		NC			3.1E-07	ug/m3	ND		
				Benzo(a)anthracene	1.3	mg/kg	3.4E-07	ug/m3	1.1E-04	(ug/m3)-1	4.E-11	9.4E-07	ug/m3	ND		
				Benzo(a)pyrene	1.4	mg/kg	3.6E-07	ug/m3	1.1E-03	(ug/m3)-1	4.E-10	1.0E-06	ug/m3	ND		
				Benzo(b)fluoranthene	2.1	mg/kg	5.6E-07	ug/m3	1.1E-04	(ug/m3)-1	6.E-11	1.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	0.41	mg/kg	1.1E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-11	3.0E-07	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	91	mg/kg	5.7E-06	ug/m3	2.4E-06	(ug/m3)-1	1.E-11	6.6E-05	ug/m3	ND		
				Carbazole	0.22	mg/kg	NC		NC			1.6E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	6.4E-08	ug/m3	1.2E-03	(ug/m3)-1	8.E-11	1.8E-07	ug/m3	ND		
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			3.8E-07	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	1.4E-07	ug/m3	1.1E-04	(ug/m3)-1	2.E-11	3.8E-07	ug/m3	ND		
				4,4`-DDE	0.66	mg/kg	4.1E-08	ug/m3	9.7E-05	(ug/m3)-1	4.E-12	4.8E-07	ug/m3	ND		
				Aldrin	0.38	mg/kg	2.4E-08	ug/m3	4.9E-03	(ug/m3)-1	1.E-10	2.8E-07	ug/m3	ND		
				Chlordane	0.12	mg/kg	7.3E-09	ug/m3	1.0E-04	(ug/m3)-1	7.E-13	8.6E-08	ug/m3	7.0E-01	ug/m3	1.E-07
				Dieldrin	2.4	mg/kg	1.5E-07	ug/m3	4.6E-03	(ug/m3)-1	7.E-10	1.8E-06	ug/m3	ND		
				Endrin	0.52	mg/kg	NC		NC			3.8E-07	ug/m3	ND		
				Heptachlor	0.43	mg/kg	2.7E-08	ug/m3	1.3E-03	(ug/m3)-1	3.E-11	3.1E-07	ug/m3	ND		
				Aroclor-1232	1.8	mg/kg	1.1E-07	ug/m3	5.7E-04	(ug/m3)-1	6.E-11	1.3E-06	ug/m3	ND		
				Aroclor-1242	2.9	mg/kg	1.8E-07	ug/m3	5.7E-04	(ug/m3)-1	1.E-10	2.1E-06	ug/m3	ND		
				Aroclor-1248	17.2	mg/kg	1.1E-06	ug/m3	5.7E-04	(ug/m3)-1	6.E-10	1.2E-05	ug/m3	ND		
				Aroclor-1254	88	mg/kg	5.5E-06	ug/m3	5.7E-04	(ug/m3)-1	3.E-09	6.4E-05	ug/m3	ND		
				Aluminum	6043	mg/kg	NC		NC			4.4E-03	ug/m3	5.0E+00	ug/m3	9.E-04
				Antimony	6.0	mg/kg	NC		NC			4.4E-06	ug/m3	ND		
				Arsenic	9.9	mg/kg	6.2E-07	ug/m3	4.3E-03	(ug/m3)-1	3.E-09	7.2E-06	ug/m3	1.5E-02	ug/m3	5.E-04
				Cadmium	27	mg/kg	1.7E-06	ug/m3	1.8E-03	(ug/m3)-1	3.E-09	2.0E-05	ug/m3	1.0E-02	ug/m3	2.E-03
				Chromium	57	mg/kg	NC		NC			4.1E-05	ug/m3	ND		
				Cobalt	9.1	mg/kg	5.7E-07	ug/m3	9.0E-03	(ug/m3)-1	5.E-09	6.6E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	200	mg/kg	NC		NC			1.5E-04	ug/m3	ND		
				Manganese	293	mg/kg	NC		NC			2.1E-04	ug/m3	5.0E-02	ug/m3	4.E-03
				Mercury	0.842	mg/kg	NC		NC			6.1E-07	ug/m3	3.0E-01	ug/m3	2.E-06
				Thallium	4.7	mg/kg	NC		NC			3.4E-06	ug/m3	ND		
				Vanadium	25	mg/kg	NC		NC			1.8E-05	ug/m3	1.0E-01	ug/m3	2.E-04
				Zinc	994	mg/kg	NC		NC			7.2E-04	ug/m3	ND		
				HCX	0.0000041	mg/kg	2.5E-13	ug/m3	3.8E+01	(ug/m3)-1	1.E-11	2.9E-12	ug/m3	4.0E-05	ug/m3	7.E-08
				Dioxin-TEQ-M	0.0025	mg/kg	1.6E-10	ug/m3	3.8E+01	(ug/m3)-1	6.E-09	1.8E-09	ug/m3	4.0E-05	ug/m3	5.E-05
			EXPOSURE ROUTE TOTAL								2.E-08					9.E-03
		EXPOSURE POINT TOTAL									2.E-08					9.E-03
	EXPOSURE MEDIUM TOTAL										2.E-08					9.E-03
OIL TOTAL											**1.E-03**					**2.E+02**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**1.E-03**				**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**	**2.E+02**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.5
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			4.8E-05	mg/kg/day	8.0E-04	mg/kg/day	6.E-02
				1,2,4-trichlorobenzene	15.3	mg/kg	5.6E-06	mg/kg/day	2.9E-02	(mg/kg/day)-1	2.E-07	3.3E-05	mg/kg/day	1.0E-02	mg/kg/day	3.E-03
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			1.5E-04	mg/kg/day	ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			1.2E-03	mg/kg/day	9.0E-02	mg/kg/day	1.E-02
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			1.5E-06	mg/kg/day	2.0E-02	mg/kg/day	8.E-05
				1,4-dichlorobenzene	10.9	mg/kg	4.0E-06	mg/kg/day	5.4E-03	(mg/kg/day)-1	2.E-08	2.3E-05	mg/kg/day	7.0E-02	mg/kg/day	3.E-04
				Benzene	109	mg/kg	4.0E-05	mg/kg/day	5.5E-02	(mg/kg/day)-1	2.E-06	2.3E-04	mg/kg/day	4.0E-03	mg/kg/day	6.E-02
				Chlorobenzene	214	mg/kg	NC		NC			4.6E-04	mg/kg/day	2.0E-02	mg/kg/day	2.E-02
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			3.0E-04	mg/kg/day	2.0E-03	mg/kg/day	2.E-01
				Ethyl benzene	22.6	mg/kg	8.2E-06	mg/kg/day	1.1E-02	(mg/kg/day)-1	9.E-08	4.8E-05	mg/kg/day	1.0E-01	mg/kg/day	5.E-04
				Naphthalene	36.0	mg/kg	NC		NC			7.7E-05	mg/kg/day	2.0E-02	mg/kg/day	4.E-03
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			2.1E-08	mg/kg/day	ND		
				Tetrachloroethene	335	mg/kg	1.2E-04	mg/kg/day	2.1E-03	(mg/kg/day)-1	3.E-07	7.1E-04	mg/kg/day	6.0E-03	mg/kg/day	1.E-01
				Trichloroethene	470	mg/kg	1.7E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	8.E-06	1.0E-03	mg/kg/day	5.0E-04	mg/kg/day	2.E+00
				Vinyl Chloride	0.21	mg/kg	7.6E-08	mg/kg/day	1.4E+00	(mg/kg/day)-1	1.E-07	4.4E-07	mg/kg/day	3.0E-03	mg/kg/day	1.E-04
				Xylenes, Total	30	mg/kg	NC		NC			6.4E-05	mg/kg/day	2.0E-01	mg/kg/day	3.E-04
				4-chloroaniline	0.43	mg/kg	1.6E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	3.E-08	9.2E-07	mg/kg/day	4.0E-03	mg/kg/day	2.E-04
				Benzo(a)anthracene	1.3	mg/kg	1.2E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-07	2.7E-06	mg/kg/day	3.0E-02	mg/kg/day	9.E-05
				Benzo(a)pyrene	1.4	mg/kg	1.3E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	9.E-06	3.0E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(b)fluoranthene	2.1	mg/kg	1.9E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-06	4.5E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(k)fluoranthene	0.41	mg/kg	3.7E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-08	8.7E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Bis(2-ethylhexyl)phthalate	91	mg/kg	3.3E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	5.E-07	1.9E-04	mg/kg/day	2.0E-02	mg/kg/day	1.E-02
				Carbazole	0.22	mg/kg	8.2E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	2.E-09	4.8E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	2.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	5.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			1.1E-06	mg/kg/day	2.0E-02	mg/kg/day	6.E-05
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	4.8E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-07	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				4,4`-DDE	0.66	mg/kg	2.4E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	8.E-08	1.4E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Aldrin	0.381	mg/kg	1.4E-07	mg/kg/day	1.7E+01	(mg/kg/day)-1	2.E-06	8.1E-07	mg/kg/day	3.0E-05	mg/kg/day	3.E-02
				Chlordane	0.12	mg/kg	4.3E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	2.5E-07	mg/kg/day	5.0E-04	mg/kg/day	5.E-04
				Dieldrin	2.4	mg/kg	8.8E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.E-05	5.2E-06	mg/kg/day	5.0E-05	mg/kg/day	1.E-01
				Endrin	0.52	mg/kg	NC		NC			1.1E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Heptachlor	0.43	mg/kg	1.6E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	7.E-07	9.1E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1232	1.8	mg/kg	6.5E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	3.8E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				Aroclor-1242	2.9	mg/kg	1.1E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	6.2E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				Aroclor-1248	17.2	mg/kg	6.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-05	3.7E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1254	88	mg/kg	3.2E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-05	1.9E-04	mg/kg/day	2.0E-05	mg/kg/day	9.E+00
				Aluminum	6043	mg/kg	NC		NC			1.3E-02	mg/kg/day	1.0E+00	mg/kg/day	1.E-02
				Antimony	6.0	mg/kg	NC		NC			1.3E-05	mg/kg/day	4.0E-04	mg/kg/day	3.E-02
				Arsenic	9.9	mg/kg	3.6E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-06	2.1E-05	mg/kg/day	3.0E-04	mg/kg/day	7.E-02
				Cadmium	27	mg/kg	NC		NC			5.8E-05	mg/kg/day	1.0E-03	mg/kg/day	6.E-02
				Chromium	57	mg/kg	NC		NC			1.2E-04	mg/kg/day	1.5E+00	mg/kg/day	8.E-05
				Cobalt	9.1	mg/kg	NC		NC			1.9E-05	mg/kg/day	3.0E-04	mg/kg/day	6.E-02
				Copper	200	mg/kg	NC		NC			4.3E-04	mg/kg/day	4.0E-02	mg/kg/day	1.E-02
				Manganese	293	mg/kg	NC		NC			6.2E-04	mg/kg/day	4.7E-02	mg/kg/day	1.E-02
				Mercury	0.842	mg/kg	NC		NC			1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.E-03
				Thallium	4.7	mg/kg	NC		NC			1.0E-05	mg/kg/day	1.0E-05	mg/kg/day	1.E+00
				Vanadium	25	mg/kg	NC		NC			5.3E-05	mg/kg/day	4.9E-03	mg/kg/day	1.E-02
				Zinc	994	mg/kg	NC		NC			2.1E-03	mg/kg/day	3.0E-01	mg/kg/day	7.E-03
				HCX	0.0000041	mg/kg	1.5E-12	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-07	8.7E-12	mg/kg/day	7.0E-10	mg/kg/day	1.E-02
				Dioxin-TEQ-M	0.0025	mg/kg	9.2E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-04	5.4E-09	mg/kg/day	7.0E-10	mg/kg/day	8.E+00
			EXPOSURE ROUTE TOTAL								3.E-04					2.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.5
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	15.3	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				1,4-dichlorobenzene	10.9	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	109	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	214	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	22.6	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	36.0	mg/kg	NC		NC			9.6E-05	mg/kg/day	2.0E-02	mg/kg/day	5.E-03
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			--		ND		
				Tetrachloroethene	335	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	470	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Vinyl Chloride	0.21	mg/kg	--		1.4E+00	(mg/kg/day)-1		--		3.0E-03	mg/kg/day	
				Xylenes, Total	30	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	0.43	mg/kg	1.5E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	3.E-08	8.8E-07	mg/kg/day	4.0E-03	mg/kg/day	2.E-04
				Benzo(a)anthracene	1.3	mg/kg	1.5E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-06	3.4E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(a)pyrene	1.4	mg/kg	1.6E-06	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-05	3.7E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(b)fluoranthene	2.1	mg/kg	2.4E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-06	5.6E-06	mg/kg/day	3.0E-02	mg/kg/day	2.E-04
				Benzo(k)fluoranthene	0.41	mg/kg	4.7E-07	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-08	1.1E-06	mg/kg/day	3.0E-02	mg/kg/day	4.E-05
				Bis(2-ethylhexyl)phthalate	91	mg/kg	3.2E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-07	1.9E-04	mg/kg/day	2.0E-02	mg/kg/day	9.E-03
				Carbazole	0.22	mg/kg	7.9E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	2.E-09	4.6E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	2.8E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	6.5E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			1.1E-06	mg/kg/day	2.0E-02	mg/kg/day	5.E-05
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	5.9E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				4,4`-DDE	0.66	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aldrin	0.381	mg/kg	--		1.7E+01	(mg/kg/day)-1		--		3.0E-05	mg/kg/day	
				Chlordane	0.12	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	2.4	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.52	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.43	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	1.8	mg/kg	8.7E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-06	5.1E-06	mg/kg/day	2.0E-05	mg/kg/day	3.E-01
				Aroclor-1242	2.9	mg/kg	1.4E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	8.3E-06	mg/kg/day	2.0E-05	mg/kg/day	4.E-01
				Aroclor-1248	17.2	mg/kg	8.4E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	4.9E-05	mg/kg/day	2.0E-05	mg/kg/day	2.E+00
				Aroclor-1254	88	mg/kg	4.3E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	9.E-05	2.5E-04	mg/kg/day	2.0E-05	mg/kg/day	1.E+01
				Aluminum	6043	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	6.0	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.9	mg/kg	1.0E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-06	6.1E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02
				Cadmium	27	mg/kg	NC		NC			5.5E-07	mg/kg/day	2.5E-05	mg/kg/day	2.E-02
				Chromium	57	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	9.1	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	200	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	293	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	0.842	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	4.7	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	25	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	994	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000041	mg/kg	4.3E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	2.5E-12	mg/kg/day	7.0E-10	mg/kg/day	4.E-03
				Dioxin-TEQ-M	0.0025	mg/kg	2.7E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	4.E-05	1.6E-09	mg/kg/day	7.0E-10	mg/kg/day	2.E+00
			EXPOSURE ROUTE TOTAL								2.E-04					2.E+01
		EXPOSURE POINT TOTAL									4.E-04					4.E+01
	EXPOSURE MEDIUM TOTAL										4.E-04					4.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.5
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	CSF/UNIT RISK VALUE	CSF UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	RfD/RfC (1) VALUE	RfD/RfC UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			1.6E-05	ug/m3	ND		
				1,2,4-trichlorobenzene	15.3	mg/kg	NC		NC			1.1E-05	ug/m3	2.0E+00	ug/m3	6.E-06
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			5.1E-05	ug/m3	7.0E+00	ug/m3	7.E-06
				1,2-dichlorobenzene	570	mg/kg	NC		NC			4.1E-04	ug/m3	2.0E+02	ug/m3	2.E-06
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			5.3E-07	ug/m3	ND		
				1,4-dichlorobenzene	10.9	mg/kg	1.4E-06	ug/m3	1.1E-05	(ug/m3)-1	1.E-11	7.9E-06	ug/m3	8.0E+02	ug/m3	1.E-08
				Benzene	109	mg/kg	1.4E-05	ug/m3	7.8E-06	(ug/m3)-1	1.E-10	7.9E-05	ug/m3	3.0E+01	ug/m3	3.E-06
				Chlorobenzene	214	mg/kg	NC		NC			1.6E-04	ug/m3	5.0E+01	ug/m3	3.E-06
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			1.0E-04	ug/m3	ND		
				Ethyl benzene	22.6	mg/kg	2.8E-06	ug/m3	2.5E-06	(ug/m3)-1	7.E-12	1.6E-05	ug/m3	1.0E+03	ug/m3	2.E-08
				Naphthalene	36.0	mg/kg	NC		NC			2.6E-05	ug/m3	3.0E+00	ug/m3	9.E-06
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			7.3E-09	ug/m3	ND		
				Tetrachloroethene	335	mg/kg	4.2E-05	ug/m3	2.6E-07	(ug/m3)-1	1.E-11	2.4E-04	ug/m3	4.0E+01	ug/m3	6.E-06
				Trichloroethene	470	mg/kg	5.9E-05	ug/m3	4.1E-06	(ug/m3)-1	2.E-10	3.4E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Vinyl Chloride	0.21	mg/kg	2.6E-08	ug/m3	8.8E-06	(ug/m3)-1	2.E-13	1.5E-07	ug/m3	1.0E+02	ug/m3	2.E-09
				Xylenes, Total	30	mg/kg	NC		NC			2.2E-05	ug/m3	1.0E+02	ug/m3	2.E-07
				4-chloroaniline	0.43	mg/kg	NC		NC			3.1E-07	ug/m3	ND		
				Benzo(a)anthracene	1.3	mg/kg	4.0E-07	ug/m3	1.1E-04	(ug/m3)-1	4.E-11	9.4E-07	ug/m3	ND		
				Benzo(a)pyrene	1.4	mg/kg	4.3E-07	ug/m3	1.1E-03	(ug/m3)-1	5.E-10	1.0E-06	ug/m3	ND		
				Benzo(b)fluoranthene	2.1	mg/kg	6.6E-07	ug/m3	1.1E-04	(ug/m3)-1	7.E-11	1.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	0.41	mg/kg	1.3E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-11	3.0E-07	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	91	mg/kg	1.1E-05	ug/m3	2.4E-06	(ug/m3)-1	3.E-11	6.6E-05	ug/m3	ND		
				Carbazole	0.22	mg/kg	NC		NC			1.6E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	7.7E-08	ug/m3	1.2E-03	(ug/m3)-1	9.E-11	1.8E-07	ug/m3	ND		
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			3.8E-07	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	1.6E-07	ug/m3	1.1E-04	(ug/m3)-1	2.E-11	3.8E-07	ug/m3	ND		
				4,4`-DDE	0.66	mg/kg	8.2E-08	ug/m3	9.7E-05	(ug/m3)-1	8.E-12	4.8E-07	ug/m3	ND		
				Aldrin	0.381	mg/kg	4.7E-08	ug/m3	4.9E-03	(ug/m3)-1	2.E-10	2.8E-07	ug/m3	ND		
				Chlordane	0.12	mg/kg	1.5E-08	ug/m3	1.0E-04	(ug/m3)-1	1.E-12	8.6E-08	ug/m3	7.0E-01	ug/m3	1.E-07
				Dieldrin	2.4	mg/kg	3.0E-07	ug/m3	4.6E-03	(ug/m3)-1	1.E-09	1.8E-06	ug/m3	ND		
				Endrin	0.52	mg/kg	NC		NC			3.8E-07	ug/m3	ND		
				Heptachlor	0.43	mg/kg	5.3E-08	ug/m3	1.3E-03	(ug/m3)-1	7.E-11	3.1E-07	ug/m3	ND		
				Aroclor-1232	1.8	mg/kg	2.2E-07	ug/m3	5.7E-04	(ug/m3)-1	1.E-10	1.3E-06	ug/m3	ND		
				Aroclor-1242	2.9	mg/kg	3.6E-07	ug/m3	5.7E-04	(ug/m3)-1	2.E-10	2.1E-06	ug/m3	ND		
				Aroclor-1248	17.2	mg/kg	2.1E-06	ug/m3	5.7E-04	(ug/m3)-1	1.E-09	1.2E-05	ug/m3	ND		
				Aroclor-1254	88	mg/kg	1.1E-05	ug/m3	5.7E-04	(ug/m3)-1	6.E-09	6.4E-05	ug/m3	ND		
				Aluminum	6043	mg/kg	NC		NC			4.4E-03	ug/m3	5.0E+00	ug/m3	9.E-04
				Antimony	6.0	mg/kg	NC		NC			4.4E-06	ug/m3	ND		
				Arsenic	9.9	mg/kg	1.2E-06	ug/m3	4.3E-03	(ug/m3)-1	5.E-09	7.2E-06	ug/m3	1.5E-02	ug/m3	5.E-04
				Cadmium	27	mg/kg	3.4E-06	ug/m3	1.8E-03	(ug/m3)-1	6.E-09	2.0E-05	ug/m3	1.0E-02	ug/m3	2.E-03
				Chromium	57	mg/kg	NC		NC			4.1E-05	ug/m3	ND		
				Cobalt	9.1	mg/kg	1.1E-06	ug/m3	9.0E-03	(ug/m3)-1	1.E-08	6.6E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	200	mg/kg	NC		NC			1.5E-04	ug/m3	ND		
				Manganese	293	mg/kg	NC		NC			2.1E-04	ug/m3	5.0E-02	ug/m3	4.E-03
				Mercury	0.842	mg/kg	NC		NC			6.1E-07	ug/m3	3.0E-01	ug/m3	2.E-06
				Thallium	4.7	mg/kg	NC		NC			3.4E-06	ug/m3	ND		
				Vanadium	25	mg/kg	NC		NC			1.8E-05	ug/m3	1.0E-01	ug/m3	2.E-04
				Zinc	994	mg/kg	NC		NC			7.2E-04	ug/m3	ND		
				HCX	0.0000041	mg/kg	5.1E-13	ug/m3	3.8E+01	(ug/m3)-1	2.E-11	2.9E-12	ug/m3	4.0E-05	ug/m3	7.E-08
				Dioxin-TEQ-M	0.0025	mg/kg	3.2E-10	ug/m3	3.8E+01	(ug/m3)-1	1.E-08	1.8E-09	ug/m3	4.0E-05	ug/m3	5.E-05
			EXPOSURE ROUTE TOTAL								4.E-08					9.E-03
		EXPOSURE POINT TOTAL									4.E-08					9.E-03
	EXPOSURE MEDIUM TOTAL										4.E-08					9.E-03
OIL TOTAL											**4.E-04**					**4.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**
											4.E-04					**4.E+01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.6
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			3.1E-05	mg/kg/day	8.0E-04	mg/kg/day	4.E-02
				1,2,4-trichlorobenzene	15.3	mg/kg	3.6E-06	mg/kg/day	2.9E-02	(mg/kg/day)-1	1.E-07	2.1E-05	mg/kg/day	1.0E-02	mg/kg/day	2.E-03
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			9.7E-05	mg/kg/day	ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			7.8E-04	mg/kg/day	9.0E-02	mg/kg/day	9.E-03
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			9.9E-07	mg/kg/day	2.0E-02	mg/kg/day	5.E-05
				1,4-dichlorobenzene	10.9	mg/kg	2.6E-06	mg/kg/day	5.4E-03	(mg/kg/day)-1	1.E-08	1.5E-05	mg/kg/day	7.0E-02	mg/kg/day	2.E-04
				Benzene	109	mg/kg	2.6E-05	mg/kg/day	5.5E-02	(mg/kg/day)-1	1.E-06	1.5E-04	mg/kg/day	4.0E-03	mg/kg/day	4.E-02
				Chlorobenzene	214	mg/kg	NC		NC			2.9E-04	mg/kg/day	2.0E-02	mg/kg/day	1.E-02
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			2.0E-04	mg/kg/day	2.0E-03	mg/kg/day	1.E-01
				Ethyl benzene	22.6	mg/kg	5.3E-06	mg/kg/day	1.1E-02	(mg/kg/day)-1	6.E-08	3.1E-05	mg/kg/day	1.0E-01	mg/kg/day	3.E-04
				Naphthalene	36.0	mg/kg	NC		NC			4.9E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			1.4E-08	mg/kg/day	ND		
				Tetrachloroethene	335	mg/kg	7.9E-05	mg/kg/day	2.1E-03	(mg/kg/day)-1	2.E-07	4.6E-04	mg/kg/day	6.0E-03	mg/kg/day	8.E-02
				Trichloroethene	470	mg/kg	1.1E-04	mg/kg/day	4.6E-02	(mg/kg/day)-1	5.E-06	6.4E-04	mg/kg/day	5.0E-04	mg/kg/day	1.E+00
				Vinyl Chloride	0.21	mg/kg	4.9E-08	mg/kg/day	1.4E+00	(mg/kg/day)-1	7.E-08	2.8E-07	mg/kg/day	3.0E-03	mg/kg/day	9.E-05
				Xylenes, Total	30	mg/kg	NC		NC			4.1E-05	mg/kg/day	2.0E-01	mg/kg/day	2.E-04
				4-chloroaniline	0.43	mg/kg	1.0E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	2.E-08	5.9E-07	mg/kg/day	4.0E-03	mg/kg/day	1.E-04
				Benzo(a)anthracene	1.3	mg/kg	3.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	1.8E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Benzo(a)pyrene	1.4	mg/kg	3.3E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-06	1.9E-06	mg/kg/day	3.0E-02	mg/kg/day	6.E-05
				Benzo(b)fluoranthene	2.1	mg/kg	5.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.E-07	2.9E-06	mg/kg/day	3.0E-02	mg/kg/day	1.E-04
				Benzo(k)fluoranthene	0.41	mg/kg	9.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	7.E-09	5.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				Bis(2-ethylhexyl)phthalate	91	mg/kg	2.1E-05	mg/kg/day	1.4E-02	(mg/kg/day)-1	3.E-07	1.2E-04	mg/kg/day	2.0E-02	mg/kg/day	6.E-03
				Carbazole	0.22	mg/kg	5.3E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	1.E-09	3.1E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	5.8E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-07	3.4E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			7.2E-07	mg/kg/day	2.0E-02	mg/kg/day	4.E-05
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	1.2E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.E-08	7.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.E-05
				4,4`-DDE	0.66	mg/kg	1.5E-07	mg/kg/day	3.4E-01	(mg/kg/day)-1	5.E-08	9.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aldrin	0.38	mg/kg	8.9E-08	mg/kg/day	1.7E+01	(mg/kg/day)-1	2.E-06	5.2E-07	mg/kg/day	3.0E-05	mg/kg/day	2.E-02
				Chlordane	0.12	mg/kg	2.8E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	1.E-08	1.6E-07	mg/kg/day	5.0E-04	mg/kg/day	3.E-04
				Dieldrin	2.4	mg/kg	5.7E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	9.E-06	3.3E-06	mg/kg/day	5.0E-05	mg/kg/day	7.E-02
				Endrin	0.52	mg/kg	NC		NC			7.1E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03
				Heptachlor	0.43	mg/kg	1.0E-07	mg/kg/day	4.5E+00	(mg/kg/day)-1	5.E-07	5.8E-07	mg/kg/day	5.0E-04	mg/kg/day	1.E-03
				Aroclor-1232	1.8	mg/kg	4.2E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-07	2.4E-06	mg/kg/day	2.0E-05	mg/kg/day	1.E-01
				Aroclor-1242	2.9	mg/kg	6.8E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	4.0E-06	mg/kg/day	2.0E-05	mg/kg/day	2.E-01
				Aroclor-1248	17.2	mg/kg	4.0E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-06	2.4E-05	mg/kg/day	2.0E-05	mg/kg/day	1.E+00
				Aroclor-1254	88	mg/kg	2.1E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-05	1.2E-04	mg/kg/day	2.0E-05	mg/kg/day	6.E+00
				Aluminum	6043	mg/kg	NC		NC			8.3E-03	mg/kg/day	1.0E+00	mg/kg/day	8.E-03
				Antimony	6.0	mg/kg	NC		NC			8.3E-06	mg/kg/day	4.0E-04	mg/kg/day	2.E-02
				Arsenic	9.9	mg/kg	2.3E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-06	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	5.E-02
				Cadmium	27	mg/kg	NC		NC			3.7E-05	mg/kg/day	1.0E-03	mg/kg/day	4.E-02
				Chromium	57	mg/kg	NC		NC			7.8E-05	mg/kg/day	1.5E+00	mg/kg/day	5.E-05
				Cobalt	9.1	mg/kg	NC		NC			1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.E-02
				Copper	200	mg/kg	NC		NC			2.7E-04	mg/kg/day	4.0E-02	mg/kg/day	7.E-03
				Manganese	293	mg/kg	NC		NC			4.0E-04	mg/kg/day	4.7E-02	mg/kg/day	9.E-03
				Mercury	0.842	mg/kg	NC		NC			1.2E-06	mg/kg/day	3.0E-04	mg/kg/day	4.E-03
				Thallium	4.7	mg/kg	NC		NC			6.5E-06	mg/kg/day	1.0E-05	mg/kg/day	6.E-01
				Vanadium	25	mg/kg	NC		NC			3.4E-05	mg/kg/day	4.9E-03	mg/kg/day	7.E-03
				Zinc	994	mg/kg	NC		NC			1.4E-03	mg/kg/day	3.0E-01	mg/kg/day	5.E-03
				HCX	0.0000041	mg/kg	9.5E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-07	5.6E-12	mg/kg/day	7.0E-10	mg/kg/day	8.E-03
				Dioxin-TEQ-M	0.0025	mg/kg	5.9E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	9.E-05	3.5E-09	mg/kg/day	7.0E-10	mg/kg/day	5.E+00
			EXPOSURE ROUTE TOTAL								2.E-04					1.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.6
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SUBSURFACE SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				1,2,4-trichlorobenzene	15.3	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	570	mg/kg	NC		NC			--		9.0E-02	mg/kg/day	
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				1,4-dichlorobenzene	10.9	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	109	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		4.0E-03	mg/kg/day	
				Chlorobenzene	214	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Ethyl benzene	22.6	mg/kg	--		--			--		1.0E-01	mg/kg/day	
				Naphthalene	36.0	mg/kg	NC		NC			2.6E-05	mg/kg/day	2.0E-02	mg/kg/day	1.E-03
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			--		ND		
				Tetrachloroethene	335	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		6.0E-03	mg/kg/day	
				Trichloroethene	470	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Vinyl Chloride	0.21	mg/kg	--		1.4E+00	(mg/kg/day)-1		--		3.0E-03	mg/kg/day	
				Xylenes, Total	30	mg/kg	NC		NC			--		2.0E-01	mg/kg/day	
				4-chloroaniline	0.43	mg/kg	4.0E-08	mg/kg/day	2.0E-01	(mg/kg/day)-1	8.E-09	2.4E-07	mg/kg/day	4.0E-03	mg/kg/day	6.E-05
				Benzo(a)anthracene	1.3	mg/kg	1.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-07	9.2E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(a)pyrene	1.4	mg/kg	1.7E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-06	9.8E-07	mg/kg/day	3.0E-02	mg/kg/day	3.E-05
				Benzo(b)fluoranthene	2.1	mg/kg	2.6E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-07	1.5E-06	mg/kg/day	3.0E-02	mg/kg/day	5.E-05
				Benzo(k)fluoranthene	0.41	mg/kg	5.0E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	4.E-09	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				Bis(2-ethylhexyl)phthalate	91	mg/kg	8.5E-06	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-07	5.0E-05	mg/kg/day	2.0E-02	mg/kg/day	2.E-03
				Carbazole	0.22	mg/kg	2.1E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	4.E-10	1.2E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	3.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	1.7E-07	mg/kg/day	3.0E-02	mg/kg/day	6.E-06
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			2.9E-07	mg/kg/day	2.0E-02	mg/kg/day	1.E-05
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	6.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	5.E-08	3.7E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-05
				4,4`-DDE	0.66	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aldrin	0.38	mg/kg	--		1.7E+01	(mg/kg/day)-1		--		3.0E-05	mg/kg/day	
				Chlordane	0.12	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Dieldrin	2.4	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		5.0E-05	mg/kg/day	
				Endrin	0.52	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Heptachlor	0.43	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	1.8	mg/kg	2.3E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-07	1.4E-06	mg/kg/day	2.0E-05	mg/kg/day	7.E-02
				Aroclor-1242	2.9	mg/kg	3.8E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	8.E-07	2.2E-06	mg/kg/day	2.0E-05	mg/kg/day	1.E-01
				Aroclor-1248	17.2	mg/kg	2.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-06	1.3E-05	mg/kg/day	2.0E-05	mg/kg/day	7.E-01
				Aroclor-1254	88	mg/kg	1.1E-05	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-05	6.7E-05	mg/kg/day	2.0E-05	mg/kg/day	3.E+00
				Aluminum	6043	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	6.0	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	9.9	mg/kg	2.8E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	4.E-07	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	5.E-03
				Cadmium	27	mg/kg	NC		NC			1.5E-07	mg/kg/day	2.5E-05	mg/kg/day	6.E-03
				Chromium	57	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				Cobalt	9.1	mg/kg	NC		NC			--		3.0E-04	mg/kg/day	
				Copper	200	mg/kg	NC		NC			--		4.0E-02	mg/kg/day	
				Manganese	293	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	0.842	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	4.7	mg/kg	NC		NC			--		1.0E-05	mg/kg/day	
				Vanadium	25	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Zinc	994	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000041	mg/kg	1.1E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	2.E-08	6.7E-13	mg/kg/day	7.0E-10	mg/kg/day	1.E-03
				Dioxin-TEQ-M	0.0025	mg/kg	7.1E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	1.E-05	4.1E-10	mg/kg/day	7.0E-10	mg/kg/day	6.E-01
			EXPOSURE ROUTE TOTAL								4.E-05					5.E+00
		EXPOSURE POINT TOTAL									2.E-04					2.E+01
	EXPOSURE MEDIUM TOTAL										2.E-04					2.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.6
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	CSF/UNIT RISK VALUE	CSF UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	RfD/RfC (1) VALUE	RfD/RfC UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	22.7	mg/kg	NC		NC			1.6E-05	ug/m3	ND		
				1,2,4-trichlorobenzene	15.3	mg/kg	NC		NC			1.1E-05	ug/m3	2.0E+00	ug/m3	6.E-06
				1,2,4-trimethylbenzene	71	mg/kg	NC		NC			5.1E-05	ug/m3	7.0E+00	ug/m3	7.E-06
				1,2-dichlorobenzene	570	mg/kg	NC		NC			4.1E-04	ug/m3	2.0E+02	ug/m3	2.E-06
				1,3-dichlorobenzene	0.73	mg/kg	NC		NC			5.3E-07	ug/m3	ND		
				1,4-dichlorobenzene	10.9	mg/kg	1.4E-06	ug/m3	1.1E-05	(ug/m3)-1	1.E-11	7.9E-06	ug/m3	8.0E+02	ug/m3	1.E-08
				Benzene	109	mg/kg	1.4E-05	ug/m3	7.8E-06	(ug/m3)-1	1.E-10	7.9E-05	ug/m3	3.0E+01	ug/m3	3.E-06
				Chlorobenzene	214	mg/kg	NC		NC			1.6E-04	ug/m3	5.0E+01	ug/m3	3.E-06
				Cis-1,2-dichloroethene	143	mg/kg	NC		NC			1.0E-04	ug/m3	ND		
				Ethyl benzene	22.6	mg/kg	2.8E-06	ug/m3	2.5E-06	(ug/m3)-1	7.E-12	1.6E-05	ug/m3	1.0E+03	ug/m3	2.E-08
				Naphthalene	36.0	mg/kg	NC		NC			2.6E-05	ug/m3	3.0E+00	ug/m3	9.E-06
				Sec-butylbenzene	0.0100	mg/kg	NC		NC			7.3E-09	ug/m3	ND		
				Tetrachloroethene	335	mg/kg	4.2E-05	ug/m3	2.6E-07	(ug/m3)-1	1.E-11	2.4E-04	ug/m3	4.0E+01	ug/m3	6.E-06
				Trichloroethene	470	mg/kg	5.9E-05	ug/m3	4.1E-06	(ug/m3)-1	2.E-10	3.4E-04	ug/m3	2.0E+00	ug/m3	2.E-04
				Vinyl Chloride	0.21	mg/kg	2.6E-08	ug/m3	8.8E-06	(ug/m3)-1	2.E-13	1.5E-07	ug/m3	1.0E+02	ug/m3	2.E-09
				Xylenes, Total	30	mg/kg	NC		NC			2.2E-05	ug/m3	1.0E+02	ug/m3	2.E-07
				4-chloroaniline	0.43	mg/kg	NC		NC			3.1E-07	ug/m3	ND		
				Benzo(a)anthracene	1.3	mg/kg	1.6E-07	ug/m3	1.1E-04	(ug/m3)-1	2.E-11	9.4E-07	ug/m3	ND		
				Benzo(a)pyrene	1.4	mg/kg	1.7E-07	ug/m3	1.1E-03	(ug/m3)-1	2.E-10	1.0E-06	ug/m3	ND		
				Benzo(b)fluoranthene	2.1	mg/kg	2.6E-07	ug/m3	1.1E-04	(ug/m3)-1	3.E-11	1.5E-06	ug/m3	ND		
				Benzo(k)fluoranthene	0.41	mg/kg	5.1E-08	ug/m3	1.1E-04	(ug/m3)-1	6.E-12	3.0E-07	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	91	mg/kg	1.1E-05	ug/m3	2.4E-06	(ug/m3)-1	3.E-11	6.6E-05	ug/m3	ND		
				Carbazole	0.22	mg/kg	NC		NC			1.6E-07	ug/m3	ND		
				Dibenz(a,h)anthracene	0.25	mg/kg	3.1E-08	ug/m3	1.2E-03	(ug/m3)-1	4.E-11	1.8E-07	ug/m3	ND		
				Di-n-octylphthalate	0.53	mg/kg	NC		NC			3.8E-07	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	0.52	mg/kg	6.5E-08	ug/m3	1.1E-04	(ug/m3)-1	7.E-12	3.8E-07	ug/m3	ND		
				4,4`-DDE	0.66	mg/kg	8.2E-08	ug/m3	9.7E-05	(ug/m3)-1	8.E-12	4.8E-07	ug/m3	ND		
				Aldrin	0.38	mg/kg	4.7E-08	ug/m3	4.9E-03	(ug/m3)-1	2.E-10	2.8E-07	ug/m3	ND		
				Chlordane	0.12	mg/kg	1.5E-08	ug/m3	1.0E-04	(ug/m3)-1	1.E-12	8.6E-08	ug/m3	7.0E-01	ug/m3	1.E-07
				Dieldrin	2.4	mg/kg	3.0E-07	ug/m3	4.6E-03	(ug/m3)-1	1.E-09	1.8E-06	ug/m3	ND		
				Endrin	0.52	mg/kg	NC		NC			3.8E-07	ug/m3	ND		
				Heptachlor	0.43	mg/kg	5.3E-08	ug/m3	1.3E-03	(ug/m3)-1	7.E-11	3.1E-07	ug/m3	ND		
				Aroclor-1232	1.8	mg/kg	2.2E-07	ug/m3	5.7E-04	(ug/m3)-1	1.E-10	1.3E-06	ug/m3	ND		
				Aroclor-1242	2.9	mg/kg	3.6E-07	ug/m3	5.7E-04	(ug/m3)-1	2.E-10	2.1E-06	ug/m3	ND		
				Aroclor-1248	17.2	mg/kg	2.1E-06	ug/m3	5.7E-04	(ug/m3)-1	1.E-09	1.2E-05	ug/m3	ND		
				Aroclor-1254	88	mg/kg	1.1E-05	ug/m3	5.7E-04	(ug/m3)-1	6.E-09	6.4E-05	ug/m3	ND		
				Aluminum	6043	mg/kg	NC		NC			4.4E-03	ug/m3	5.0E+00	ug/m3	9.E-04
				Antimony	6.0	mg/kg	NC		NC			4.4E-06	ug/m3	ND		
				Arsenic	9.9	mg/kg	1.2E-06	ug/m3	4.3E-03	(ug/m3)-1	5.E-09	7.2E-06	ug/m3	1.5E-02	ug/m3	5.E-04
				Cadmium	27	mg/kg	3.4E-06	ug/m3	1.8E-03	(ug/m3)-1	6.E-09	2.0E-05	ug/m3	1.0E-02	ug/m3	2.E-03
				Chromium	57	mg/kg	NC		NC			4.1E-05	ug/m3	ND		
				Cobalt	9.1	mg/kg	1.1E-06	ug/m3	9.0E-03	(ug/m3)-1	1.E-08	6.6E-06	ug/m3	6.0E-03	ug/m3	1.E-03
				Copper	200	mg/kg	NC		NC			1.5E-04	ug/m3	ND		
				Manganese	293	mg/kg	NC		NC			2.1E-04	ug/m3	5.0E-02	ug/m3	4.E-03
				Mercury	0.842	mg/kg	NC		NC			6.1E-07	ug/m3	3.0E-01	ug/m3	2.E-06
				Thallium	4.7	mg/kg	NC		NC			3.4E-06	ug/m3	ND		
				Vanadium	25	mg/kg	NC		NC			1.8E-05	ug/m3	1.0E-01	ug/m3	2.E-04
				Zinc	994	mg/kg	NC		NC			7.2E-04	ug/m3	ND		
				HCX	0.0000041	mg/kg	5.1E-13	ug/m3	3.8E+01	(ug/m3)-1	2.E-11	2.9E-12	ug/m3	4.0E-05	ug/m3	7.E-08
				Dioxin-TEQ-M	0.0025	mg/kg	3.2E-10	ug/m3	3.8E+01	(ug/m3)-1	1.E-08	1.8E-09	ug/m3	4.0E-05	ug/m3	5.E-05
			EXPOSURE ROUTE TOTAL								4.E-08					9.E-03
		EXPOSURE POINT TOTAL									4.E-08					9.E-03
	EXPOSURE MEDIUM TOTAL										4.E-08					9.E-03
OIL TOTAL											**2.E-04**					**2.E+01**
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**2.E-04**		**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**2.E+01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 7.7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	SOURCE AREA	INGESTION	1,2,3-trichlorobenzene	27	mg/kg	NC		NC			8.9E-05	mg/kg/day	8.0E-03	mg/kg/day	1.E-02
				1,2,4-trichlorobenzene	53	mg/kg	2.4E-06	mg/kg/day	2.9E-02	(mg/kg/day)-1	7.E-08	1.7E-04	mg/kg/day	9.0E-02	mg/kg/day	2.E-03
				1,2,4-trimethylbenzene	55	mg/kg	NC		NC			1.8E-04	mg/kg/day	ND		
				1,2-dichlorobenzene	361	mg/kg	NC		NC			1.2E-03	mg/kg/day	6.0E-01	mg/kg/day	2.E-03
				1,3-dichlorobenzene	0.59	mg/kg	NC		NC			1.9E-06	mg/kg/day	2.0E-02	mg/kg/day	1.E-04
				1,4-dichlorobenzene	7.2	mg/kg	3.3E-07	mg/kg/day	5.4E-03	(mg/kg/day)-1	2.E-09	2.3E-05	mg/kg/day	7.0E-02	mg/kg/day	3.E-04
				Benzene	61	mg/kg	2.8E-06	mg/kg/day	5.5E-02	(mg/kg/day)-1	2.E-07	2.0E-04	mg/kg/day	1.0E-02	mg/kg/day	2.E-02
				Chlorobenzene	128	mg/kg	NC		NC			4.1E-04	mg/kg/day	7.0E-02	mg/kg/day	6.E-03
				Cis-1,2-dichloroethene	83	mg/kg	NC		NC			2.7E-04	mg/kg/day	3.0E-01	mg/kg/day	9.E-04
				Ethyl benzene	6.1	mg/kg	2.8E-07	mg/kg/day	1.1E-02	(mg/kg/day)-1	3.E-09	2.0E-05	mg/kg/day	5.0E-02	mg/kg/day	4.E-04
				Naphthalene	28.4	mg/kg	NC		NC			9.2E-05	mg/kg/day	6.0E-01	mg/kg/day	2.E-04
				Tetrachloroethene	207	mg/kg	9.5E-06	mg/kg/day	2.1E-03	(mg/kg/day)-1	2.E-08	6.7E-04	mg/kg/day	1.0E-01	mg/kg/day	7.E-03
				Trichloroethene	268	mg/kg	1.2E-05	mg/kg/day	4.6E-02	(mg/kg/day)-1	6.E-07	8.7E-04	mg/kg/day	5.0E-04	mg/kg/day	2.E+00
				Vinyl Chloride	0.18	mg/kg	8.3E-09	mg/kg/day	1.4E+00	(mg/kg/day)-1	1.E-08	5.8E-07	mg/kg/day	3.0E-03	mg/kg/day	2.E-04
				Xylenes, Total	28	mg/kg	NC		NC			8.9E-05	mg/kg/day	4.0E-01	mg/kg/day	2.E-04
				4-chloroaniline	9.4	mg/kg	4.3E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	9.E-08	3.0E-05	mg/kg/day	5.0E-04	mg/kg/day	6.E-02
				Benzo(a)anthracene	1.7	mg/kg	7.8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.E-08	5.4E-06	mg/kg/day	3.0E-01	mg/kg/day	2.E-05
				Benzo(a)pyrene	1.7	mg/kg	7.9E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.E-07	5.5E-06	mg/kg/day	3.0E-01	mg/kg/day	2.E-05
				Benzo(b)fluoranthene	2.3	mg/kg	1.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	8.E-08	7.3E-06	mg/kg/day	3.0E-01	mg/kg/day	2.E-05
				Benzo(k)fluoranthene	0.99	mg/kg	4.6E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	3.E-09	3.2E-06	mg/kg/day	3.0E-01	mg/kg/day	1.E-05
				Bis(2-ethylhexyl)phthalate	60	mg/kg	2.8E-06	mg/kg/day	1.4E-02	(mg/kg/day)-1	4.E-08	1.9E-04	mg/kg/day	1.0E-01	mg/kg/day	2.E-03
				Carbazole	0.29	mg/kg	1.3E-08	mg/kg/day	2.0E-02	(mg/kg/day)-1	3.E-10	9.4E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.34	mg/kg	1.6E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	1.E-07	1.1E-06	mg/kg/day	3.0E-01	mg/kg/day	4.E-06
				Di-n-octylphthalate	0.59	mg/kg	NC		NC			1.9E-06	mg/kg/day	4.0E-01	mg/kg/day	5.E-06
				Indeno(1,2,3-cd)pyrene	0.78	mg/kg	3.6E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.5E-06	mg/kg/day	3.0E-01	mg/kg/day	8.E-06
				4,4`-DDE	0.41	mg/kg	1.9E-08	mg/kg/day	3.4E-01	(mg/kg/day)-1	6.E-09	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	3.E-03
				Aldrin	0.17	mg/kg	7.8E-09	mg/kg/day	1.7E+01	(mg/kg/day)-1	1.E-07	5.5E-07	mg/kg/day	4.0E-05	mg/kg/day	1.E-02
				Chlordane	0.97	mg/kg	4.5E-08	mg/kg/day	3.5E-01	(mg/kg/day)-1	2.E-08	3.1E-06	mg/kg/day	6.0E-04	mg/kg/day	5.E-03
				Dieldrin	1.08	mg/kg	5.0E-08	mg/kg/day	1.6E+01	(mg/kg/day)-1	8.E-07	3.5E-06	mg/kg/day	1.0E-04	mg/kg/day	3.E-02
				Endrin	0.26	mg/kg	NC		NC			8.3E-07	mg/kg/day	2.0E-03	mg/kg/day	4.E-04
				Heptachlor	0.29	mg/kg	1.3E-08	mg/kg/day	4.5E+00	(mg/kg/day)-1	6.E-08	9.4E-07	mg/kg/day	5.0E-04	mg/kg/day	2.E-03
				Aroclor-1232	4.0	mg/kg	1.8E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-07	1.3E-05	mg/kg/day	5.0E-05	mg/kg/day	3.E-01
				Aroclor-1242	3.6	mg/kg	1.7E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-07	1.2E-05	mg/kg/day	5.0E-05	mg/kg/day	2.E-01
				Aroclor-1248	11.8	mg/kg	5.4E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-06	3.8E-05	mg/kg/day	5.0E-05	mg/kg/day	8.E-01
				Aroclor-1254	68	mg/kg	3.2E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	6.E-06	2.2E-04	mg/kg/day	3.0E-05	mg/kg/day	7.E+00
				Aroclor-1268	4.3	mg/kg	2.0E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	4.E-07	1.4E-05	mg/kg/day	5.0E-05	mg/kg/day	3.E-01
				Aluminum	6606	mg/kg	NC		NC			2.1E-02	mg/kg/day	1.0E+00	mg/kg/day	2.E-02
				Antimony	3.5	mg/kg	NC		NC			1.1E-05	mg/kg/day	4.0E-04	mg/kg/day	3.E-02
				Arsenic	8.4	mg/kg	3.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	2.7E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02
				Cadmium	19.2	mg/kg	NC		NC			6.2E-05	mg/kg/day	5.0E-04	mg/kg/day	1.E-01
				Chromium	74	mg/kg	NC		NC			2.4E-04	mg/kg/day	1.0E+00	mg/kg/day	2.E-04
				Cobalt	8.2	mg/kg	NC		NC			2.6E-05	mg/kg/day	3.0E-03	mg/kg/day	9.E-03
				Copper	164	mg/kg	NC		NC			5.3E-04	mg/kg/day	1.0E-02	mg/kg/day	5.E-02
				Manganese	325	mg/kg	NC		NC			1.0E-03	mg/kg/day	4.7E-02	mg/kg/day	2.E-02
				Mercury	1.2	mg/kg	NC		NC			3.8E-06	mg/kg/day	2.0E-03	mg/kg/day	2.E-03
				Thallium	2.9	mg/kg	NC		NC			9.4E-06	mg/kg/day	8.0E-04	mg/kg/day	1.E-02
				Vanadium	31	mg/kg	NC		NC			1.0E-04	mg/kg/day	1.0E-02	mg/kg/day	1.E-02
				Zinc	761	mg/kg	NC		NC			2.5E-03	mg/kg/day	3.0E-01	mg/kg/day	8.E-03
				HCX	0.0000081	mg/kg	3.7E-13	mg/kg/day	1.5E+05	(mg/kg/day)-1	6.E-08	2.6E-11	mg/kg/day	2.0E-05	mg/kg/day	1.E-06
				Dioxin-TEQ-M	0.0047	mg/kg	2.2E-10	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-05	1.5E-08	mg/kg/day	2.0E-05	mg/kg/day	8.E-04
			EXPOSURE ROUTE TOTAL								4.E-05					1.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
SOIL	SOIL	SOURCE AREA	DERMAL	1,2,3-trichlorobenzene	27	mg/kg	NC		NC			--		8.0E-03	mg/kg/day	
				1,2,4-trichlorobenzene	53	mg/kg	--		2.9E-02	(mg/kg/day)-1		--		9.0E-02	mg/kg/day	
				1,2,4-trimethylbenzene	55	mg/kg	NC		NC			--		ND		
				1,2-dichlorobenzene	361	mg/kg	NC		NC			--		6.0E-01	mg/kg/day	
				1,3-dichlorobenzene	0.59	mg/kg	NC		NC			--		2.0E-02	mg/kg/day	
				1,4-dichlorobenzene	7.2	mg/kg	--		5.4E-03	(mg/kg/day)-1		--		7.0E-02	mg/kg/day	
				Benzene	61	mg/kg	--		5.5E-02	(mg/kg/day)-1		--		1.0E-02	mg/kg/day	
				Chlorobenzene	128	mg/kg	NC		NC			--		7.0E-02	mg/kg/day	
				Cis-1,2-dichloroethene	83	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				Ethyl benzene	6.1	mg/kg	--		--			--		5.0E-02	mg/kg/day	
				Naphthalene	28.4	mg/kg	NC		NC			3.6E-05	mg/kg/day	6.0E-01	mg/kg/day	6.E-05
				Tetrachloroethene	207	mg/kg	--		2.1E-03	(mg/kg/day)-1		--		1.0E-01	mg/kg/day	
				Trichloroethene	268	mg/kg	--		4.6E-02	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Vinyl Chloride	0.18	mg/kg	--		1.4E+00	(mg/kg/day)-1		--		3.0E-03	mg/kg/day	
				Xylenes, Total	28	mg/kg	NC		NC			--		4.0E-01	mg/kg/day	
				4-chloroaniline	9.4	mg/kg	1.3E-07	mg/kg/day	2.0E-01	(mg/kg/day)-1	3.E-08	9.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.E-02
				Benzo(a)anthracene	1.7	mg/kg	3.0E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.E-08	2.1E-06	mg/kg/day	3.0E-01	mg/kg/day	7.E-06
				Benzo(a)pyrene	1.7	mg/kg	3.1E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.E-07	2.2E-06	mg/kg/day	3.0E-01	mg/kg/day	7.E-06
				Benzo(b)fluoranthene	2.3	mg/kg	4.1E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	3.E-08	2.9E-06	mg/kg/day	3.0E-01	mg/kg/day	1.E-05
				Benzo(k)fluoranthene	0.99	mg/kg	1.8E-08	mg/kg/day	7.3E-02	(mg/kg/day)-1	1.E-09	1.2E-06	mg/kg/day	3.0E-01	mg/kg/day	4.E-06
				Bis(2-ethylhexyl)phthalate	60	mg/kg	8.4E-07	mg/kg/day	1.4E-02	(mg/kg/day)-1	1.E-08	5.8E-05	mg/kg/day	1.0E-01	mg/kg/day	6.E-04
				Carbazole	0.29	mg/kg	4.0E-09	mg/kg/day	2.0E-02	(mg/kg/day)-1	8.E-11	2.8E-07	mg/kg/day	ND		
				Dibenz(a,h)anthracene	0.34	mg/kg	6.1E-09	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.E-08	4.3E-07	mg/kg/day	3.0E-01	mg/kg/day	1.E-06
				Di-n-octylphthalate	0.59	mg/kg	NC		NC			5.7E-07	mg/kg/day	4.0E-01	mg/kg/day	1.E-06
				Indeno(1,2,3-cd)pyrene	0.78	mg/kg	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.E-08	9.8E-07	mg/kg/day	3.0E-01	mg/kg/day	3.E-06
				4,4`-DDE	0.41	mg/kg	--		3.4E-01	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aldrin	0.17	mg/kg	--		1.7E+01	(mg/kg/day)-1		--		4.0E-05	mg/kg/day	
				Chlordane	0.97	mg/kg	--		3.5E-01	(mg/kg/day)-1		--		6.0E-04	mg/kg/day	
				Dieldrin	1.08	mg/kg	--		1.6E+01	(mg/kg/day)-1		--		1.0E-04	mg/kg/day	
				Endrin	0.26	mg/kg	NC		NC			--		2.0E-03	mg/kg/day	
				Heptachlor	0.29	mg/kg	--		4.5E+00	(mg/kg/day)-1		--		5.0E-04	mg/kg/day	
				Aroclor-1232	4.0	mg/kg	7.7E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	5.4E-06	mg/kg/day	5.0E-05	mg/kg/day	1.E-01
				Aroclor-1242	3.6	mg/kg	7.1E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	1.E-07	4.9E-06	mg/kg/day	5.0E-05	mg/kg/day	1.E-01
				Aroclor-1248	11.8	mg/kg	2.3E-07	mg/kg/day	2.0E+00	(mg/kg/day)-1	5.E-07	1.6E-05	mg/kg/day	5.0E-05	mg/kg/day	3.E-01
				Aroclor-1254	68	mg/kg	1.3E-06	mg/kg/day	2.0E+00	(mg/kg/day)-1	3.E-06	9.3E-05	mg/kg/day	3.0E-05	mg/kg/day	3.E+00
				Aroclor-1268	4.3	mg/kg	8.4E-08	mg/kg/day	2.0E+00	(mg/kg/day)-1	2.E-07	5.9E-06	mg/kg/day	5.0E-05	mg/kg/day	1.E-01
				Aluminum	6606	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Antimony	3.5	mg/kg	NC		NC			--		6.0E-05	mg/kg/day	
				Arsenic	8.4	mg/kg	3.5E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-08	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	8.E-03
				Cadmium	19.2	mg/kg	NC		NC			1.9E-07	mg/kg/day	1.3E-05	mg/kg/day	1.E-02
				Chromium	74	mg/kg	NC		NC			--		1.3E-02	mg/kg/day	
				Cobalt	8.2	mg/kg	NC		NC			--		3.0E-03	mg/kg/day	
				Copper	164	mg/kg	NC		NC			--		1.0E-02	mg/kg/day	
				Manganese	325	mg/kg	NC		NC			--		1.9E-03	mg/kg/day	
				Mercury	1.2	mg/kg	NC		NC			--		1.4E-04	mg/kg/day	
				Thallium	2.9	mg/kg	NC		NC			--		8.0E-04	mg/kg/day	
				Vanadium	31	mg/kg	NC		NC			--		2.6E-04	mg/kg/day	
				Zinc	761	mg/kg	NC		NC			--		3.0E-01	mg/kg/day	
				HCX	0.0000081	mg/kg	3.4E-14	mg/kg/day	1.5E+05	(mg/kg/day)-1	5.E-09	2.4E-12	mg/kg/day	2.0E-05	mg/kg/day	1.E-07
				Dioxin-TEQ-M	0.0047	mg/kg	2.0E-11	mg/kg/day	1.5E+05	(mg/kg/day)-1	3.E-06	1.4E-09	mg/kg/day	2.0E-05	mg/kg/day	7.E-05
			EXPOSURE ROUTE TOTAL								7.E-06					4.E+00
		EXPOSURE POINT TOTAL									5.E-05					1.E+01
	EXPOSURE MEDIUM TOTAL										5.E-05					1.E+01

US EPA ARCHIVE DOCUMENT

TABLE 7.7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	CSF/UNIT RISK VALUE	CSF UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE UNITS	RfD/RfC (1) VALUE	RfD/RfC UNITS	HAZARD QUOTIENT
SOIL	AIR	DUST AT SOURCE AREA	DUST INHALATION	1,2,3-trichlorobenzene	27	mg/kg	NC		NC			2.6E-04	ug/m3	ND		
				1,2,4-trichlorobenzene	53	mg/kg	NC		NC			5.0E-04	ug/m3	2.0E+01	ug/m3	3.E-05
				1,2,4-trimethylbenzene	55	mg/kg	NC		NC			5.3E-04	ug/m3	7.0E+01	ug/m3	8.E-06
				1,2-dichlorobenzene	361	mg/kg	NC		NC			3.5E-03	ug/m3	2.0E+03	ug/m3	2.E-06
				1,3-dichlorobenzene	0.59	mg/kg	NC		NC			5.6E-06	ug/m3	ND		
				1,4-dichlorobenzene	7.2	mg/kg	9.8E-07	ug/m3	1.1E-05	(ug/m3)-1	1.E-11	6.9E-05	ug/m3	1.2E+03	ug/m3	6.E-08
				Benzene	61	mg/kg	8.3E-06	ug/m3	7.8E-06	(ug/m3)-1	6.E-11	5.8E-04	ug/m3	8.0E+01	ug/m3	7.E-06
				Chlorobenzene	128	mg/kg	NC		NC			1.2E-03	ug/m3	5.0E+02	ug/m3	2.E-06
				Cis-1,2-dichloroethene	83	mg/kg	NC		NC			8.0E-04	ug/m3	ND		
				Ethyl benzene	6.1	mg/kg	8.4E-07	ug/m3	2.5E-06	(ug/m3)-1	2.E-12	5.9E-05	ug/m3	9.0E+03	ug/m3	7.E-09
				Naphthalene	28.4	mg/kg	NC		NC			2.7E-04	ug/m3	3.0E+00	ug/m3	9.E-05
				Tetrachloroethene	207	mg/kg	2.8E-05	ug/m3	2.6E-07	(ug/m3)-1	7.E-12	2.0E-03	ug/m3	4.0E+01	ug/m3	5.E-05
				Trichloroethene	268	mg/kg	3.7E-05	ug/m3	4.1E-06	(ug/m3)-1	2.E-10	2.6E-03	ug/m3	5.4E+02	ug/m3	5.E-06
				Vinyl Chloride	0.18	mg/kg	2.5E-08	ug/m3	8.8E-06	(ug/m3)-1	2.E-13	1.7E-06	ug/m3	1.0E+02	ug/m3	2.E-08
				Xylenes, Total	28	mg/kg	NC		NC			2.7E-04	ug/m3	4.0E+02	ug/m3	7.E-07
				4-chloroaniline	9.4	mg/kg	NC		NC			9.0E-05	ug/m3	ND		
				Benzo(a)anthracene	1.7	mg/kg	2.3E-07	ug/m3	1.1E-04	(ug/m3)-1	3.E-11	1.6E-05	ug/m3	ND		
				Benzo(a)pyrene	1.7	mg/kg	2.3E-07	ug/m3	1.1E-03	(ug/m3)-1	3.E-10	1.6E-05	ug/m3	ND		
				Benzo(b)fluoranthene	2.3	mg/kg	3.1E-07	ug/m3	1.1E-04	(ug/m3)-1	3.E-11	2.2E-05	ug/m3	ND		
				Benzo(k)fluoranthene	0.99	mg/kg	1.4E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-11	9.5E-06	ug/m3	ND		
				Bis(2-ethylhexyl)phthalate	60	mg/kg	8.3E-06	ug/m3	2.4E-06	(ug/m3)-1	2.E-11	5.8E-04	ug/m3	ND		
				Carbazole	0.29	mg/kg	NC		NC			2.8E-06	ug/m3	ND		
				Dibenz(a,h)anthracene	0.34	mg/kg	4.7E-08	ug/m3	1.2E-03	(ug/m3)-1	6.E-11	3.3E-06	ug/m3	ND		
				Di-n-octylphthalate	0.59	mg/kg	NC		NC			5.7E-06	ug/m3	NA		
				Indeno(1,2,3-cd)pyrene	0.78	mg/kg	1.1E-07	ug/m3	1.1E-04	(ug/m3)-1	1.E-11	7.5E-06	ug/m3	ND		
				4,4`-DDE	0.41	mg/kg	5.6E-08	ug/m3	9.7E-05	(ug/m3)-1	5.E-12	3.9E-06	ug/m3	ND		
				Aldrin	0.17	mg/kg	2.3E-08	ug/m3	4.9E-03	(ug/m3)-1	1.E-10	1.6E-06	ug/m3	ND		
				Chlordane	0.97	mg/kg	1.3E-07	ug/m3	1.0E-04	(ug/m3)-1	1.E-11	9.3E-06	ug/m3	2.0E-01	ug/m3	5.E-05
				Dieldrin	1.08	mg/kg	1.5E-07	ug/m3	4.6E-03	(ug/m3)-1	7.E-10	1.0E-05	ug/m3	ND		
				Endrin	0.26	mg/kg	NC		NC			2.5E-06	ug/m3	ND		
				Heptachlor	0.29	mg/kg	4.0E-08	ug/m3	1.3E-03	(ug/m3)-1	5.E-11	2.8E-06	ug/m3	ND		
				Aroclor-1232	4.0	mg/kg	5.4E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	3.8E-05	ug/m3	ND		
				Aroclor-1242	3.6	mg/kg	5.0E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	3.5E-05	ug/m3	ND		
				Aroclor-1248	11.8	mg/kg	1.6E-06	ug/m3	5.7E-04	(ug/m3)-1	9.E-10	1.1E-04	ug/m3	ND		
				Aroclor-1254	68	mg/kg	9.4E-06	ug/m3	5.7E-04	(ug/m3)-1	5.E-09	6.5E-04	ug/m3	ND		
				Aroclor-1268	4.3	mg/kg	6.0E-07	ug/m3	5.7E-04	(ug/m3)-1	3.E-10	4.2E-05	ug/m3	ND		
				Aluminum	6606	mg/kg	NC		NC			6.3E-02	ug/m3	5.0E+00	ug/m3	1.E-02
				Antimony	3.5	mg/kg	NC		NC			3.4E-05	ug/m3	ND		
				Arsenic	8.4	mg/kg	1.2E-06	ug/m3	4.3E-03	(ug/m3)-1	5.E-09	8.1E-05	ug/m3	1.5E-02	ug/m3	5.E-03
				Cadmium	19.2	mg/kg	2.6E-06	ug/m3	1.8E-03	(ug/m3)-1	5.E-09	1.8E-04	ug/m3	1.0E-02	ug/m3	2.E-02
				Chromium	74	mg/kg	NC		NC			7.1E-04	ug/m3	5.0E+00	ug/m3	1.E-04
				Cobalt	8.2	mg/kg	1.1E-06	ug/m3	9.0E-03	(ug/m3)-1	1.E-08	7.9E-05	ug/m3	2.0E-02	ug/m3	4.E-03
				Copper	164	mg/kg	NC		NC			1.6E-03	ug/m3	ND		
				Manganese	325	mg/kg	NC		NC			3.1E-03	ug/m3	5.0E-02	ug/m3	6.E-02
				Mercury	1.2	mg/kg	NC		NC			1.1E-05	ug/m3	3.0E-01	ug/m3	4.E-05
				Thallium	2.9	mg/kg	NC		NC			2.8E-05	ug/m3	ND		
				Vanadium	31	mg/kg	NC		NC			3.0E-04	ug/m3	1.0E-01	ug/m3	3.E-03
				Zinc	761	mg/kg	NC		NC			7.3E-03	ug/m3	ND		
				HCX	0.0000081	mg/kg	1.1E-12	ug/m3	3.8E+01	(ug/m3)-1	4.E-11	7.8E-11	ug/m3	4.0E-05	ug/m3	2.E-06
				Dioxin-TEQ-M	0.0047	mg/kg	6.5E-10	ug/m3	3.8E+01	(ug/m3)-1	2.E-08	4.5E-08	ug/m3	4.0E-05	ug/m3	1.E-03
			EXPOSURE ROUTE TOTAL								5.E-08					1.E-01
		EXPOSURE POINT TOTAL									5.E-08					1.E-01
	EXPOSURE MEDIUM TOTAL										5.E-08					1.E-01
OIL TOTAL											**5.E-05**					**2.E+01**
										TOTAL RECEPTOR RISK ACROSS ALL MEDIA	**5.E-05**			**TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA**		**2.E+01**

OTES:
) - Blank cells indicate that an RfD or RfC is not avalailable from the sources used to obtain dose-response data for this risk assessment.
C - Not carcinogenic by this exposure route.
A - Not applicable; exposure route not applicable for this chemical/exposure medium.
V - Not volatile; exposure route not complete for this chemical.
- Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

US EPA ARCHIVE DOCUMENT

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			2.9E+00	NA	--	2.9E+00
			1,2,4-trichlorobenzene	1.1E-05	NA	--	NA	1.1E-05	Endocrine	4.3E-01	NA	--	4.3E-01
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	2.1E-01	NA	--	2.1E-01
			1,4-dichlorobenzene	1.8E-07	NA	--	NA	1.8E-07	Endocrine	5.7E-03	NA	--	5.7E-03
			Benzene	4.2E-09	NA	--	NA	4.2E-09	Immune system / Hematological	2.2E-04	NA	--	2.2E-04
			Chlorobenzene	NC	NA	NC	NA		Liver	2.1E-01	NA	--	2.1E-01
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	1.2E+00	NA	--	1.2E+00
			Ethyl benzene	4.2E-07	NA	--	NA	4.2E-07	Liver / Kidney	4.5E-03	NA	--	4.5E-03
			Naphthalene	NC	NA	NC	NA		General Toxicity	2.9E-02	NA	1.1E-02	4.0E-02
			Tetrachloroethene	1.7E-06	NA	--	NA	1.7E-06	Liver	1.5E+00	NA	--	1.5E+00
			Trichloroethene	2.9E-05	NA	--	NA	2.9E-05	Immune system	1.4E+01	NA	--	1.4E+01
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	1.0E-02	NA	--	1.0E-02
			4-chloroaniline	6.1E-05	NA	1.7E-05	NA	7.9E-05	Hematological	8.9E-01	NA	2.5E-01	1.1E+00
			Benzo(a)anthracene	1.2E-05	NA	4.3E-06	NA	1.6E-05	Kidney	1.5E-03	NA	5.5E-04	2.1E-03
			Benzo(a)pyrene	9.7E-05	NA	3.5E-05	NA	1.3E-04	Kidney	1.2E-03	NA	4.5E-04	1.7E-03
			Benzo(b)fluoranthene	1.1E-05	NA	4.1E-06	NA	1.6E-05	Kidney	1.4E-03	NA	5.2E-04	2.0E-03
			Benzo(k)fluoranthene	6.8E-07	NA	2.5E-07	NA	9.3E-07	Kidney	8.6E-04	NA	3.1E-04	1.2E-03
			Bis(2-ethylhexyl)phthalate	2.5E-06	NA	7.0E-07	NA	3.2E-06	Liver	1.0E-01	NA	2.9E-02	1.3E-01
			Carbazole	1.0E-08	NA	2.9E-09	NA	1.3E-08		--	NA	--	
			Dibenz(a,h)anthracene	1.9E-05	NA	6.9E-06	NA	2.6E-05	Kidney	2.4E-04	NA	8.8E-05	3.3E-04
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	1.8E-03	NA	5.0E-04	2.3E-03
			Indeno(1,2,3-cd)pyrene	4.6E-06	NA	1.7E-06	NA	6.3E-06	Kidney	5.8E-04	NA	2.1E-04	8.0E-04
			4,4`-DDE	3.5E-07	NA	--	NA	3.5E-07	Liver	2.4E-02	NA	--	2.4E-02
			Chlordane	1.5E-06	NA	--	NA	1.5E-06	Liver	1.0E-01	NA	--	1.0E-01
			Dieldrin	3.9E-06	NA	--	NA	3.9E-06	Liver	5.7E-02	NA	--	5.7E-02
			Endrin	NC	NA	NC	NA		Liver / Nervous System	1.3E-02	NA	--	1.3E-02
			Heptachlor	4.0E-06	NA	--	NA	4.0E-06	Liver	2.1E-02	NA	--	2.1E-02
			Aroclor-1232	5.5E-04	NA	2.1E-04	NA	7.6E-04	Immune system / Eye	1.6E+02	NA	6.3E+01	2.2E+02
			Aroclor-1242	1.8E-05	NA	6.9E-06	NA	2.5E-05	Immune system / Eye	5.1E+00	NA	2.0E+00	7.2E+00
			Aroclor-1248	1.3E-06	NA	5.1E-07	NA	1.8E-06	Immune system / Eye	3.8E-01	NA	1.5E-01	5.3E-01
			Aroclor-1254	1.4E-04	NA	5.5E-05	NA	1.9E-04	Immune system / Eye	4.1E+01	NA	1.6E+01	5.7E+01
			Aroclor-1268	9.5E-06	NA	3.7E-06	NA	1.3E-05	Immune system / Eye	2.8E+00	NA	1.1E+00	3.9E+00
			Aluminum	NC	NA	NC	NA		Nervous System	1.0E-01	NA	--	1.0E-01
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	1.3E-01	NA	--	1.3E-01
			Arsenic	9.9E-06	NA	8.3E-07	NA	1.1E-05	Skin / hematological	2.6E-01	NA	2.2E-02	2.8E-01
			Cadmium	NC	NA	NC	NA		Kidney	5.3E-02	NA	5.9E-03	5.9E-02
			Chromium	NC	NA	NC	NA		NOAEL	1.0E-03	NA	--	1.0E-03
			Cobalt	NC	NA	NC	NA		Endocrine	3.6E-01	NA	--	3.6E-01
			Copper	NC	NA	NC	NA		Undetermined	3.8E-02	NA	--	3.8E-02
			Manganese	NC	NA	NC	NA		Nervous System	1.2E-01	NA	--	1.2E-01
			Mercury	NC	NA	NC	NA		Immune system	1.0E-01	NA	--	1.0E-01
			Thallium	NC	NA	NC	NA		NOAEL	7.9E+00	NA	--	7.9E+00
			Vanadium	NC	NA	NC	NA		Kidney	1.0E-01	NA	--	1.0E-01
			Zinc	NC	NA	NC	NA		Liver	1.6E-02	NA	--	1.6E-02
			HCX	1.1E-06	NA	9.5E-08	NA	1.2E-06	Reproductive / Endocrine	1.3E-01	NA	1.1E-02	1.4E-01
			Dioxin-TEQ-M	1.2E-03	NA	1.0E-04	NA	1.3E-03	Reproductive / Endocrine	1.4E+02	NA	1.2E+01	1.5E+02
			CHEMICAL TOTAL	2.2E-03	--	4.6E-04	--	3E-03		3.8E+02	--	9.4E+01	5E+02
		EXPOSURE POINT TOTAL						3E-03					5E+02
	EXPOSURE MEDIUM TOTAL							3E-03					5E+02

US EPA ARCHIVE DOCUMENT

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	1.2E-04	NA	1.2E-04
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	8.7E-06	NA	8.7E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	5.4E-06	NA	5.4E-06
			1,4-dichlorobenzene	NA	2.1E-11	NA	NA	2.1E-11	Developmental	NA	2.8E-08	NA	2.8E-08
			Benzene	NA	3.4E-14	NA	NA	3.4E-14	Immune system	NA	1.7E-09	NA	1.7E-09
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	4.7E-06	NA	4.7E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	5.4E-12	NA	NA	5.4E-12	Developmental	NA	2.5E-08	NA	2.5E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	1.1E-05	NA	1.1E-05
			Tetrachloroethene	NA	1.2E-11	NA	NA	1.2E-11	Nervous System	NA	1.3E-05	NA	1.3E-05
			Trichloroethene	NA	1.4E-10	NA	NA	1.4E-10	kidney	NA	2.1E-04	NA	2.1E-04
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	1.2E-06	NA	1.2E-06
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	1.0E-10	NA	NA	1.0E-10		NA	--	NA	
			Benzo(a)pyrene	NA	8.3E-10	NA	NA	8.3E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	9.7E-11	NA	NA	9.7E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	5.8E-11	NA	NA	5.8E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	2.4E-11	NA	NA	2.4E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	1.8E-10	NA	NA	1.8E-10		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	3.9E-11	NA	NA	3.9E-11		NA	--	NA	
			4,4`-DDE	NA	5.6E-12	NA	NA	5.6E-12		NA	--	NA	
			Chlordane	NA	2.5E-11	NA	NA	2.5E-11		NA	4.1E-06	NA	4.1E-06
			Dieldrin	NA	6.3E-11	NA	NA	6.3E-11		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	6.6E-11	NA	NA	6.6E-11		NA	--	NA	
			Aroclor-1232	NA	8.9E-09	NA	NA	8.9E-09		NA	--	NA	
			Aroclor-1242	NA	2.9E-10	NA	NA	2.9E-10		NA	--	NA	
			Aroclor-1248	NA	2.1E-11	NA	NA	2.1E-11		NA	--	NA	
			Aroclor-1254	NA	2.3E-09	NA	NA	2.3E-09		NA	--	NA	
			Aroclor-1268	NA	1.5E-10	NA	NA	1.5E-10		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	1.2E-03	NA	1.2E-03
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	1.6E-09	NA	NA	1.6E-09	Developmental / Cardiovascular / Nervous system	NA	2.9E-04	NA	2.9E-04
			Cadmium	NA	4.6E-10	NA	NA	4.6E-10	Kidney / Respiratory	NA	3.0E-04	NA	3.0E-04
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	4.7E-09	NA	NA	4.7E-09	Respiratory	NA	1.0E-03	NA	1.0E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	6.6E-03	NA	6.6E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	5.9E-06	NA	5.9E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	2.9E-04	NA	2.9E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	1.6E-11	NA	NA	1.6E-11	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.3E-07	NA	1.3E-07
			Dioxin-TEQ-M	NA	1.8E-08	NA	NA	1.8E-08	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.4E-04	NA	1.4E-04
			CHEMICAL TOTAL	--	3.8E-08	--	--	4E-08		--	1.0E-02	--	1E-02
		EXPOSURE POINT TOTAL						4E-08					1E-02
	EXPOSURE MEDIUM TOTAL							4E-08					1E-02
SOIL TOTAL								**3E-03**					**5E+02**
RECEPTOR TOTAL								**3E-03**					**5E+02**
							TOTAL RISK ACROSS ALL MEDIA	**3E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**5E+02**

US EPA ARCHIVE DOCUMENT

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	1.8E-01
TOTAL CARDIOVASCULAR HI =	2.9E-04
TOTAL DEVELOPMENTAL HI =	2.9E-04
TOTAL ENDOCRINE HI =	1.5E+02
TOTAL EYE HI =	2.9E+02
	--
TOTAL HEMATOLOGICAL HI =	1.6E+00
TOTAL IMMUNE SYSTEM HI =	3.1E+02
TOTAL KIDNEY HI =	1.8E-01
TOTAL LIVER HI =	2.3E+00
	--
TOTAL NERVOUS SYSTEM HI =	2.5E-01
TOTAL NOAEL HI =	1.2E+01
TOTAL REPRODUCTIVE HI =	1.5E+02
TOTAL SKIN HI =	2.8E-01
TOTAL RESPIRATORY HI =	1.5E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			4.8E-01	NA	--	4.8E-01
			1,2,4-trichlorobenzene	3.6E-06	NA	--	NA	3.6E-06	Endocrine	7.2E-02	NA	--	7.2E-02
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	3.6E-02	NA	--	3.6E-02
			1,4-dichlorobenzene	6.1E-08	NA	--	NA	6.1E-08	Endocrine	9.4E-04	NA	--	9.4E-04
			Benzene	1.4E-09	NA	--	NA	1.4E-09	Immune system / Hematological	3.7E-05	NA	--	3.7E-05
			Chlorobenzene	NC	NA	NC	NA		Liver	3.4E-02	NA	--	3.4E-02
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	1.9E-01	NA	--	1.9E-01
			Ethyl benzene	1.4E-07	NA	--	NA	1.4E-07	Liver / Kidney	7.5E-04	NA	--	7.5E-04
			Naphthalene	NC	NA	NC	NA		General Toxicity	4.9E-03	NA	6.1E-03	1.1E-02
			Tetrachloroethene	5.6E-07	NA	--	NA	5.6E-07	Liver	2.6E-01	NA	--	2.6E-01
			Trichloroethene	9.5E-06	NA	--	NA	9.5E-06	Immune system	2.4E+00	NA	--	2.4E+00
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	1.7E-03	NA	--	1.7E-03
			4-chloroaniline	2.0E-05	NA	2.0E-05	NA	4.0E-05	Hematological	1.5E-01	NA	1.4E-01	2.9E-01
			Benzo(a)anthracene	2.4E-06	NA	2.9E-06	NA	5.3E-06	Kidney	2.5E-04	NA	3.1E-04	5.7E-04
			Benzo(a)pyrene	1.9E-05	NA	2.4E-05	NA	4.3E-05	Kidney	2.1E-04	NA	2.6E-04	4.6E-04
			Benzo(b)fluoranthene	2.3E-06	NA	2.8E-06	NA	5.1E-06	Kidney	2.4E-04	NA	3.0E-04	5.4E-04
			Benzo(k)fluoranthene	1.3E-07	NA	1.7E-07	NA	3.0E-07	Kidney	1.4E-04	NA	1.8E-04	3.2E-04
			Bis(2-ethylhexyl)phthalate	8.3E-07	NA	8.0E-07	NA	1.6E-06	Liver	1.7E-02	NA	1.7E-02	3.4E-02
			Carbazole	3.4E-09	NA	3.3E-09	NA	6.7E-09		--	NA	--	
			Dibenz(a,h)anthracene	3.8E-06	NA	4.7E-06	NA	8.5E-06	Kidney	4.0E-05	NA	5.0E-05	9.0E-05
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	3.0E-04	NA	2.9E-04	5.8E-04
			Indeno(1,2,3-cd)pyrene	9.1E-07	NA	1.1E-06	NA	2.1E-06	Kidney	9.7E-05	NA	1.2E-04	2.2E-04
			4,4`-DDE	1.2E-07	NA	--	NA	1.2E-07	Liver	4.0E-03	NA	--	4.0E-03
			Chlordane	5.1E-07	NA	--	NA	5.1E-07	Liver	1.7E-02	NA	--	1.7E-02
			Dieldrin	1.3E-06	NA	--	NA	1.3E-06	Liver	9.4E-03	NA	--	9.4E-03
			Endrin	NC	NA	NC	NA		Liver / Nervous System	2.1E-03	NA	--	2.1E-03
			Heptachlor	1.3E-06	NA	--	NA	1.3E-06	Liver	3.5E-03	NA	--	3.5E-03
			Aroclor-1232	1.8E-04	NA	2.5E-04	NA	4.3E-04	Immune system / Eye	2.7E+01	NA	3.6E+01	6.2E+01
			Aroclor-1242	5.9E-06	NA	7.9E-06	NA	1.4E-05	Immune system / Eye	8.6E-01	NA	1.2E+00	2.0E+00
			Aroclor-1248	4.3E-07	NA	5.8E-07	NA	1.0E-06	Immune system / Eye	6.3E-02	NA	8.5E-02	1.5E-01
			Aroclor-1254	4.6E-05	NA	6.2E-05	NA	1.1E-04	Immune system / Eye	6.8E+00	NA	9.1E+00	1.6E+01
			Aroclor-1268	3.2E-06	NA	4.3E-06	NA	7.4E-06	Immune system / Eye	4.6E-01	NA	6.2E-01	1.1E+00
			Aluminum	NC	NA	NC	NA		Nervous System	1.7E-02	NA	--	1.7E-02
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	2.2E-02	NA	--	2.2E-02
			Arsenic	3.3E-06	NA	9.5E-07	NA	4.3E-06	Skin / hematological	4.3E-02	NA	1.2E-02	5.5E-02
			Cadmium	NC	NA	NC	NA		Kidney	8.8E-03	NA	3.4E-03	1.2E-02
			Chromium	NC	NA	NC	NA		NOAEL	1.7E-04	NA	--	1.7E-04
			Cobalt	NC	NA	NC	NA		Endocrine	5.9E-02	NA	--	5.9E-02
			Copper	NC	NA	NC	NA		Undetermined	6.3E-03	NA	--	6.3E-03
			Manganese	NC	NA	NC	NA		Nervous System	2.1E-02	NA	--	2.1E-02
			Mercury	NC	NA	NC	NA		Immune system	1.7E-02	NA	--	1.7E-02
			Thallium	NC	NA	NC	NA		NOAEL	1.3E+00	NA	--	1.3E+00
			Vanadium	NC	NA	NC	NA		Kidney	1.7E-02	NA	--	1.7E-02
			Zinc	NC	NA	NC	NA		Liver	2.7E-03	NA	--	2.7E-03
			HCX	3.8E-07	NA	1.1E-07	NA	4.9E-07	Reproductive / Endocrine	2.1E-02	NA	6.0E-03	2.7E-02
			Dioxin-TEQ-M	4.1E-04	NA	1.2E-04	NA	5.3E-04	Reproductive / Endocrine	2.3E+01	NA	6.6E+00	3.0E+01
			CHEMICAL TOTAL	7.2E-04	--	5.0E-04	--	1E-03		6.3E+01	--	5.4E+01	1E+02
		EXPOSURE POINT TOTAL						1E-03					1E+02
	EXPOSURE MEDIUM TOTAL							1E-03					1E+02

US EPA ARCHIVE DOCUMENT

TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	1.2E-04	NA	1.2E-04
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	8.7E-06	NA	8.7E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	5.4E-06	NA	5.4E-06
			1,4-dichlorobenzene	NA	4.2E-11	NA	NA	4.2E-11	Developmental	NA	2.8E-08	NA	2.8E-08
			Benzene	NA	6.7E-14	NA	NA	6.7E-14	Immune system	NA	1.7E-09	NA	1.7E-09
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	4.7E-06	NA	4.7E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	1.1E-11	NA	NA	1.1E-11	Developmental	NA	2.5E-08	NA	2.5E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	1.1E-05	NA	1.1E-05
			Tetrachloroethene	NA	2.3E-11	NA	NA	2.3E-11	Nervous System	NA	1.3E-05	NA	1.3E-05
			Trichloroethene	NA	2.9E-10	NA	NA	2.9E-10	kidney	NA	2.1E-04	NA	2.1E-04
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	1.2E-06	NA	1.2E-06
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	1.2E-10	NA	NA	1.2E-10		NA	--	NA	
			Benzo(a)pyrene	NA	9.9E-10	NA	NA	9.9E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	1.2E-10	NA	NA	1.2E-10		NA	--	NA	
			Benzo(k)fluoranthene	NA	6.9E-11	NA	NA	6.9E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	4.9E-11	NA	NA	4.9E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	2.1E-10	NA	NA	2.1E-10		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	4.7E-11	NA	NA	4.7E-11		NA	--	NA	
			4,4`-DDE	NA	1.1E-11	NA	NA	1.1E-11		NA	--	NA	
			Chlordane	NA	4.9E-11	NA	NA	4.9E-11		NA	4.1E-06	NA	4.1E-06
			Dieldrin	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Aroclor-1232	NA	1.8E-08	NA	NA	1.8E-08		NA	--	NA	
			Aroclor-1242	NA	5.7E-10	NA	NA	5.7E-10		NA	--	NA	
			Aroclor-1248	NA	4.2E-11	NA	NA	4.2E-11		NA	--	NA	
			Aroclor-1254	NA	4.5E-09	NA	NA	4.5E-09		NA	--	NA	
			Aroclor-1268	NA	3.1E-10	NA	NA	3.1E-10		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	1.2E-03	NA	1.2E-03
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	3.2E-09	NA	NA	3.2E-09	Developmental / Cardiovascular / Nervous system	NA	2.9E-04	NA	2.9E-04
			Cadmium	NA	9.3E-10	NA	NA	9.3E-10	Kidney / Respiratory	NA	3.0E-04	NA	3.0E-04
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	9.3E-09	NA	NA	9.3E-09	Respiratory	NA	1.0E-03	NA	1.0E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	6.6E-03	NA	6.6E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	5.9E-06	NA	5.9E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	2.9E-04	NA	2.9E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	3.3E-11	NA	NA	3.3E-11	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.3E-07	NA	1.3E-07
			Dioxin-TEQ-M	NA	3.6E-08	NA	NA	3.6E-08	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.4E-04	NA	1.4E-04
			CHEMICAL TOTAL	--	7.5E-08	--	--	7E-08		--	1.0E-02	--	1E-02
		EXPOSURE POINT TOTAL						7E-08					1E-02
	EXPOSURE MEDIUM TOTAL							7E-08					1E-02
SOIL TOTAL								**1E-03**					**1E+02**
RECEPTOR TOTAL								**1E-03**					**1E+02**
							TOTAL RISK ACROSS ALL MEDIA	**1E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**1E+02**

US EPA ARCHIVE DOCUMENT

TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	3.5E-02
TOTAL CARDIOVASCULAR HI =	2.9E-04
TOTAL DEVELOPMENTAL HI =	2.9E-04
TOTAL ENDOCRINE HI =	3.0E+01
TOTAL EYE HI =	8.2E+01
	--
TOTAL HEMATOLOGICAL HI =	3.7E-01
TOTAL IMMUNE SYSTEM HI =	8.4E+01
TOTAL KIDNEY HI =	3.4E-02
TOTAL LIVER HI =	4.0E-01
	--
TOTAL NERVOUS SYSTEM HI =	4.8E-02
TOTAL NOAEL HI =	2.0E+00
TOTAL REPRODUCTIVE HI =	3.0E+01
TOTAL SKIN HI =	5.5E-02
TOTAL RESPIRATORY HI =	1.5E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			3.1E-01	NA	--	3.1E-01
			1,2,4-trichlorobenzene	2.3E-06	NA	--	NA	2.3E-06	Endocrine	4.7E-02	NA	--	4.7E-02
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	2.3E-02	NA	--	2.3E-02
			1,4-dichlorobenzene	3.9E-08	NA	--	NA	3.9E-08	Endocrine	6.1E-04	NA	--	6.1E-04
			Benzene	8.9E-10	NA	--	NA	8.9E-10	Immune system / Hematological	2.4E-05	NA	--	2.4E-05
			Chlorobenzene	NC	NA	NC	NA		Liver	2.2E-02	NA	--	2.2E-02
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	1.2E-01	NA	--	1.2E-01
			Ethyl benzene	9.0E-08	NA	--	NA	9.0E-08	Liver / Kidney	4.8E-04	NA	--	4.8E-04
			Naphthalene	NC	NA	NC	NA		General Toxicity	3.1E-03	NA	1.6E-03	4.8E-03
			Tetrachloroethene	3.6E-07	NA	--	NA	3.6E-07	Liver	1.7E-01	NA	--	1.7E-01
			Trichloroethene	6.1E-06	NA	--	NA	6.1E-06	Immune system	1.6E+00	NA	--	1.6E+00
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	1.1E-03	NA	--	1.1E-03
			4-chloroaniline	1.3E-05	NA	5.2E-06	NA	1.8E-05	Hematological	9.6E-02	NA	3.8E-02	1.3E-01
			Benzo(a)anthracene	6.1E-07	NA	3.2E-07	NA	9.2E-07	Kidney	1.6E-04	NA	8.4E-05	2.5E-04
			Benzo(a)pyrene	5.0E-06	NA	2.6E-06	NA	7.6E-06	Kidney	1.3E-04	NA	6.9E-05	2.0E-04
			Benzo(b)fluoranthene	5.8E-07	NA	3.0E-07	NA	8.8E-07	Kidney	1.5E-04	NA	8.0E-05	2.3E-04
			Benzo(k)fluoranthene	3.5E-08	NA	1.8E-08	NA	5.3E-08	Kidney	9.2E-05	NA	4.8E-05	1.4E-04
			Bis(2-ethylhexyl)phthalate	5.3E-07	NA	2.1E-07	NA	7.5E-07	Liver	1.1E-02	NA	4.4E-03	1.6E-02
			Carbazole	2.2E-09	NA	8.8E-10	NA	3.1E-09		--	NA	--	
			Dibenz(a,h)anthracene	9.7E-07	NA	5.0E-07	NA	1.5E-06	Kidney	2.6E-05	NA	1.3E-05	3.9E-05
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	1.9E-04	NA	7.6E-05	2.7E-04
			Indeno(1,2,3-cd)pyrene	2.3E-07	NA	1.2E-07	NA	3.6E-07	Kidney	6.2E-05	NA	3.2E-05	9.5E-05
			4,4`-DDE	7.4E-08	NA	--	NA	7.4E-08	Liver	2.5E-03	NA	--	2.5E-03
			Chlordane	3.3E-07	NA	--	NA	3.3E-07	Liver	1.1E-02	NA	--	1.1E-02
			Dieldrin	8.3E-07	NA	--	NA	8.3E-07	Liver	6.1E-03	NA	--	6.1E-03
			Endrin	NC	NA	NC	NA		Liver / Nervous System	1.4E-03	NA	--	1.4E-03
			Heptachlor	8.6E-07	NA	--	NA	8.6E-07	Liver	2.2E-03	NA	--	2.2E-03
			Aroclor-1232	1.2E-04	NA	6.6E-05	NA	1.8E-04	Immune system / Eye	1.7E+01	NA	9.6E+00	2.7E+01
			Aroclor-1242	3.8E-06	NA	2.1E-06	NA	5.9E-06	Immune system / Eye	5.5E-01	NA	3.1E-01	8.6E-01
			Aroclor-1248	2.8E-07	NA	1.6E-07	NA	4.3E-07	Immune system / Eye	4.1E-02	NA	2.3E-02	6.3E-02
			Aroclor-1254	3.0E-05	NA	1.7E-05	NA	4.6E-05	Immune system / Eye	4.4E+00	NA	2.4E+00	6.8E+00
			Aroclor-1268	2.0E-06	NA	1.1E-06	NA	3.2E-06	Immune system / Eye	3.0E-01	NA	1.7E-01	4.6E-01
			Aluminum	NC	NA	NC	NA		Nervous System	1.1E-02	NA	--	1.1E-02
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	1.4E-02	NA	--	1.4E-02
			Arsenic	2.1E-06	NA	2.5E-07	NA	2.4E-06	Skin / hematological	2.8E-02	NA	3.3E-03	3.1E-02
			Cadmium	NC	NA	NC	NA		Kidney	5.7E-03	NA	9.0E-04	6.6E-03
			Chromium	NC	NA	NC	NA		NOAEL	1.1E-04	NA	--	1.1E-04
			Cobalt	NC	NA	NC	NA		Endocrine	3.8E-02	NA	--	3.8E-02
			Copper	NC	NA	NC	NA		Undetermined	4.0E-03	NA	--	4.0E-03
			Manganese	NC	NA	NC	NA		Nervous System	1.3E-02	NA	--	1.3E-02
			Mercury	NC	NA	NC	NA		Immune system	1.1E-02	NA	--	1.1E-02
			Thallium	NC	NA	NC	NA		NOAEL	8.5E-01	NA	--	8.5E-01
			Vanadium	NC	NA	NC	NA		Kidney	1.1E-02	NA	--	1.1E-02
			Zinc	NC	NA	NC	NA		Liver	1.7E-03	NA	--	1.7E-03
			HCX	2.4E-07	NA	2.9E-08	NA	2.7E-07	Reproductive / Endocrine	1.4E-02	NA	1.6E-03	1.5E-02
			Dioxin-TEQ-M	2.7E-04	NA	3.2E-05	NA	3.0E-04	Reproductive / Endocrine	1.5E+01	NA	1.8E+00	1.7E+01
			CHEMICAL TOTAL	4.5E-04	--	1.3E-04	--	6E-04		4.1E+01	--	1.4E+01	5E+01
		EXPOSURE POINT TOTAL						6E-04					5E+01
	EXPOSURE MEDIUM TOTAL							6E-04					5E+01

US EPA ARCHIVE DOCUMENT

TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	1.2E-04	NA	1.2E-04
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	8.7E-06	NA	8.7E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	5.4E-06	NA	5.4E-06
			1,4-dichlorobenzene	NA	4.2E-11	NA	NA	4.2E-11	Developmental	NA	2.8E-08	NA	2.8E-08
			Benzene	NA	6.7E-14	NA	NA	6.7E-14	Immune system	NA	1.7E-09	NA	1.7E-09
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	4.7E-06	NA	4.7E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	1.1E-11	NA	NA	1.1E-11	Developmental	NA	2.5E-08	NA	2.5E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	1.1E-05	NA	1.1E-05
			Tetrachloroethene	NA	2.3E-11	NA	NA	2.3E-11	Nervous System	NA	1.3E-05	NA	1.3E-05
			Trichloroethene	NA	2.9E-10	NA	NA	2.9E-10	kidney	NA	2.1E-04	NA	2.1E-04
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	1.2E-06	NA	1.2E-06
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	4.9E-11	NA	NA	4.9E-11		NA	--	NA	
			Benzo(a)pyrene	NA	4.0E-10	NA	NA	4.0E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	4.6E-11	NA	NA	4.6E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	2.8E-11	NA	NA	2.8E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	4.9E-11	NA	NA	4.9E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	8.5E-11	NA	NA	8.5E-11		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	1.9E-11	NA	NA	1.9E-11		NA	--	NA	
			4,4`-DDE	NA	1.1E-11	NA	NA	1.1E-11		NA	--	NA	
			Chlordane	NA	4.9E-11	NA	NA	4.9E-11		NA	4.1E-06	NA	4.1E-06
			Dieldrin	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Aroclor-1232	NA	1.8E-08	NA	NA	1.8E-08		NA	--	NA	
			Aroclor-1242	NA	5.7E-10	NA	NA	5.7E-10		NA	--	NA	
			Aroclor-1248	NA	4.2E-11	NA	NA	4.2E-11		NA	--	NA	
			Aroclor-1254	NA	4.5E-09	NA	NA	4.5E-09		NA	--	NA	
			Aroclor-1268	NA	3.1E-10	NA	NA	3.1E-10		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	1.2E-03	NA	1.2E-03
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	3.2E-09	NA	NA	3.2E-09	Developmental / Cardiovascular / Nervous system	NA	2.9E-04	NA	2.9E-04
			Cadmium	NA	9.3E-10	NA	NA	9.3E-10	Kidney / Respiratory	NA	3.0E-04	NA	3.0E-04
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	9.3E-09	NA	NA	9.3E-09	Respiratory	NA	1.0E-03	NA	1.0E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	6.6E-03	NA	6.6E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	5.9E-06	NA	5.9E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	2.9E-04	NA	2.9E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	3.3E-11	NA	NA	3.3E-11	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.3E-07	NA	1.3E-07
			Dioxin-TEQ-M	NA	3.6E-08	NA	NA	3.6E-08	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	1.4E-04	NA	1.4E-04
			CHEMICAL TOTAL	--	7.4E-08	--	--	7E-08		--	1.0E-02	--	1E-02
		EXPOSURE POINT TOTAL						7E-08					1E-02
	EXPOSURE MEDIUM TOTAL							7E-08					1E-02
SOIL TOTAL								**6E-04**					**5E+01**
RECEPTOR TOTAL								**6E-04**					**5E+01**
							TOTAL RISK ACROSS ALL MEDIA	**6E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**5E+01**

US EPA ARCHIVE DOCUMENT

TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	2.0E-02
TOTAL CARDIOVASCULAR HI =	2.9E-04
TOTAL DEVELOPMENTAL HI =	2.9E-04
TOTAL ENDOCRINE HI =	1.7E+01
TOTAL EYE HI =	3.5E+01
	--
TOTAL HEMATOLOGICAL HI =	1.8E-01
TOTAL IMMUNE SYSTEM HI =	3.6E+01
TOTAL KIDNEY HI =	2.0E-02
TOTAL LIVER HI =	2.5E-01
	--
TOTAL NERVOUS SYSTEM HI =	3.4E-02
TOTAL NOAEL HI =	1.3E+00
TOTAL REPRODUCTIVE HI =	1.7E+01
TOTAL SKIN HI =	3.1E-02
TOTAL RESPIRATORY HI =	1.5E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SUBSURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			3.6E-01	NA	--	3.6E-01
			1,2,4-trichlorobenzene	4.9E-07	NA	--	NA	4.9E-07	Endocrine	2.0E-02	NA	--	2.0E-02
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	8.1E-02	NA	--	8.1E-02
			1,3-dichlorobenzene	NC	NA	NC	NA		Endocrine	4.6E-04	NA	--	4.6E-04
			1,4-dichlorobenzene	6.5E-08	NA	--	NA	6.5E-08	Endocrine	2.0E-03	NA	--	2.0E-03
			Benzene	6.6E-06	NA	--	NA	6.6E-06	Immune system / Hematological	3.5E-01	NA	--	3.5E-01
			Chlorobenzene	NC	NA	NC	NA		Liver	1.4E-01	NA	--	1.4E-01
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	9.1E-01	NA	--	9.1E-01
			Ethyl benzene	2.7E-07	NA	--	NA	2.7E-07	Liver / Kidney	2.9E-03	NA	--	2.9E-03
			Naphthalene	NC	NA	NC	NA		General Toxicity	2.3E-02	NA	8.4E-03	3.1E-02
			Sec-butylbenzene	NC	NA	NC	NA			--	NA	--	
			Tetrachloroethene	7.7E-07	NA	--	NA	7.7E-07	Liver	7.1E-01	NA	--	7.1E-01
			Trichloroethene	2.4E-05	NA	--	NA	2.4E-05	Immune system	1.2E+01	NA	--	1.2E+01
			Vinyl Chloride	3.2E-07	NA	--	NA	3.2E-07	Liver	8.9E-04	NA	--	8.9E-04
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	1.9E-03	NA	--	1.9E-03
			4-chloroaniline	9.4E-08	NA	2.6E-08	NA	1.2E-07	Hematological	1.4E-03	NA	3.9E-04	1.8E-03
			Benzo(a)anthracene	4.3E-06	NA	1.6E-06	NA	5.9E-06	Kidney	5.5E-04	NA	2.0E-04	7.5E-04
			Benzo(a)pyrene	4.7E-05	NA	1.7E-05	NA	6.4E-05	Kidney	5.9E-04	NA	2.2E-04	8.1E-04
			Benzo(b)fluoranthene	7.1E-06	NA	2.6E-06	NA	9.7E-06	Kidney	9.1E-04	NA	3.3E-04	1.2E-03
			Benzo(k)fluoranthene	1.4E-07	NA	5.0E-08	NA	1.9E-07	Kidney	1.7E-04	NA	6.4E-05	2.4E-04
			Bis(2-ethylhexyl)phthalate	1.4E-06	NA	3.9E-07	NA	1.8E-06	Liver	5.8E-02	NA	1.6E-02	7.4E-02
			Carbazole	4.9E-09	NA	1.4E-09	NA	6.3E-09		--	NA	--	
			Dibenz(a,h)anthracene	8.3E-06	NA	3.0E-06	NA	1.1E-05	Kidney	1.0E-04	NA	3.8E-05	1.4E-04
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	3.4E-04	NA	9.4E-05	4.3E-04
			Indeno(1,2,3-cd)pyrene	1.8E-06	NA	6.4E-07	NA	2.4E-06	Kidney	2.2E-04	NA	8.1E-05	3.0E-04
			4,4`-DDE	2.4E-07	NA	--	NA	2.4E-07	Liver	1.7E-02	NA	--	1.7E-02
			Aldrin	7.1E-06	NA	--	NA	7.1E-06	Liver	1.6E-01	NA	--	1.6E-01
			Chlordane	4.5E-08	NA	--	NA	4.5E-08	Liver	3.0E-03	NA	--	3.0E-03
			Dieldrin	4.2E-05	NA	--	NA	4.2E-05	Liver	6.2E-01	NA	--	6.2E-01
			Endrin	NC	NA	NC	NA		Liver / Nervous System	2.2E-02	NA	--	2.2E-02
			Heptachlor	2.1E-06	NA	--	NA	2.1E-06	Liver	1.1E-02	NA	--	1.1E-02
			Aroclor-1232	3.9E-06	NA	1.5E-06	NA	5.4E-06	Immune system / Eye	1.1E+00	NA	4.4E-01	1.6E+00
			Aroclor-1242	6.4E-06	NA	2.5E-06	NA	8.9E-06	Immune system / Eye	1.9E+00	NA	7.3E-01	2.6E+00
			Aroclor-1248	3.8E-05	NA	1.5E-05	NA	5.2E-05	Immune system / Eye	1.1E+01	NA	4.3E+00	1.5E+01
			Aroclor-1254	1.9E-04	NA	7.5E-05	NA	2.7E-04	Immune system / Eye	5.6E+01	NA	2.2E+01	7.8E+01
			Aluminum	NC	NA	NC	NA		Nervous System	7.7E-02	NA	--	7.7E-02
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	1.9E-01	NA	--	1.9E-01
			Arsenic	1.6E-05	NA	1.4E-06	NA	1.8E-05	Skin / hematological	4.2E-01	NA	3.5E-02	4.6E-01
			Cadmium	NC	NA	NC	NA		Kidney	3.5E-01	NA	3.9E-02	3.9E-01
			Chromium	NC	NA	NC	NA		NOAEL	4.9E-04	NA	--	4.9E-04
			Cobalt	NC	NA	NC	NA		Endocrine	3.9E-01	NA	--	3.9E-01
			Copper	NC	NA	NC	NA		Undetermined	6.4E-02	NA	--	6.4E-02
			Manganese	NC	NA	NC	NA		Nervous System	8.0E-02	NA	--	8.0E-02
			Mercury	NC	NA	NC	NA		Immune system	3.6E-02	NA	--	3.6E-02
			Thallium	NC	NA	NC	NA		NOAEL	6.1E+00	NA	--	6.1E+00
			Vanadium	NC	NA	NC	NA		Kidney	6.5E-02	NA	--	6.5E-02
			Zinc	NC	NA	NC	NA		Liver	4.2E-02	NA	--	4.2E-02
			HCX	6.7E-07	NA	5.6E-08	NA	7.2E-07	Reproductive / Endocrine	7.4E-02	NA	6.2E-03	8.0E-02
			Dioxin-TEQ-M	4.2E-04	NA	3.5E-05	NA	4.5E-04	Reproductive / Endocrine	4.6E+01	NA	3.9E+00	5.0E+01
			CHEMICAL TOTAL	8.3E-04	--	1.6E-04	--	1E-03		1.4E+02	--	3.1E+01	2E+02
		EXPOSURE POINT TOTAL						1E-03					2E+02
	EXPOSURE MEDIUM TOTAL							1E-03					2E+02

US EPA ARCHIVE DOCUMENT

TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	5.6E-06	NA	5.6E-06
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	7.3E-06	NA	7.3E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	2.1E-06	NA	2.1E-06
			1,3-dichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,4-dichlorobenzene	NA	7.5E-12	NA	NA	7.5E-12	Developmental	NA	9.9E-09	NA	9.9E-09
			Benzene	NA	5.3E-11	NA	NA	5.3E-11	Immune system	NA	2.6E-06	NA	2.6E-06
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	3.1E-06	NA	3.1E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	3.5E-12	NA	NA	3.5E-12	Developmental	NA	1.6E-08	NA	1.6E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	8.7E-06	NA	8.7E-06
			Sec-butylbenzene	NA	NC	NA	NA			NA	--	NA	
			Tetrachloroethene	NA	5.4E-12	NA	NA	5.4E-12	Nervous System	NA	6.1E-06	NA	6.1E-06
			Trichloroethene	NA	1.2E-10	NA	NA	1.2E-10	kidney	NA	1.7E-04	NA	1.7E-04
			Vinyl Chloride	NA	1.1E-13	NA	NA	1.1E-13	Liver	NA	1.5E-09	NA	1.5E-09
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	2.2E-07	NA	2.2E-07
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	3.7E-11	NA	NA	3.7E-11		NA	--	NA	
			Benzo(a)pyrene	NA	4.0E-10	NA	NA	4.0E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	6.1E-11	NA	NA	6.1E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	1.2E-11	NA	NA	1.2E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	1.4E-11	NA	NA	1.4E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	7.7E-11	NA	NA	7.7E-11		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	1.5E-11	NA	NA	1.5E-11		NA	--	NA	
			4,4`-DDE	NA	4.0E-12	NA	NA	4.0E-12		NA	--	NA	
			Aldrin	NA	1.2E-10	NA	NA	1.2E-10		NA	--	NA	
			Chlordane	NA	7.3E-13	NA	NA	7.3E-13		NA	1.2E-07	NA	1.2E-07
			Dieldrin	NA	6.9E-10	NA	NA	6.9E-10		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	3.4E-11	NA	NA	3.4E-11		NA	--	NA	
			Aroclor-1232	NA	6.3E-11	NA	NA	6.3E-11		NA	--	NA	
			Aroclor-1242	NA	1.0E-10	NA	NA	1.0E-10		NA	--	NA	
			Aroclor-1248	NA	6.1E-10	NA	NA	6.1E-10		NA	--	NA	
			Aroclor-1254	NA	3.1E-09	NA	NA	3.1E-09		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	8.8E-04	NA	8.8E-04
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	2.6E-09	NA	NA	2.6E-09	Developmental / Cardiovascular / Nervous system	NA	4.8E-04	NA	4.8E-04
			Cadmium	NA	3.0E-09	NA	NA	3.0E-09	Kidney / Respiratory	NA	2.0E-03	NA	2.0E-03
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	5.1E-09	NA	NA	5.1E-09	Respiratory	NA	1.1E-03	NA	1.1E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	4.3E-03	NA	4.3E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	2.0E-06	NA	2.0E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	1.8E-04	NA	1.8E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	9.6E-12	NA	NA	9.6E-12	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	7.4E-08	NA	7.4E-08
			Dioxin-TEQ-M	NA	6.0E-09	NA	NA	6.0E-09	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	4.6E-05	NA	4.6E-05
			CHEMICAL TOTAL	--	2.2E-08	--	--	2E-08		--	9.1E-03	--	9E-03
		EXPOSURE POINT TOTAL						2E-08					9E-03
	EXPOSURE MEDIUM TOTAL							2E-08					9E-03
SOIL TOTAL								**1E-03**					**2E+02**
RECEPTOR TOTAL								**1E-03**					**2E+02**
							TOTAL RISK ACROSS ALL MEDIA	**1E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**2E+02**

US EPA ARCHIVE DOCUMENT

TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	2.3E-01
TOTAL CARDIOVASCULAR HI =	4.8E-04
TOTAL DEVELOPMENTAL HI =	4.8E-04
TOTAL ENDOCRINE HI =	5.1E+01
TOTAL EYE HI =	9.7E+01
	--
TOTAL HEMATOLOGICAL HI =	1.0E+00
TOTAL IMMUNE SYSTEM HI =	1.1E+02
TOTAL KIDNEY HI =	4.6E-01
TOTAL LIVER HI =	1.9E+00
	--
TOTAL NERVOUS SYSTEM HI =	1.9E-01
TOTAL NOAEL HI =	7.4E+00
TOTAL REPRODUCTIVE HI =	5.0E+01
TOTAL SKIN HI =	4.6E-01
TOTAL RESPIRATORY HI =	3.1E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SUBSURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			6.0E-02	NA	--	6.0E-02
			1,2,4-trichlorobenzene	1.6E-07	NA	--	NA	1.6E-07	Endocrine	3.3E-03	NA	--	3.3E-03
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	1.3E-02	NA	--	1.3E-02
			1,3-dichlorobenzene	NC	NA	NC	NA		Endocrine	7.7E-05	NA	--	7.7E-05
			1,4-dichlorobenzene	2.2E-08	NA	--	NA	2.2E-08	Endocrine	3.3E-04	NA	--	3.3E-04
			Benzene	2.2E-06	NA	--	NA	2.2E-06	Immune system / Hematological	5.8E-02	NA	--	5.8E-02
			Chlorobenzene	NC	NA	NC	NA		Liver	2.3E-02	NA	--	2.3E-02
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	1.5E-01	NA	--	1.5E-01
			Ethyl benzene	9.1E-08	NA	--	NA	9.1E-08	Liver / Kidney	4.8E-04	NA	--	4.8E-04
			Naphthalene	NC	NA	NC	NA		General Toxicity	3.8E-03	NA	4.8E-03	8.6E-03
			Sec-butylbenzene	NC	NA	NC	NA			--	NA	--	
			Tetrachloroethene	2.6E-07	NA	--	NA	2.6E-07	Liver	1.2E-01	NA	--	1.2E-01
			Trichloroethene	7.9E-06	NA	--	NA	7.9E-06	Immune system	2.0E+00	NA	--	2.0E+00
			Vinyl Chloride	1.1E-07	NA	--	NA	1.1E-07	Liver	1.5E-04	NA	--	1.5E-04
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	3.2E-04	NA	--	3.2E-04
			4-chloroaniline	3.1E-08	NA	3.0E-08	NA	6.2E-08	Hematological	2.3E-04	NA	2.2E-04	4.5E-04
			Benzo(a)anthracene	8.6E-07	NA	1.1E-06	NA	1.9E-06	Kidney	9.2E-05	NA	1.1E-04	2.1E-04
			Benzo(a)pyrene	9.2E-06	NA	1.2E-05	NA	2.1E-05	Kidney	9.8E-05	NA	1.2E-04	2.2E-04
			Benzo(b)fluoranthene	1.4E-06	NA	1.8E-06	NA	3.2E-06	Kidney	1.5E-04	NA	1.9E-04	3.4E-04
			Benzo(k)fluoranthene	2.7E-08	NA	3.4E-08	NA	6.1E-08	Kidney	2.9E-05	NA	3.6E-05	6.5E-05
			Bis(2-ethylhexyl)phthalate	4.7E-07	NA	4.5E-07	NA	9.1E-07	Liver	9.7E-03	NA	9.3E-03	1.9E-02
			Carbazole	1.6E-09	NA	1.6E-09	NA	3.2E-09		--	NA	--	
			Dibenz(a,h)anthracene	1.6E-06	NA	2.0E-06	NA	3.7E-06	Kidney	1.7E-05	NA	2.2E-05	3.9E-05
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	5.6E-05	NA	5.4E-05	1.1E-04
			Indeno(1,2,3-cd)pyrene	3.5E-07	NA	4.3E-07	NA	7.8E-07	Kidney	3.7E-05	NA	4.6E-05	8.3E-05
			4,4`-DDE	8.1E-08	NA	--	NA	8.1E-08	Liver	2.8E-03	NA	--	2.8E-03
			Aldrin	2.4E-06	NA	--	NA	2.4E-06	Liver	2.7E-02	NA	--	2.7E-02
			Chlordane	1.5E-08	NA	--	NA	1.5E-08	Liver	5.0E-04	NA	--	5.0E-04
			Dieldrin	1.4E-05	NA	--	NA	1.4E-05	Liver	1.0E-01	NA	--	1.0E-01
			Endrin	NC	NA	NC	NA		Liver / Nervous System	3.7E-03	NA	--	3.7E-03
			Heptachlor	7.0E-07	NA	--	NA	7.0E-07	Liver	1.8E-03	NA	--	1.8E-03
			Aroclor-1232	1.3E-06	NA	1.7E-06	NA	3.0E-06	Immune system / Eye	1.9E-01	NA	2.5E-01	4.4E-01
			Aroclor-1242	2.1E-06	NA	2.9E-06	NA	5.0E-06	Immune system / Eye	3.1E-01	NA	4.2E-01	7.3E-01
			Aroclor-1248	1.3E-05	NA	1.7E-05	NA	2.9E-05	Immune system / Eye	1.8E+00	NA	2.5E+00	4.3E+00
			Aroclor-1254	6.4E-05	NA	8.6E-05	NA	1.5E-04	Immune system / Eye	9.3E+00	NA	1.3E+01	2.2E+01
			Aluminum	NC	NA	NC	NA		Nervous System	1.3E-02	NA	--	1.3E-02
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	3.2E-02	NA	--	3.2E-02
			Arsenic	5.4E-06	NA	1.6E-06	NA	7.0E-06	Skin / hematological	7.0E-02	NA	2.0E-02	9.0E-02
			Cadmium	NC	NA	NC	NA		Kidney	5.8E-02	NA	2.2E-02	8.0E-02
			Chromium	NC	NA	NC	NA		NOAEL	8.1E-05	NA	--	8.1E-05
			Cobalt	NC	NA	NC	NA		Endocrine	6.5E-02	NA	--	6.5E-02
			Copper	NC	NA	NC	NA		Undetermined	1.1E-02	NA	--	1.1E-02
			Manganese	NC	NA	NC	NA		Nervous System	1.3E-02	NA	--	1.3E-02
			Mercury	NC	NA	NC	NA		Immune system	6.0E-03	NA	--	6.0E-03
			Thallium	NC	NA	NC	NA		NOAEL	1.0E+00	NA	--	1.0E+00
			Vanadium	NC	NA	NC	NA		Kidney	1.1E-02	NA	--	1.1E-02
			Zinc	NC	NA	NC	NA		Liver	7.1E-03	NA	--	7.1E-03
			HCX	2.2E-07	NA	6.4E-08	NA	2.9E-07	Reproductive / Endocrine	1.2E-02	NA	3.6E-03	1.6E-02
			Dioxin-TEQ-M	1.4E-04	NA	4.0E-05	NA	1.8E-04	Reproductive / Endocrine	7.7E+00	NA	2.2E+00	9.9E+00
			CHEMICAL TOTAL	2.7E-04	--	1.7E-04	--	4E-04		2.3E+01	--	1.8E+01	4E+01
		EXPOSURE POINT TOTAL						4E-04					4E+01
	EXPOSURE MEDIUM TOTAL							4E-04					4E+01

US EPA ARCHIVE DOCUMENT

TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	5.6E-06	NA	5.6E-06
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	7.3E-06	NA	7.3E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	2.1E-06	NA	2.1E-06
			1,3-dichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,4-dichlorobenzene	NA	1.5E-11	NA	NA	1.5E-11	Developmental	NA	9.9E-09	NA	9.9E-09
			Benzene	NA	1.1E-10	NA	NA	1.1E-10	Immune system	NA	2.6E-06	NA	2.6E-06
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	3.1E-06	NA	3.1E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	7.0E-12	NA	NA	7.0E-12	Developmental	NA	1.6E-08	NA	1.6E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	8.7E-06	NA	8.7E-06
			Sec-butylbenzene	NA	NC	NA	NA			NA	--	NA	
			Tetrachloroethene	NA	1.1E-11	NA	NA	1.1E-11	Nervous System	NA	6.1E-06	NA	6.1E-06
			Trichloroethene	NA	2.4E-10	NA	NA	2.4E-10	kidney	NA	1.7E-04	NA	1.7E-04
			Vinyl Chloride	NA	2.3E-13	NA	NA	2.3E-13	Liver	NA	1.5E-09	NA	1.5E-09
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	2.2E-07	NA	2.2E-07
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	4.4E-11	NA	NA	4.4E-11		NA	--	NA	
			Benzo(a)pyrene	NA	4.7E-10	NA	NA	4.7E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	7.3E-11	NA	NA	7.3E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	1.4E-11	NA	NA	1.4E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	2.7E-11	NA	NA	2.7E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	9.2E-11	NA	NA	9.2E-11		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	1.8E-11	NA	NA	1.8E-11		NA	--	NA	
			4,4`-DDE	NA	7.9E-12	NA	NA	7.9E-12		NA	--	NA	
			Aldrin	NA	2.3E-10	NA	NA	2.3E-10		NA	--	NA	
			Chlordane	NA	1.5E-12	NA	NA	1.5E-12		NA	1.2E-07	NA	1.2E-07
			Dieldrin	NA	1.4E-09	NA	NA	1.4E-09		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	6.9E-11	NA	NA	6.9E-11		NA	--	NA	
			Aroclor-1232	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Aroclor-1242	NA	2.1E-10	NA	NA	2.1E-10		NA	--	NA	
			Aroclor-1248	NA	1.2E-09	NA	NA	1.2E-09		NA	--	NA	
			Aroclor-1254	NA	6.2E-09	NA	NA	6.2E-09		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	8.8E-04	NA	8.8E-04
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	5.3E-09	NA	NA	5.3E-09	Developmental / Cardiovascular / Nervous system	NA	4.8E-04	NA	4.8E-04
			Cadmium	NA	6.1E-09	NA	NA	6.1E-09	Kidney / Respiratory	NA	2.0E-03	NA	2.0E-03
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	1.0E-08	NA	NA	1.0E-08	Respiratory	NA	1.1E-03	NA	1.1E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	4.3E-03	NA	4.3E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	2.0E-06	NA	2.0E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	1.8E-04	NA	1.8E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	1.9E-11	NA	NA	1.9E-11	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	7.4E-08	NA	7.4E-08
			Dioxin-TEQ-M	NA	1.2E-08	NA	NA	1.2E-08	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	4.6E-05	NA	4.6E-05
			CHEMICAL TOTAL	--	4.4E-08	--	--	4E-08		--	9.1E-03	--	9E-03
		EXPOSURE POINT TOTAL						4E-08					9E-03
	EXPOSURE MEDIUM TOTAL							4E-08					9E-03
SOIL TOTAL								**4E-04**					**4E+01**
RECEPTOR TOTAL								**4E-04**					**4E+01**
							TOTAL RISK ACROSS ALL MEDIA	**4E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**4E+01**

US EPA ARCHIVE DOCUMENT

TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	4.1E-02
TOTAL CARDIOVASCULAR HI =	4.8E-04
TOTAL DEVELOPMENTAL HI =	4.8E-04
TOTAL ENDOCRINE HI =	1.0E+01
TOTAL EYE HI =	2.7E+01
	--
TOTAL HEMATOLOGICAL HI =	1.8E-01
TOTAL IMMUNE SYSTEM HI =	2.9E+01
TOTAL KIDNEY HI =	9.4E-02
TOTAL LIVER HI =	3.2E-01
	--
TOTAL NERVOUS SYSTEM HI =	3.6E-02
TOTAL NOAEL HI =	1.2E+00
TOTAL REPRODUCTIVE HI =	9.9E+00
TOTAL SKIN HI =	9.0E-02
TOTAL RESPIRATORY HI =	3.1E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SUBSURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			3.9E-02	NA	--	3.9E-02
			1,2,4-trichlorobenzene	1.0E-07	NA	--	NA	1.0E-07	Endocrine	2.1E-03	NA	--	2.1E-03
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	8.7E-03	NA	--	8.7E-03
			1,3-dichlorobenzene	NC	NA	NC	NA		Endocrine	5.0E-05	NA	--	5.0E-05
			1,4-dichlorobenzene	1.4E-08	NA	--	NA	1.4E-08	Endocrine	2.1E-04	NA	--	2.1E-04
			Benzene	1.4E-06	NA	--	NA	1.4E-06	Immune system / Hematological	3.7E-02	NA	--	3.7E-02
			Chlorobenzene	NC	NA	NC	NA		Liver	1.5E-02	NA	--	1.5E-02
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Undetermined	9.8E-02	NA	--	9.8E-02
			Ethyl benzene	5.8E-08	NA	--	NA	5.8E-08	Liver / Kidney	3.1E-04	NA	--	3.1E-04
			Naphthalene	NC	NA	NC	NA		General Toxicity	2.5E-03	NA	1.3E-03	3.7E-03
			Sec-butylbenzene	NC	NA	NC	NA			--	NA	--	
			Tetrachloroethene	1.6E-07	NA	--	NA	1.6E-07	Liver	7.6E-02	NA	--	7.6E-02
			Trichloroethene	5.1E-06	NA	--	NA	5.1E-06	Immune system	1.3E+00	NA	--	1.3E+00
			Vinyl Chloride	6.8E-08	NA	--	NA	6.8E-08	Liver	9.5E-05	NA	--	9.5E-05
			Xylenes, Total	NC	NA	NC	NA		General Toxicity	2.1E-04	NA	--	2.1E-04
			4-chloroaniline	2.0E-08	NA	8.1E-09	NA	2.8E-08	Hematological	1.5E-04	NA	5.9E-05	2.1E-04
			Benzo(a)anthracene	2.2E-07	NA	1.1E-07	NA	3.4E-07	Kidney	5.9E-05	NA	3.1E-05	8.9E-05
			Benzo(a)pyrene	2.4E-06	NA	1.2E-06	NA	3.6E-06	Kidney	6.3E-05	NA	3.3E-05	9.6E-05
			Benzo(b)fluoranthene	3.6E-07	NA	1.9E-07	NA	5.5E-07	Kidney	9.7E-05	NA	5.0E-05	1.5E-04
			Benzo(k)fluoranthene	7.0E-09	NA	3.6E-09	NA	1.1E-08	Kidney	1.9E-05	NA	9.7E-06	2.8E-05
			Bis(2-ethylhexyl)phthalate	3.0E-07	NA	1.2E-07	NA	4.2E-07	Liver	6.2E-03	NA	2.5E-03	8.7E-03
			Carbazole	1.1E-09	NA	4.2E-10	NA	1.5E-09		--	NA	--	
			Dibenz(a,h)anthracene	4.2E-07	NA	2.2E-07	NA	6.4E-07	Kidney	1.1E-05	NA	5.8E-06	1.7E-05
			Di-n-octylphthalate	NC	NA	NC	NA		Liver / Kidney	3.6E-05	NA	1.4E-05	5.0E-05
			Indeno(1,2,3-cd)pyrene	8.9E-08	NA	4.6E-08	NA	1.4E-07	Kidney	2.4E-05	NA	1.2E-05	3.6E-05
			4,4`-DDE	5.2E-08	NA	--	NA	5.2E-08	Liver	1.8E-03	NA	--	1.8E-03
			Aldrin	1.5E-06	NA	--	NA	1.5E-06	Liver	1.7E-02	NA	--	1.7E-02
			Chlordane	9.7E-09	NA	--	NA	9.7E-09	Liver	3.2E-04	NA	--	3.2E-04
			Dieldrin	9.1E-06	NA	--	NA	9.1E-06	Liver	6.6E-02	NA	--	6.6E-02
			Endrin	NC	NA	NC	NA		Liver / Nervous System	2.4E-03	NA	--	2.4E-03
			Heptachlor	4.5E-07	NA	--	NA	4.5E-07	Liver	1.2E-03	NA	--	1.2E-03
			Aroclor-1232	8.3E-07	NA	4.6E-07	NA	1.3E-06	Immune system / Eye	1.2E-01	NA	6.8E-02	1.9E-01
			Aroclor-1242	1.4E-06	NA	7.6E-07	NA	2.1E-06	Immune system / Eye	2.0E-01	NA	1.1E-01	3.1E-01
			Aroclor-1248	8.1E-06	NA	4.5E-06	NA	1.3E-05	Immune system / Eye	1.2E+00	NA	6.6E-01	1.8E+00
			Aroclor-1254	4.1E-05	NA	2.3E-05	NA	6.4E-05	Immune system / Eye	6.0E+00	NA	3.4E+00	9.4E+00
			Aluminum	NC	NA	NC	NA		Nervous System	8.3E-03	NA	--	8.3E-03
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	2.1E-02	NA	--	2.1E-02
			Arsenic	3.5E-06	NA	4.2E-07	NA	3.9E-06	Skin / hematological	4.5E-02	NA	5.4E-03	5.1E-02
			Cadmium	NC	NA	NC	NA		Kidney	3.7E-02	NA	5.9E-03	4.3E-02
			Chromium	NC	NA	NC	NA		NOAEL	5.2E-05	NA	--	5.2E-05
			Cobalt	NC	NA	NC	NA		Endocrine	4.2E-02	NA	--	4.2E-02
			Copper	NC	NA	NC	NA		Undetermined	6.8E-03	NA	--	6.8E-03
			Manganese	NC	NA	NC	NA		Nervous System	8.6E-03	NA	--	8.6E-03
			Mercury	NC	NA	NC	NA		Immune system	3.8E-03	NA	--	3.8E-03
			Thallium	NC	NA	NC	NA		NOAEL	6.5E-01	NA	--	6.5E-01
			Vanadium	NC	NA	NC	NA		Kidney	7.0E-03	NA	--	7.0E-03
			Zinc	NC	NA	NC	NA		Liver	4.5E-03	NA	--	4.5E-03
			HCX	1.4E-07	NA	1.7E-08	NA	1.6E-07	Reproductive / Endocrine	7.9E-03	NA	9.5E-04	8.9E-03
			Dioxin-TEQ-M	8.9E-05	NA	1.1E-05	NA	1.0E-04	Reproductive / Endocrine	5.0E+00	NA	5.9E-01	5.5E+00
			CHEMICAL TOTAL	1.7E-04	--	4.2E-05	--	2E-04		1.5E+01	--	4.8E+00	2E+01
		EXPOSURE POINT TOTAL						2E-04					2E+01
	EXPOSURE MEDIUM TOTAL							2E-04					2E+01

US EPA ARCHIVE DOCUMENT

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	5.6E-06	NA	5.6E-06
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	7.3E-06	NA	7.3E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	2.1E-06	NA	2.1E-06
			1,3-dichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,4-dichlorobenzene	NA	1.5E-11	NA	NA	1.5E-11	Developmental	NA	9.9E-09	NA	9.9E-09
			Benzene	NA	1.1E-10	NA	NA	1.1E-10	Immune system	NA	2.6E-06	NA	2.6E-06
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	3.1E-06	NA	3.1E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	7.0E-12	NA	NA	7.0E-12	Developmental	NA	1.6E-08	NA	1.6E-08
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	8.7E-06	NA	8.7E-06
			Sec-butylbenzene	NA	NC	NA	NA			NA	--	NA	
			Tetrachloroethene	NA	1.1E-11	NA	NA	1.1E-11	Nervous System	NA	6.1E-06	NA	6.1E-06
			Trichloroethene	NA	2.4E-10	NA	NA	2.4E-10	kidney	NA	1.7E-04	NA	1.7E-04
			Vinyl Chloride	NA	2.3E-13	NA	NA	2.3E-13	Liver	NA	1.5E-09	NA	1.5E-09
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	2.2E-07	NA	2.2E-07
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	1.8E-11	NA	NA	1.8E-11		NA	--	NA	
			Benzo(a)pyrene	NA	1.9E-10	NA	NA	1.9E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	2.9E-11	NA	NA	2.9E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	5.6E-12	NA	NA	5.6E-12		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	2.7E-11	NA	NA	2.7E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	3.7E-11	NA	NA	3.7E-11		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	7.2E-12	NA	NA	7.2E-12		NA	--	NA	
			4,4`-DDE	NA	7.9E-12	NA	NA	7.9E-12		NA	--	NA	
			Aldrin	NA	2.3E-10	NA	NA	2.3E-10		NA	--	NA	
			Chlordane	NA	1.5E-12	NA	NA	1.5E-12		NA	1.2E-07	NA	1.2E-07
			Dieldrin	NA	1.4E-09	NA	NA	1.4E-09		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	6.9E-11	NA	NA	6.9E-11		NA	--	NA	
			Aroclor-1232	NA	1.3E-10	NA	NA	1.3E-10		NA	--	NA	
			Aroclor-1242	NA	2.1E-10	NA	NA	2.1E-10		NA	--	NA	
			Aroclor-1248	NA	1.2E-09	NA	NA	1.2E-09		NA	--	NA	
			Aroclor-1254	NA	6.2E-09	NA	NA	6.2E-09		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	8.8E-04	NA	8.8E-04
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	5.3E-09	NA	NA	5.3E-09	Developmental / Cardiovascular / Nervous system	NA	4.8E-04	NA	4.8E-04
			Cadmium	NA	6.1E-09	NA	NA	6.1E-09	Kidney / Respiratory	NA	2.0E-03	NA	2.0E-03
			Chromium	NA	NC	NA	NA			NA	--	NA	
			Cobalt	NA	1.0E-08	NA	NA	1.0E-08	Respiratory	NA	1.1E-03	NA	1.1E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	4.3E-03	NA	4.3E-03
			Mercury	NA	NC	NA	NA		Nervous System	NA	2.0E-06	NA	2.0E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	1.8E-04	NA	1.8E-04
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	1.9E-11	NA	NA	1.9E-11	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	7.4E-08	NA	7.4E-08
			Dioxin-TEQ-M	NA	1.2E-08	NA	NA	1.2E-08	Liver / Reproductive / Endocrine / Respiratory / Hematological	NA	4.6E-05	NA	4.6E-05
			CHEMICAL TOTAL	--	4.4E-08	--	--	4E-08		--	9.1E-03	--	9E-03
		EXPOSURE POINT TOTAL						4E-08					9E-03
	EXPOSURE MEDIUM TOTAL							4E-08					9E-03
SOIL TOTAL								**2E-04**					**2E+01**
RECEPTOR TOTAL								**2E-04**					**2E+01**
							TOTAL RISK ACROSS ALL MEDIA	**2E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**2E+01**

US EPA ARCHIVE DOCUMENT

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	2.5E-02
TOTAL CARDIOVASCULAR HI =	4.8E-04
TOTAL DEVELOPMENTAL HI =	4.8E-04
TOTAL ENDOCRINE HI =	5.6E+00
TOTAL EYE HI =	1.2E+01
	--
TOTAL HEMATOLOGICAL HI =	1.1E-01
TOTAL IMMUNE SYSTEM HI =	1.3E+01
TOTAL KIDNEY HI =	5.3E-02
TOTAL LIVER HI =	2.0E-01
	--
TOTAL NERVOUS SYSTEM HI =	2.5E-02
TOTAL NOAEL HI =	7.9E-01
TOTAL REPRODUCTIVE HI =	5.6E+00
TOTAL SKIN HI =	5.1E-02
TOTAL RESPIRATORY HI =	3.1E-03

US EPA ARCHIVE DOCUMENT

TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SOIL	SOURCE AREA	1,2,3-trichlorobenzene	NC	NA	NC	NA			1.1E-02	NA	--	1.1E-02
			1,2,4-trichlorobenzene	7.0E-08	NA	--	NA	7.0E-08	Endocrine	1.9E-03	NA	--	1.9E-03
			1,2,4-trimethylbenzene	NC	NA	NC	NA		Undetermined	--	NA	--	
			1,2-dichlorobenzene	NC	NA	NC	NA		Liver	1.9E-03	NA	--	1.9E-03
			1,3-dichlorobenzene	NC	NA	NC	NA		Endocrine	9.5E-05	NA	--	9.5E-05
			1,4-dichlorobenzene	1.8E-09	NA	--	NA	1.8E-09	Endocrine	3.3E-04	NA	--	3.3E-04
			Benzene	1.5E-07	NA	--	NA	1.5E-07	Immune system / Hematological	2.0E-02	NA	--	2.0E-02
			Chlorobenzene	NC	NA	NC	NA		Liver	5.9E-03	NA	--	5.9E-03
			Cis-1,2-dichloroethene	NC	NA	NC	NA		Hematological	9.0E-04	NA	--	9.0E-04
			Ethyl benzene	3.1E-09	NA	--	NA	3.1E-09	Liver	4.0E-04	NA	--	4.0E-04
			Naphthalene	NC	NA	NC	NA		Nervous System	1.5E-04	NA	6.0E-05	2.1E-04
			Tetrachloroethene	2.0E-08	NA	--	NA	2.0E-08	Liver	6.7E-03	NA	--	6.7E-03
			Trichloroethene	5.7E-07	NA	--	NA	5.7E-07	Immune system	1.7E+00	NA	--	1.7E+00
			Vinyl Chloride	1.2E-08	NA	--	NA	1.2E-08	Liver	1.9E-04	NA	--	1.9E-04
			Xylenes, Total	NC	NA	NC	NA		Nervous System	2.2E-04	NA	--	2.2E-04
			4-chloroaniline	8.7E-08	NA	2.6E-08	NA	1.1E-07	Hematological	6.1E-02	NA	1.8E-02	7.9E-02
			Benzo(a)anthracene	5.7E-08	NA	2.2E-08	NA	7.9E-08	Kidney	1.8E-05	NA	7.1E-06	2.5E-05
			Benzo(a)pyrene	5.8E-07	NA	2.2E-07	NA	8.0E-07	Kidney	1.8E-05	NA	7.2E-06	2.6E-05
			Benzo(b)fluoranthene	7.6E-08	NA	3.0E-08	NA	1.1E-07	Kidney	2.4E-05	NA	9.5E-06	3.4E-05
			Benzo(k)fluoranthene	3.3E-09	NA	1.3E-09	NA	4.6E-09	Kidney	1.1E-05	NA	4.1E-06	1.5E-05
			Bis(2-ethylhexyl)phthalate	3.9E-08	NA	1.2E-08	NA	5.1E-08	Reproductive	1.9E-03	NA	5.8E-04	2.5E-03
			Carbazole	2.7E-10	NA	8.1E-11	NA	3.5E-10		--	NA	--	
			Dibenz(a,h)anthracene	1.1E-07	NA	4.5E-08	NA	1.6E-07	Kidney	3.7E-06	NA	1.4E-06	5.1E-06
			Di-n-octylphthalate	NC	NA	NC	NA		Liver	4.8E-06	NA	1.4E-06	6.2E-06
			Indeno(1,2,3-cd)pyrene	2.6E-08	NA	1.0E-08	NA	3.7E-08	Kidney	8.4E-06	NA	3.3E-06	1.2E-05
			4,4`-DDE	6.4E-09	NA	--	NA	6.4E-09	Liver	2.7E-03	NA	--	2.7E-03
			Aldrin	1.3E-07	NA	--	NA	1.3E-07	Liver	1.4E-02	NA	--	1.4E-02
			Chlordane	1.6E-08	NA	--	NA	1.6E-08	Liver	5.2E-03	NA	--	5.2E-03
			Dieldrin	7.9E-07	NA	--	NA	7.9E-07	Nervous System	3.5E-02	NA	--	3.5E-02
			Endrin	NC	NA	NC	NA		Nervous System	4.1E-04	NA	--	4.1E-04
			Heptachlor	6.1E-08	NA	--	NA	6.1E-08	Liver	1.9E-03	NA	--	1.9E-03
			Aroclor-1232	3.6E-07	NA	1.5E-07	NA	5.2E-07	Immune system / Eye	2.6E-01	NA	1.1E-01	3.6E-01
			Aroclor-1242	3.4E-07	NA	1.4E-07	NA	4.8E-07	Immune system / Eye	2.4E-01	NA	9.9E-02	3.3E-01
			Aroclor-1248	1.1E-06	NA	4.6E-07	NA	1.5E-06	Immune system / Eye	7.6E-01	NA	3.2E-01	1.1E+00
			Aroclor-1254	6.3E-06	NA	2.6E-06	NA	8.9E-06	Immune system / Eye	7.4E+00	NA	3.1E+00	1.0E+01
			Aroclor-1268	4.0E-07	NA	1.7E-07	NA	5.7E-07	Immune system / Eye	2.8E-01	NA	1.2E-01	4.0E-01
			Aluminum	NC	NA	NC	NA		Nervous System	2.1E-02	NA	--	2.1E-02
			Antimony	NC	NA	NC	NA		General Toxicity / Hematological	2.8E-02	NA	--	2.8E-02
			Arsenic	5.8E-07	NA	5.2E-08	NA	6.3E-07	Skin	9.0E-02	NA	8.1E-03	9.9E-02
			Cadmium	NC	NA	NC	NA			1.2E-01	NA	1.5E-02	1.4E-01
			Chromium	NC	NA	NC	NA		NOAEL	2.4E-04	NA	--	2.4E-04
			Cobalt	NC	NA	NC	NA		Endocrine	8.8E-03	NA	--	8.8E-03
			Copper	NC	NA	NC	NA		Undetermined	5.3E-02	NA	--	5.3E-02
			Manganese	NC	NA	NC	NA		Nervous System	2.2E-02	NA	--	2.2E-02
			Mercury	NC	NA	NC	NA		Kidney	1.9E-03	NA	--	1.9E-03
			Thallium	NC	NA	NC	NA		NOAEL	1.2E-02	NA	--	1.2E-02
			Vanadium	NC	NA	NC	NA		Kidney	1.0E-02	NA	--	1.0E-02
			Zinc	NC	NA	NC	NA		Hematological	8.2E-03	NA	--	8.2E-03
			HCX	5.6E-08	NA	5.0E-09	NA	6.1E-08	Reproductive / Endocrine	1.3E-06	NA	1.2E-07	1.4E-06
			Dioxin-TEQ-M	3.3E-05	NA	2.9E-06	NA	3.6E-05	Reproductive / Endocrine	7.6E-04	NA	6.9E-05	8.3E-04
			CHEMICAL TOTAL	4.5E-05	--	6.9E-06	--	5E-05		1.1E+01	--	3.8E+00	1E+01
		EXPOSURE POINT TOTAL						5E-05					1E+01
	EXPOSURE MEDIUM TOTAL							5E-05					1E+01

US EPA ARCHIVE DOCUMENT

TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	AIR	DUST AT SOURCE AREA	1,2,3-trichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,2,4-trichlorobenzene	NA	NC	NA	NA			NA	2.5E-05	NA	2.5E-05
			1,2,4-trimethylbenzene	NA	NC	NA	NA		Undetermined	NA	7.6E-06	NA	7.6E-06
			1,2-dichlorobenzene	NA	NC	NA	NA		General Toxicity	NA	1.7E-06	NA	1.7E-06
			1,3-dichlorobenzene	NA	NC	NA	NA			NA	--	NA	
			1,4-dichlorobenzene	NA	1.1E-11	NA	NA	1.1E-11	Developmental	NA	5.7E-08	NA	5.7E-08
			Benzene	NA	6.5E-11	NA	NA	6.5E-11	Immune system	NA	7.3E-06	NA	7.3E-06
			Chlorobenzene	NA	NC	NA	NA		Undetermined	NA	2.4E-06	NA	2.4E-06
			Cis-1,2-dichloroethene	NA	NC	NA	NA			NA	--	NA	
			Ethyl benzene	NA	2.1E-12	NA	NA	2.1E-12	ear	NA	6.5E-09	NA	6.5E-09
			Naphthalene	NA	NC	NA	NA		Respiratory	NA	9.1E-05	NA	9.1E-05
			Tetrachloroethene	NA	7.4E-12	NA	NA	7.4E-12	Nervous System	NA	5.0E-05	NA	5.0E-05
			Trichloroethene	NA	1.5E-10	NA	NA	1.5E-10	Nervous System	NA	4.8E-06	NA	4.8E-06
			Vinyl Chloride	NA	2.2E-13	NA	NA	2.2E-13	Liver	NA	1.7E-08	NA	1.7E-08
			Xylenes, Total	NA	NC	NA	NA		Nervous System	NA	6.6E-07	NA	6.6E-07
			4-chloroaniline	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	2.5E-11	NA	NA	2.5E-11		NA	--	NA	
			Benzo(a)pyrene	NA	2.6E-10	NA	NA	2.6E-10		NA	--	NA	
			Benzo(b)fluoranthene	NA	3.4E-11	NA	NA	3.4E-11		NA	--	NA	
			Benzo(k)fluoranthene	NA	1.5E-11	NA	NA	1.5E-11		NA	--	NA	
			Bis(2-ethylhexyl)phthalate	NA	2.0E-11	NA	NA	2.0E-11		NA	--	NA	
			Carbazole	NA	NC	NA	NA			NA	--	NA	
			Dibenz(a,h)anthracene	NA	5.6E-11	NA	NA	5.6E-11		NA	--	NA	
			Di-n-octylphthalate	NA	NC	NA	NA			NA	--	NA	
			Indeno(1,2,3-cd)pyrene	NA	1.2E-11	NA	NA	1.2E-11		NA	--	NA	
			4,4`-DDE	NA	5.5E-12	NA	NA	5.5E-12		NA	--	NA	
			Aldrin	NA	1.1E-10	NA	NA	1.1E-10		NA	--	NA	
			Chlordane	NA	1.3E-11	NA	NA	1.3E-11		NA	4.7E-05	NA	4.7E-05
			Dieldrin	NA	6.8E-10	NA	NA	6.8E-10		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Heptachlor	NA	5.2E-11	NA	NA	5.2E-11		NA	--	NA	
			Aroclor-1232	NA	3.1E-10	NA	NA	3.1E-10		NA	--	NA	
			Aroclor-1242	NA	2.8E-10	NA	NA	2.8E-10		NA	--	NA	
			Aroclor-1248	NA	9.2E-10	NA	NA	9.2E-10		NA	--	NA	
			Aroclor-1254	NA	5.3E-09	NA	NA	5.3E-09		NA	--	NA	
			Aroclor-1268	NA	3.4E-10	NA	NA	3.4E-10		NA	--	NA	
			Aluminum	NA	NC	NA	NA		Nervous System	NA	1.3E-02	NA	1.3E-02
			Antimony	NA	NC	NA	NA			NA	--	NA	
			Arsenic	NA	4.9E-09	NA	NA	4.9E-09	Developmental / Cardiovascular / Nervous system	NA	5.4E-03	NA	5.4E-03
			Cadmium	NA	4.7E-09	NA	NA	4.7E-09	Kidney / Respiratory	NA	1.8E-02	NA	1.8E-02
			Chromium	NA	NC	NA	NA		Respiratory	NA	1.4E-04	NA	1.4E-04
			Cobalt	NA	1.0E-08	NA	NA	1.0E-08	Respiratory	NA	3.9E-03	NA	3.9E-03
			Copper	NA	NC	NA	NA			NA	--	NA	
			Manganese	NA	NC	NA	NA		Nervous System	NA	6.2E-02	NA	6.2E-02
			Mercury	NA	NC	NA	NA		Nervous System	NA	3.7E-05	NA	3.7E-05
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	3.0E-03	NA	3.0E-03
			Zinc	NA	NC	NA	NA			NA	--	NA	
			HCX	NA	4.2E-11	NA	NA	4.2E-11		NA	1.9E-06	NA	1.9E-06
			Dioxin-TEQ-M	NA	2.5E-08	NA	NA	2.5E-08		NA	1.1E-03	NA	1.1E-03
			CHEMICAL TOTAL	--	5.3E-08	--	--	5E-08		--	1.1E-01	--	1E-01
		EXPOSURE POINT TOTAL						5E-08					1E-01
	EXPOSURE MEDIUM TOTAL							5E-08					1E-01
SOIL TOTAL								**5E-05**					**2E+01**
RECEPTOR TOTAL								**5E-05**					**2E+01**
							TOTAL RISK ACROSS ALL MEDIA	**5E-05**	**TOTAL HAZARD ACROSS ALL MEDIA**				**2E+01**

US EPA ARCHIVE DOCUMENT

TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

TOTAL GENERAL TOXICITY HI =	**2.8E-02**
TOTAL CARDIOVASCULAR HI =	**5.4E-03**
TOTAL DEVELOPMENTAL HI =	**5.4E-03**
TOTAL ENDOCRINE HI =	**1.2E-02**
TOTAL EYE HI =	**1.3E+01**
	--
TOTAL HEMATOLOGICAL HI =	**1.4E-01**
TOTAL IMMUNE SYSTEM HI =	**1.4E+01**
TOTAL KIDNEY HI =	**3.0E-02**
TOTAL LIVER HI =	**3.9E-02**
	--
TOTAL NERVOUS SYSTEM HI =	**1.6E-01**
TOTAL NOAEL HI =	**2.2E-01**
TOTAL REPRODUCTIVE HI =	**3.4E-03**
TOTAL SKIN HI =	**9.9E-02**
TOTAL RESPIRATORY HI =	**2.3E-02**

US EPA ARCHIVE DOCUMENT

TABLE 10.1
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,3-trichlorobenzene				NA			2.9E+00	NA		2.9E+00
			1,2,4-trichlorobenzene	1.1E-05	NA		NA	1.1E-05	Endocrine	--	NA	--	
			Cis-1,2-dichloroethene				NA		Undetermined	1.2E+00	NA		1.2E+00
			Tetrachloroethene	1.7E-06	NA		NA	1.7E-06	Liver	1.5E+00	NA		1.5E+00
			Trichloroethene	2.9E-05	NA		NA	2.9E-05	Immune system	1.4E+01	NA		1.4E+01
			4-chloroaniline	6.1E-05	NA	1.7E-05	NA	7.9E-05	Hematological	8.9E-01	NA	2.5E-01	1.1E+00
			Benzo(a)anthracene	1.2E-05	NA	4.3E-06	NA	1.6E-05	Kidney	--	NA	--	
			Benzo(a)pyrene	9.7E-05	NA	3.5E-05	NA	1.3E-04	Kidney	--	NA	--	
			Benzo(b)fluoranthene	1.1E-05	NA	4.1E-06	NA	1.6E-05	Kidney	--	NA	--	
			Bis(2-ethylhexyl)phthalate	2.5E-06	NA	7.0E-07	NA	3.2E-06	Liver	--	NA	--	
			Dibenz(a,h)anthracene	1.9E-05	NA	6.9E-06	NA	2.6E-05	Kidney	--	NA	--	
			Indeno(1,2,3-cd)pyrene	4.6E-06	NA	1.7E-06	NA	6.3E-06	Kidney	--	NA	--	
			Dieldrin	3.9E-06	NA		NA	3.9E-06	Liver	--	NA	--	
			Heptachlor	4.0E-06	NA		NA	4.0E-06	Liver	--	NA	--	
			Aroclor-1232	5.5E-04	NA	2.1E-04	NA	7.6E-04	Immune system / Eye	1.6E+02	NA	6.3E+01	2.2E+02
			Aroclor-1242	1.8E-05	NA	6.9E-06	NA	2.5E-05	Immune system / Eye	5.1E+00	NA	2.0E+00	7.2E+00
			Aroclor-1248	1.3E-06	NA	5.1E-07	NA	1.8E-06	Immune system / Eye	--	NA	--	
			Aroclor-1254	1.4E-04	NA	5.5E-05	NA	1.9E-04	Immune system / Eye	4.1E+01	NA	1.6E+01	5.7E+01
			Aroclor-1268	9.5E-06	NA	3.7E-06	NA	1.3E-05	Immune system / Eye	2.8E+00	NA	1.1E+00	3.9E+00
			Arsenic	9.9E-06	NA	8.3E-07	NA	1.1E-05	Skin / hematologica	--	NA	--	
			Thallium				NA		NOAEL	7.9E+00	NA		7.9E+00
			Dioxin-TEQ-M	1.2E-03	NA	1.0E-04	NA	1.3E-03	Reproductive / Endocrine	1.4E+02	NA	1.2E+01	1.5E+02
			CHEMICAL TOTAL	2.2E-03	--	4.6E-04	--	3E-03		3.8E+02	0.0E+00	9.4E+01	5E+02
		EXPOSURE POINT TOTAL						3E-03					5E+02
	EXPOSURE MEDIUM TOTAL							3E-03					5E+02
OIL TOTAL								**3E-03**					**5E+02**
RECEPTOR TOTAL								**3E-03**					**4.7E+02**
							TOTAL RISK ACROSS ALL MEDIA	**3E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**4.7E+02**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**1.5E+02**
TOTAL EYE HI =	**2.9E+02**
	--
TOTAL HEMATOLOGICAL HI =	**1.1E+00**
TOTAL IMMUNE SYSTEM HI =	**3.0E+02**
	--
TOTAL LIVER HI =	**1.5E+00**
	--
	--
TOTAL NOAEL HI =	**1.2E+01**
TOTAL REPRODUCTIVE HI =	**1.5E+02**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.2
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,4-trichlorobenzene	3.6E-06	NA		NA	3.6E-06	Endocrine	--	NA	--	
			Trichloroethene	9.5E-06	NA		NA	9.5E-06	Immune system	2.4E+00	NA		2.4E+00
			4-chloroaniline	2.0E-05	NA	2.0E-05	NA	4.0E-05	Hematological	--	NA	--	
			Benzo(a)anthracene	2.4E-06	NA	2.9E-06	NA	5.3E-06	Kidney	--	NA	--	
			Benzo(a)pyrene	1.9E-05	NA	2.4E-05	NA	4.3E-05	Kidney	--	NA	--	
			Benzo(b)fluoranthene	2.3E-06	NA	2.8E-06	NA	5.1E-06	Kidney	--	NA	--	
			Bis(2-ethylhexyl)phthalate	8.3E-07	NA	8.0E-07	NA	1.6E-06	Liver	--	NA	--	
			Dibenz(a,h)anthracene	3.8E-06	NA	4.7E-06	NA	8.5E-06	Kidney	--	NA	--	
			Indeno(1,2,3-cd)pyrene	9.1E-07	NA	1.1E-06	NA	2.1E-06	Kidney	--	NA	--	
			Aroclor-1232	1.8E-04	NA	2.5E-04	NA	4.3E-04	Immune system / Eye	2.7E+01	NA	3.6E+01	6.2E+01
			Aroclor-1242	5.9E-06	NA	7.9E-06	NA	1.4E-05	Immune system / Eye	8.6E-01	NA	1.2E+00	2.0E+00
			Aroclor-1254	4.6E-05	NA	6.2E-05	NA	1.1E-04	Immune system / Eye	6.8E+00	NA	9.1E+00	1.6E+01
			Aroclor-1268	3.2E-06	NA	4.3E-06	NA	7.4E-06	Immune system / Eye	4.6E-01	NA	6.2E-01	1.1E+00
			Arsenic	3.3E-06	NA	9.5E-07	NA	4.3E-06	Skin / hematologica	--	NA	--	
			Thallium				NA		NOAEL	1.3E+00	NA		1.3E+00
			Dioxin-TEQ-M	4.1E-04	NA	1.2E-04	NA	5.3E-04	Reproductive / Endocrine	2.3E+01	NA	6.6E+00	3.0E+01
			CHEMICAL TOTAL	7.2E-04	--	5.0E-04	--	1E-03		6.2E+01	0.0E+00	5.3E+01	1E+02
		EXPOSURE POINT TOTAL						1E-03					1E+02
	EXPOSURE MEDIUM TOTAL							1E-03					1E+02
OIL TOTAL								**1E-03**					**1E+02**
RECEPTOR TOTAL								**1E-03**					**1.1E+02**
				TOTAL RISK ACROSS ALL MEDIA				**1E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**1.1E+02**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**3.0E+01**
TOTAL EYE HI =	**8.1E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**8.4E+01**
	--
	--
	--
	--
TOTAL NOAEL HI =	**1.3E+00**
TOTAL REPRODUCTIVE HI =	**3.0E+01**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.3
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SURFACE SOIL	SOURCE AREA	1,2,4-trichlorobenzene	2.3E-06	NA		NA	2.3E-06	Endocrine	--	NA	--	
			Trichloroethene	6.1E-06	NA		NA	6.1E-06	Immune system	1.6E+00	NA		1.6E+00
			4-chloroaniline	1.3E-05	NA	5.2E-06	NA	1.8E-05	Hematological	--	NA	--	
			Benzo(a)pyrene	5.0E-06	NA	2.6E-06	NA	7.6E-06	Kidney	--	NA	--	
			Aroclor-1232	1.2E-04	NA	6.6E-05	NA	1.8E-04	Immune system / Eye	1.7E+01	NA	9.6E+00	2.7E+01
			Aroclor-1242	3.8E-06	NA	2.1E-06	NA	5.9E-06	Immune system / Eye	--	NA	--	
			Aroclor-1254	3.0E-05	NA	1.7E-05	NA	4.6E-05	Immune system / Eye	4.4E+00	NA	2.4E+00	6.8E+00
			Aroclor-1268	2.0E-06	NA	1.1E-06	NA	3.2E-06	Immune system / Eye	--	NA	--	
			Arsenic	2.1E-06	NA	2.5E-07	NA	2.4E-06	Skin / hematologica	--	NA	--	
			Dioxin-TEQ-M	2.7E-04	NA	3.2E-05	NA	3.0E-04	Reproductive / Endocrine	1.5E+01	NA	1.8E+00	1.7E+01
			CHEMICAL TOTAL	4.5E-04	--	1.3E-04	--	6E-04		3.8E+01	0.0E+00	1.4E+01	5E+01
		EXPOSURE POINT TOTAL						6E-04					5E+01
	EXPOSURE MEDIUM TOTAL							6E-04					5E+01
OIL TOTAL								**6E-04**					**5E+01**
RECEPTOR TOTAL								**6E-04**					**5.2E+01**
				TOTAL RISK ACROSS ALL MEDIA				**6E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**5.2E+01**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**1.7E+01**
TOTAL EYE HI =	**3.3E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**3.5E+01**
	--
	--
	--
	--
	--
TOTAL REPRODUCTIVE HI =	**1.7E+01**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.4
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
OIL	SUBSURFACE SOIL	SOURCE AREA	Benzene	6.6E-06	NA		NA	6.6E-06	Immune system / Hematological	--	NA	--	
			Trichloroethene	2.4E-05	NA		NA	2.4E-05	Immune system	1.2E+01	NA		1.2E+01
			Benzo(a)anthracene	4.3E-06	NA	1.6E-06	NA	5.9E-06	Kidney	--	NA	--	
			Benzo(a)pyrene	4.7E-05	NA	1.7E-05	NA	6.4E-05	Kidney	--	NA	--	
			Benzo(b)fluoranthene	7.1E-06	NA	2.6E-06	NA	9.7E-06	Kidney	--	NA	--	
			Bis(2-ethylhexyl)phthalate	1.4E-06	NA	3.9E-07	NA	1.8E-06	Liver	--	NA	--	
			Dibenz(a,h)anthracene	8.3E-06	NA	3.0E-06	NA	1.1E-05	Kidney	--	NA	--	
			Indeno(1,2,3-cd)pyrene	1.8E-06	NA	6.4E-07	NA	2.4E-06	Kidney	--	NA	--	
			Aldrin	7.1E-06	NA		NA	7.1E-06	Liver	--	NA	--	
			Dieldrin	4.2E-05	NA		NA	4.2E-05	Liver	--	NA	--	
			Heptachlor	2.1E-06	NA		NA	2.1E-06	Liver	--	NA	--	
			Aroclor-1232	3.9E-06	NA	1.5E-06	NA	5.4E-06	Immune system / Eye	1.1E+00	NA	4.4E-01	1.6E+00
			Aroclor-1242	6.4E-06	NA	2.5E-06	NA	8.9E-06	Immune system / Eye	1.9E+00	NA	7.3E-01	2.6E+00
			Aroclor-1248	3.8E-05	NA	1.5E-05	NA	5.2E-05	Immune system / Eye	1.1E+01	NA	4.3E+00	1.5E+01
			Aroclor-1254	1.9E-04	NA	7.5E-05	NA	2.7E-04	Immune system / Eye	5.6E+01	NA	2.2E+01	7.8E+01
			Arsenic	1.6E-05	NA	1.4E-06	NA	1.8E-05	Skin / hematologica	--	NA	--	
			Thallium				NA		NOAEL	6.1E+00	NA		6.1E+00
			Dioxin-TEQ-M	4.2E-04	NA	3.5E-05	NA	4.5E-04	Reproductive / Endocrine	4.6E+01	NA	3.9E+00	5.0E+01
			CHEMICAL TOTAL	8.2E-04	--	1.6E-04	--	1E-03		1.3E+02	0.0E+00	3.1E+01	2E+02
		EXPOSURE POINT TOTAL						1E-03					2E+02
	EXPOSURE MEDIUM TOTAL							1E-03					2E+02
OIL TOTAL								**1E-03**					**2E+02**
RECEPTOR TOTAL								**1E-03**					**1.7E+02**
				TOTAL RISK ACROSS ALL MEDIA				**1E-03**	**TOTAL HAZARD ACROSS ALL MEDIA**				**1.7E+02**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**5.0E+01**
TOTAL EYE HI =	**9.7E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**1.1E+02**
	--
	--
	--
	--
TOTAL NOAEL HI =	**6.1E+00**
TOTAL REPRODUCTIVE HI =	**5.0E+01**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.5
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - OLDER CHILD - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: OLDER CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
OIL	SUBSURFACE SOIL	SOURCE AREA	Trichloroethene	7.9E-06	NA		NA	7.9E-06	Immune system	2.0E+00	NA		2.0E+00
			Benzo(a)anthracene	8.6E-07	NA	1.1E-06	NA	1.9E-06	Kidney	--	NA	--	
			Benzo(a)pyrene	9.2E-06	NA	1.2E-05	NA	2.1E-05	Kidney	--	NA	--	
			Benzo(b)fluoranthene	1.4E-06	NA	1.8E-06	NA	3.2E-06	Kidney	--	NA	--	
			Dibenz(a,h)anthracene	1.6E-06	NA	2.0E-06	NA	3.7E-06	Kidney	--	NA	--	
			Dieldrin	1.4E-05	NA		NA	1.4E-05	Liver	--	NA	--	
			Aroclor-1232	1.3E-06	NA	1.7E-06	NA	3.0E-06	Immune system / Eye	--	NA	--	
			Aroclor-1242	2.1E-06	NA	2.9E-06	NA	5.0E-06	Immune system / Eye	--	NA	--	
			Aroclor-1248	1.3E-05	NA	1.7E-05	NA	2.9E-05	Immune system / Eye	1.8E+00	NA	2.5E+00	4.3E+00
			Aroclor-1254	6.4E-05	NA	8.6E-05	NA	1.5E-04	Immune system / Eye	9.3E+00	NA	1.3E+01	2.2E+01
			Arsenic	5.4E-06	NA	1.6E-06	NA	7.0E-06	Skin / hematologica	--	NA	--	
			Dioxin-TEQ-M	1.4E-04	NA	4.0E-05	NA	1.8E-04	Reproductive / Endocrine	7.7E+00	NA	2.2E+00	9.9E+00
			CHEMICAL TOTAL	2.6E-04	--	1.7E-04	--	4E-04		2.2E+01	0.0E+00	1.7E+01	4E+01
		EXPOSURE POINT TOTAL						4E-04					4E+01
	EXPOSURE MEDIUM TOTAL							4E-04					4E+01
OIL TOTAL								**4E-04**					**4E+01**
RECEPTOR TOTAL								**4E-04**					**3.9E+01**
			TOTAL RISK ACROSS ALL MEDIA					**4E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**3.9E+01**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**9.9E+00**
TOTAL EYE HI =	**2.6E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**2.8E+01**
	--
	--
	--
	--
TOTAL NOAEL HI =	**1.0E+00**
TOTAL REPRODUCTIVE HI =	**9.9E+00**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.6
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - RESIDENT - ADULT - SUBSURFACE SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
OIL	SUBSURFACE SOIL	SOURCE AREA	Trichloroethene	5.1E-06	NA		NA	5.1E-06	Immune system	1.3E+00	NA		1.3E+00
			Benzo(a)pyrene	2.4E-06	NA	1.2E-06	NA	3.6E-06	Kidney	--	NA	--	
			Aldrin	1.5E-06	NA		NA	1.5E-06	Liver	--	NA	--	
			Dieldrin	9.1E-06	NA		NA	9.1E-06	Liver	--	NA	--	
			Aroclor-1242	1.4E-06	NA	7.6E-07	NA	2.1E-06	Immune system / Eye	--	NA	--	
			Aroclor-1248	8.1E-06	NA	4.5E-06	NA	1.3E-05	Immune system / Eye	1.2E+00	NA	6.6E-01	1.8E+00
			Aroclor-1254	4.1E-05	NA	2.3E-05	NA	6.4E-05	Immune system / Eye	6.0E+00	NA	3.4E+00	9.4E+00
			Arsenic	3.5E-06	NA	4.2E-07	NA	3.9E-06	Skin / hematologica	--	NA	--	
			Dioxin-TEQ-M	8.9E-05	NA	1.1E-05	NA	1.0E-04	Reproductive / Endocrine	5.0E+00	NA	5.9E-01	5.5E+00
			CHEMICAL TOTAL	1.6E-04	--	4.1E-05	--	2E-04		1.3E+01	0.0E+00	4.6E+00	2E+01
		EXPOSURE POINT TOTAL						2E-04					2E+01
	EXPOSURE MEDIUM TOTAL							2E-04					2E+01
OIL TOTAL								**2E-04**					**2E+01**
RECEPTOR TOTAL								**2E-04**					**1.8E+01**
				TOTAL RISK ACROSS ALL MEDIA				**2E-04**	**TOTAL HAZARD ACROSS ALL MEDIA**				**1.8E+01**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
TOTAL ENDOCRINE HI =	**5.5E+00**
TOTAL EYE HI =	**1.1E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**1.2E+01**
	--
	--
	--
	--
	--
TOTAL REPRODUCTIVE HI =	**5.5E+00**
	--
	--

US EPA ARCHIVE DOCUMENT

TABLE 10.7
RISK SUMMARY - REASONABLE MAXIMUM EXPOSURE - FUTURE - CONSTRUCTION WORKER - ADULT - SOIL
SOURCE AREA RISK ASSESSMENT
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK					NON-CARCINOGENIC HAZARD QUOTIENT				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
OIL	SOIL	SOURCE AREA	Trichloroethene	--	NA	--	NA		Immune system	1.7E+00	NA		1.7E+00
			Aroclor-1248	1.1E-06	NA	4.6E-07	NA	1.5E-06	Immune system / Eye	7.6E-01	NA	3.2E-01	1.1E+00
			Aroclor-1254	6.3E-06	NA	2.6E-06	NA	8.9E-06	Immune system / Eye	7.4E+00	NA	3.1E+00	1.0E+01
			Dioxin-TEQ-M	3.3E-05	NA	2.9E-06	NA	3.6E-05	Reproductive / Endocrine	--	NA	--	
			CHEMICAL TOTAL	4.0E-05	--	6.0E-06	--	5E-05		9.8E+00	0.0E+00	3.4E+00	1E+01
		EXPOSURE POINT TOTAL						5E-05					1E+01
	EXPOSURE MEDIUM TOTAL							5E-05					1E+01
OIL TOTAL								**5E-05**					**1E+01**
RECEPTOR TOTAL								**5E-05**					**1.3E+01**
				TOTAL RISK ACROSS ALL MEDIA				**5E-05**	**TOTAL HAZARD ACROSS ALL MEDIA**				**1.3E+01**

NOTES:
NC - Not carcinogenic by this exposure route.
NA - Not applicable; exposure route not applicable for this chemical/exposure medium.
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

	--
	--
	--
	--
TOTAL EYE HI =	**1.2E+01**
	--
	--
TOTAL IMMUNE SYSTEM HI =	**1.3E+01**
	--
	--
	--
	--
	--
	--
	--
	--

US EPA ARCHIVE DOCUMENT

Table 11.1
Risk Assessment Summary - Reasonable Maximum Exposure
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Exposure Scenario	Receptor	Exposure Point	Exposure Route	Excess Lifetime Cancer Risk	Hazard Index (1)	Target Organ/System
Hypothetical Future - Source Area						
Resident	Child (ages 1 through 6)	Surface Soil	Incidental ingestion	2.2E-03	223	Immune System
			Dermal contact	4.6E-04	82	Immune System
			Dust inhalation	3.8E-08	0.000000002	Immune System
			Total Risk:	**3E-03**	**305**	
	Older Child (ages 7 through 18)	Surface Soil	Incidental ingestion	7.2E-04	38	Immune System
			Dermal contact	5.0E-04	47	Immune System
			Dust inhalation	7.5E-08	0.000000002	Immune System
			Total Risk:	**1E-03**	**85**	
	Adult (ages 19 and above)	Surface Soil	Incidental ingestion	4.5E-04	24	Immune System
			Dermal contact	1.3E-04	13	Immune System
			Dust inhalation	7.4E-08	0.000000002	Immune System
			Total Risk:	**6E-04**	**37**	
			Total Receptor Risk:	**4E-03**	**NA**	
Hypothetical Future - Source Area						
Resident	Child (ages 1 through 6)	Subsurface Soil	Incidental ingestion	8.3E-04	82	Immune System
			Dermal contact	1.6E-04	27	Immune System
			Dust inhalation	2.2E-08	0.000003	Immune System
			Total Risk:	**1E-03**	**109**	
	Older Child (ages 7 through 18)	Subsurface Soil	Incidental ingestion	2.7E-04	14	Immune System
			Dermal contact	1.7E-04	16	Immune System
			Dust inhalation	4.4E-08	0.000003	Immune System
			Total Risk:	**4E-04**	**30**	
	Adult (ages 19 and above)	Subsurface Soil	Incidental ingestion	1.7E-04	9	Immune System
			Dermal contact	4.2E-05	4	Immune System
			Dust inhalation	4.4E-08	0.000003	Immune System
			Total Risk:	**2E-04**	**13**	
			Total Receptor Risk:	**2E-03**	**NA**	
Hypothetical Future - Source Area						
Construction Worker	Adult	Soil	Incidental ingestion	4.5E-05	11	Immune System
			Dermal contact	6.9E-06	4	Immune System
			Dust inhalation	5.3E-08	0.000007	Immune System
			Total Risk:	**5E-05**	**15**	

NA - Not Applicable
(1) Hazard Index shown is for the target organ/suystem with the highest hazard index.

Prepared by: EYM 5/9/12
Checked by: BJR 5/10/12

Table 11.2
Lead Model Summary
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Child Lead Model Summary

	Surface Soil			Subsurface Soil		
Exposure Point	**EPC (mg/kg)**	**PbB_{child} (ug/dL)**	**$P(PbB_{child} > PbB_t)$**	**EPC (mg/kg)**	**PbB_{child} (ug/dL)**	**$P(PbB_{child} > PbB_t)$**
Source Area	299	3.8	2.0%	252	3.4	1.0%

Adult Lead Model Summary

	Soil				
Exposure Point	**EPC (mg/kg)**	**PbB_{adult} (1) (ug/dL)**	**PbB_{adult} (2) (ug/dL)**	**$P(PbB_{fetal} > PbB_t)$ (1)**	**$P(PbB_{fetal} > PbB_t)$ (2)**
Source Area	266	1.4	1.9	0.020%	0.84%

Notes:
(1) GSDi and PbBo from Analysis of NHANES 1999-2004
(2) GSDi and PbBo from Analysis of NHANES III (Phases 1&2)

mg/kg = milligram per kilogram
ug/dL = microgram per deciliter
EPC = Exposure point concentration
GSDi = Geometric standard deviation
PbB = blood lead level
P(PbBchild > PbBt) = the probability that child PbB > target PbB, assuming lognormal distributions
P(PbBfetal > PbBt) = The probability that fetal PbB > target PbB, assuming lognormal distribution

Prepared by: EYM 5/10/12
Checked by: BJR 5/17/12

US EPA ARCHIVE DOCUMENT

APPENDIX A

Samples Used in the Source Area Baseline Human Health Risk Assessment

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
	CMS-SD-5001-0005-01	6/3/2005	0-0.7
01-DEL-201	2108336	7/22/2002	0-2
01-DEL-202	2108340	7/22/2002	0-2
01-DEL-203	2108339	7/22/2002	0-2
02-DEL-201	2108332	7/22/2002	0-2
02-DEL-203	2108331	7/22/2002	0-2
03-DEL-101	2108328	7/22/2002	0-2
03-DEL-103	2108329	7/22/2002	0-2
03-DEL-201	2108324	7/22/2002	0-2
03-DEL-202	2108325	7/22/2002	0-2
03-DEL-203	2108326	7/22/2002	0-2
CMS-026	3428-CMS-026	2/16/1999	0-0.25
CMS-027	3428-CMS-027	2/16/1999	0-0.25
CMS-028	3428-CMS-028	2/16/1999	0-0.25
CMS-029	3428-CMS-029	2/16/1999	0-0.25
CMS-030	3428-CMS-030	2/16/1999	0-0.25
CMS-031	3428-CMS-031	2/16/1999	0-0.25
CMS-033	3428-CMS-033	2/16/1999	0-0.25
CMS-034	3428-CMS-034	2/16/1999	0-0.25
CMS-035	3428-CMS-035	2/17/1999	0-0.25
CMS-037	3428-CMS-037	2/16/1999	0-0.25
CMS-038	3428-CMS-038	2/16/1999	0-0.25
CMS-041	3428-CMS-041	2/16/1999	0-0.25
CMS-044	3428-CMS-044	2/16/1999	0-0.25
CMS-047	3428-CMS-047	2/16/1999	0-0.25
CMS-048	3428-CMS-048	2/16/1999	0-0.25
CMS-050	3428-CMS-050	2/16/1999	0-0.25
CMS-051	3428-CMS-051	2/16/1999	0-0.25
CMS-051	CMS-051-A	7/2/1999	0-1
CMS-051	CMS-051-B	7/2/1999	1-2
CMS-051	CMS-051-C	7/2/1999	2-3
CMS-052	3428-CMS-052	2/16/1999	0-0.25
CMS-053	3428-CMS-053	2/16/1999	0-0.25
CMS-054	3428-CMS-054	2/16/1999	0-0.25
CMS-056	3428-CMS-056	2/16/1999	0-0.25
CMS-058	3428-CMS-058	2/16/1999	0-0.25
CMS-059	3428-CMS-059	2/16/1999	0-0.25
CMS-061	3428-CMS-061	2/16/1999	0-0.25
CMS-062	3428-CMS-062	2/16/1999	0-0.25
CMS-063	3428-CMS-063	2/16/1999	0-0.25
CMS-063	CMS-063-A	7/2/1999	0-1
CMS-063	CMS-063-B	7/2/1999	1-2
CMS-064	3428-CMS-064	2/16/1999	0-0.25
CMS-065	3428-CMS-065	2/16/1999	0-0.25
CMS-066	3428-CMS-066	2/16/1999	0-0.25
CMS-067	3428-CMS-067	2/16/1999	0-0.25
CMS-068	3428-CMS-068	2/16/1999	0-0.25
CMS-069	3428-CMS-069	2/16/1999	0-0.25
CMS-069	CMS-069-A	6/30/1999	0-1
CMS-069	CMS-069-B	6/30/1999	1-2
CMS-069	CMS-069-C	6/30/1999	2-3
CMS-069	CMS-069-D	6/30/1999	3-4
CMS-069	CMS-069-E	6/30/1999	4-5
CMS-070	3428-CMS-070	2/16/1999	0-0.25
CMS-071	3428-CMS-071	2/16/1999	0-0.25
CMS-072	3428-CMS-072	2/16/1999	0-0.25
CMS-073	3428-CMS-073	2/16/1999	0-0.25
CMS-074	3428-CMS-074	2/16/1999	0-0.25
CMS-074	CMS-074-A	6/29/1999	0-1
CMS-074	CMS-074-B	6/29/1999	1-2
CMS-074	CMS-074-C	6/29/1999	2-3
CMS-075	3428-CMS-075	2/16/1999	0-0.25
CMS-075	CMS-075-A	6/30/1999	0-1
CMS-075	CMS-075-B	6/30/1999	1-2
CMS-075	CMS-075-C	6/30/1999	2-3
CMS-075	CMS-075-D	6/30/1999	3-4
CMS-076	3428-CMS-076	2/16/1999	0-0.25
CMS-076	CMS-076-A	6/29/1999	0-1
CMS-076	CMS-076-B	6/29/1999	1-2
CMS-076	CMS-076-C	6/29/1999	2-3
CMS-078	3428-CMS-078	2/16/1999	0-0.25

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-079	3428-CMS-079	2/16/1999	0-0.25
CMS-080	3428-CMS-080	2/16/1999	0-0.25
CMS-081	3428-CMS-081	2/16/1999	0-0.25
CMS-081	CMS-081-A	6/29/1999	0-1
CMS-081	CMS-081-B	6/29/1999	1-2
CMS-082	3428-CMS-082	2/16/1999	0-0.25
CMS-082	CMS-082-A	6/29/1999	0-1
CMS-082	CMS-082-B	6/29/1999	1-2
CMS-084	3428-CMS-084	2/16/1999	0-0.25
CMS-085	3428-CMS-085	2/17/1999	0-0.25
CMS-086	3428-CMS-086	2/16/1999	0-0.25
CMS-087	3428-CMS-087	2/16/1999	0-0.25
CMS-088	3428-CMS-088	2/16/1999	0-0.25
CMS-089	3428-CMS-089	2/16/1999	0-0.25
CMS-089	CMS-089-A	6/28/1999	0-1
CMS-089	CMS-089-B	6/28/1999	1-2
CMS-089	CMS-089-C	6/28/1999	2-3
CMS-089	CMS-089-D	6/28/1999	3-4
CMS-090	3428-CMS-090	2/17/1999	0-0.25
CMS-091	3428-CMS-091	2/17/1999	0-0.25
CMS-092	3428-CMS-092	2/16/1999	0-0.25
CMS-093	3428-CMS-093	2/16/1999	0-0.25
CMS-093	CMS-093-A	6/30/1999	0-1
CMS-094	3428-CMS-094	2/16/1999	0-0.25
CMS-094	CMS-094-A	6/29/1999	0-1
CMS-095	3428-CMS-095	2/16/1999	0-0.25
CMS-096	3428-CMS-096	2/16/1999	0-0.25
CMS-098	3428-CMS-098	2/17/1999	0-0.25
CMS-098	CMS-098-A	6/28/1999	0-1
CMS-099	3428-CMS-099	2/17/1999	0-0.25
CMS-100	3428-CMS-100	2/17/1999	0-0.25
CMS-101	3428-CMS-101	2/16/1999	0-0.25
CMS-102	3428-CMS-102	2/16/1999	0-0.25
CMS-102	CMS-102-A	6/29/1999	0-1
CMS-103	3428-CMS-103	2/16/1999	0-0.25
CMS-104	3428-CMS-104	2/16/1999	0-0.25
CMS-107	3428-CMS-107	2/17/1999	0-0.25
CMS-109	3428-CMS-109	2/16/1999	0-0.25
CMS-109	CMS-109-A	6/29/1999	0-1
CMS-110	3428-CMS-110	2/16/1999	0-0.25
CMS-111	3428-CMS-111	2/16/1999	0-0.25
CMS-112	3428-CMS-112	2/16/1999	0-0.25
CMS-114	3428-CMS-114	2/17/1999	0-0.25
CMS-115	3428-CMS-115	2/17/1999	0-0.25
CMS-117	3428-CMS-117	2/16/1999	0-0.25
CMS-117	CMS-117-A	6/29/1999	0-1
CMS-118	3428-CMS-118	2/16/1999	0-0.25
CMS-118	CMS-118-A	6/30/1999	0-1
CMS-118	CMS-118-B	6/30/1999	1-2
CMS-118	CMS-118-C	6/30/1999	2-3
CMS-118	CMS-118-D	6/30/1999	3-4
CMS-118	CMS-118-E	6/30/1999	4-5
CMS-119	3428-CMS-119	2/17/1999	0-0.25
CMS-121	3428-CMS-121	2/17/1999	0-0.25
CMS-124	3428-CMS-124	2/16/1999	0-0.25
CMS-125	3428-CMS-125	2/16/1999	0-0.25
CMS-126	3428-CMS-126	2/16/1999	0-0.25
CMS-127	3428-CMS-127	2/16/1999	0-0.25
CMS-128	3428-CMS-128	2/16/1999	0-0.25
CMS-130	3428-CMS-130	2/17/1999	0-0.25
CMS-131	3428-CMS-131	2/16/1999	0-0.25
CMS-131	CMS-131-A	6/25/1999	0-1
CMS-131	CMS-131-B	6/25/1999	1-2
CMS-131	CMS-131-C	6/25/1999	2-3
CMS-131	CMS-131-D	6/25/1999	3-4
CMS-132	3428-CMS-132	2/16/1999	0-0.25
CMS-133	3428-CMS-133	2/16/1999	0-0.25
CMS-134	3428-CMS-134	2/16/1999	0-0.25
CMS-134	CMS-134-A	6/24/1999	0-1
CMS-135	3428-CMS-135	2/17/1999	0-0.25
CMS-135	CMS-135-A	6/25/1999	0-1

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-136	3428-CMS-136	2/17/1999	0-0.25
CMS-138	3428-CMS-138	2/16/1999	0-0.25
CMS-139	3428-CMS-139	2/16/1999	0-0.25
CMS-140	3428-CMS-140	2/16/1999	0-0.25
CMS-140	CMS-140-A	6/24/1999	0-1
CMS-141	3428-CMS-141	2/16/1999	0-0.25
CMS-141	CMS-141-A	6/24/1999	0-1
CMS-142	3428-CMS-142	2/17/1999	0-0.25
CMS-142	CMS-142-A	6/28/1999	0-1
CMS-143	3428-CMS-143	2/17/1999	0-0.25
CMS-144	3428-CMS-144	2/17/1999	0-0.25
CMS-145	3428-CMS-145	2/16/1999	0-0.25
CMS-147	3428-CMS-147	2/16/1999	0-0.25
CMS-147	CMS-147-A	6/24/1999	0-1
CMS-147	CMS-147-B	6/24/1999	1-2
CMS-147	CMS-147-C	6/24/1999	2-3
CMS-148	3428-CMS-148	2/17/1999	0-0.25
CMS-148	CMS-148-A	6/24/1999	0-1
CMS-149	3428-CMS-149	2/17/1999	0-0.25
CMS-149	CMS-149-A	6/25/1999	0-1
CMS-150	3428-CMS-150	2/17/1999	0-0.25
CMS-150	CMS-150-A	6/25/1999	0-1
CMS-150	CMS-150-B	6/25/1999	1-2
CMS-151	3428-CMS-151	2/17/1999	0-0.25
CMS-152	3428-CMS-152	2/16/1999	0-0.25
CMS-152	CMS-152-A	6/21/1999	0-1
CMS-152	CMS-152-B	6/21/1999	1-2
CMS-152	CMS-152-C	6/21/1999	2-3
CMS-153	3428-CMS-153	2/16/1999	0-0.25
CMS-153	CMS-153-A	6/22/1999	0-1
CMS-153	CMS-153-B	6/22/1999	1-2
CMS-153	CMS-153-C	6/22/1999	2-3
CMS-153	CMS-153-D	6/22/1999	3-4
CMS-153	CMS-153-E	6/22/1999	4-5
CMS-154	3428-CMS-154	2/16/1999	0-0.25
CMS-154	CMS-154-A	6/22/1999	0-1
CMS-154	CMS-154-B	6/22/1999	1-2
CMS-154	CMS-154-C	6/22/1999	2-3
CMS-155	3428-CMS-155	2/16/1999	0-0.25
CMS-155	CMS-155-A	6/22/1999	0-1
CMS-155	CMS-155-B	6/22/1999	1-2
CMS-155	CMS-155-D	7/2/1999	3-4
CMS-155	CMS-155-E	7/2/1999	4-5
CMS-156	3428-CMS-156*	2/17/1999	0-0.25
CMS-156	CMS-156-A	6/24/1999	0-1
CMS-157	3428-CMS-157	2/17/1999	0-0.25
CMS-157	CMS-157-A	6/29/1999	0-1
CMS-158	3428-CMS-158	2/17/1999	0-0.25
CMS-158	CMS-158-A	6/29/1999	0-1
CMS-159	3428-CMS-159	2/17/1999	0-0.25
CMS-159	CMS-159-A	7/1/1999	0-1
CMS-160	3428-CMS-160	2/16/1999	0-0.25
CMS-160	CMS-160-A	6/23/1999	0-1
CMS-160	CMS-160-B	6/23/1999	1-2
CMS-160	CMS-160-C	6/23/1999	2-3
CMS-161	3428-CMS-161	2/17/1999	0-0.25
CMS-161	CMS-161-A	6/23/1999	0-1
CMS-161	CMS-161-B	6/23/1999	1-2
CMS-162	3428-CMS-162	2/17/1999	0-0.25
CMS-162	CMS-162-A	6/22/1999	0-1
CMS-162	CMS-162-B	6/22/1999	1-2
CMS-162	CMS-162-C	6/22/1999	2-3
CMS-162	CMS-162-D	7/2/1999	3-4
CMS-163	3428-CMS-163	2/17/1999	0-0.25
CMS-164	3428-CMS-164	2/17/1999	0-0.25
CMS-164	CMS-164-A	6/22/1999	0-1
CMS-165	3428-CMS-165	2/17/1999	0-0.25
CMS-165	CMS-165-A	6/29/1999	0-1
CMS-166	3428-CMS-166	2/17/1999	0-0.25
CMS-166	CMS-166-A	6/29/1999	0-1
CMS-167	3428-CMS-167	2/17/1999	0-0.25

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-167	CMS-167-A	6/29/1999	0-1
CMS-168	3428-CMS-168	2/17/1999	0-0.25
CMS-168	CMS-168-A	6/25/1999	0-1
CMS-168	CMS-168-B	6/25/1999	1-2
CMS-168	CMS-168-C	6/25/1999	2-3
CMS-169	3428-CMS-169	2/17/1999	0-0.25
CMS-169	CMS-169-A	6/25/1999	0-1
CMS-170	3428-CMS-170	2/17/1999	0-0.25
CMS-170	CMS-170-A	6/24/1999	0-1
CMS-170	CMS-170-B	6/24/1999	1-2
CMS-171	3428-CMS-171	2/17/1999	0-0.25
CMS-171	CMS-171-A	6/24/1999	0-1
CMS-172	3428-CMS-172	2/17/1999	0-0.25
CMS-172	CMS-172-A	6/29/1999	0-1
CMS-173	3428-CMS-173	2/17/1999	0-0.25
CMS-173	CMS-173-A	6/28/1999	0-1
CMS-173	CMS-173-B	6/28/1999	1-2
CMS-226	3428-CMS-226	2/17/1999	0-0.25
CMS-228	3428-CMS-228	2/17/1999	0-0.25
CMS-229	3428-CMS-229	2/17/1999	0-0.25
CMS-230	3428-CMS-230	2/17/1999	0-0.25
CMS-231	3428-CMS-231	2/17/1999	0-0.25
CMS-232	3428-CMS-232	2/17/1999	0-0.25
CMS-232	CMS-232-A	6/29/1999	0-1
CMS-232	CMS-232-B	6/29/1999	1-2
CMS-233	3428-CMS-233	2/17/1999	0-0.25
CMS-234	3428-CMS-234	2/17/1999	0-0.25
CMS-235	3428-CMS-235	2/17/1999	0-0.25
CMS-236	3428-CMS-236	2/17/1999	0-0.25
CMS-237	3428-CMS-237	2/17/1999	0-0.25
CMS-237	CMS-237-A	6/23/1999	0-1
CMS-237	CMS-237-B	6/23/1999	1-2
CMS-237	CMS-237-C	6/23/1999	2-3
CMS-238	3428-CMS-238	2/17/1999	0-0.25
CMS-238	CMS-238-A	6/23/1999	0-1
CMS-238	CMS-238-B	6/23/1999	1-2
CMS-239	3428-CMS-239	2/17/1999	0-0.25
CMS-239	CMS-239-A	6/23/1999	0-1
CMS-239	CMS-239-B	6/23/1999	1-2
CMS-240	3428-CMS-240	2/17/1999	0-0.25
CMS-240	CMS-240-A	6/25/1999	0-1
CMS-241	3428-CMS-241	2/17/1999	0-0.25
CMS-241	CMS-241-A	6/25/1999	0-1
CMS-241	CMS-241-B	6/25/1999	1-2
CMS-242	3428-CMS-242	2/17/1999	0-0.25
CMS-242	CMS-242-A	6/24/1999	0-1
CMS-242	CMS-242-B	6/24/1999	1-2
CMS-400	CMS-400-A	6/21/1999	0-1
CMS-400	CMS-400-B	6/21/1999	1-2
CMS-400	CMS-400-C	6/21/1999	2-3
CMS-400	CMS-400-D	6/21/1999	3-4
CMS-400	CMS-400-E	6/21/1999	4-5
CMS-401	CMS-401-A	6/22/1999	0-1
CMS-401	CMS-401-B	6/22/1999	1-2
CMS-401	CMS-401-C	6/22/1999	2-3
CMS-401	CMS-401-D	6/22/1999	3-4
CMS-402	CMS-402-A	6/22/1999	0-1
CMS-402	CMS-402-B	6/22/1999	1-2
CMS-402	CMS-402-C	6/22/1999	2-3
CMS-402	CMS-402-D	6/22/1999	3-4
CMS-402	CMS-402-E	6/22/1999	4-5
CMS-403	CMS-403-A	6/22/1999	0-1
CMS-403	CMS-403-B	6/22/1999	1-2
CMS-403	CMS-403-C	6/22/1999	2-3
CMS-403	CMS-403-D	6/22/1999	3-4
CMS-403	CMS-403-E	6/22/1999	4-5
CMS-404	CMS-404-A	6/22/1999	0-1
CMS-404	CMS-404-B	6/22/1999	1-2
CMS-404	CMS-404-C	6/22/1999	2-3
CMS-404	CMS-404-D	6/22/1999	3-4
CMS-404	CMS-404-E	6/22/1999	4-5

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-405	CMS-405-A	6/23/1999	0-1
CMS-405	CMS-405-B	6/23/1999	1-2
CMS-405	CMS-405-C	6/23/1999	2-3
CMS-405	CMS-405-D	6/23/1999	3-4
CMS-405	CMS-405-E	6/23/1999	4-5
CMS-406	CMS-406-A	6/29/1999	0-1
CMS-406	CMS-406-B	6/29/1999	1-2
CMS-406	CMS-406-C	6/29/1999	2-3
CMS-406	CMS-406-D	6/29/1999	3-4
CMS-407	CMS-407-A	6/28/1999	0-1
CMS-407	CMS-407-B	6/28/1999	1-2
CMS-407	CMS-407-C	6/28/1999	2-3
CMS-407	CMS-407-D	6/28/1999	3-4
CMS-408	CMS-408-A	6/28/1999	0-1
CMS-408	CMS-408-B	6/28/1999	1-2
CMS-408	CMS-408-C	6/28/1999	2-3
CMS-409	CMS-409-A	6/23/1999	0-1
CMS-409	CMS-409-B	6/23/1999	1-2
CMS-409	CMS-409-C	6/23/1999	2-3
CMS-409	CMS-409-D	6/23/1999	3-4
CMS-409	CMS-409-E	6/23/1999	4-5
CMS-410	CMS-410-A	6/24/1999	0-1
CMS-410	CMS-410-B	6/24/1999	1-2
CMS-410	CMS-410-C	6/24/1999	2-3
CMS-410	CMS-410-D	6/24/1999	3-4
CMS-410	CMS-410-E	6/24/1999	4-5
CMS-4101	CMS-SS-4101-1019-01	11/22/2002	1-1.9
CMS-4101	CMS-SS-4101-3042-01	11/22/2002	3-4.2
CMS-4102	CMS-SS-4102-0008-01	11/22/2002	0-0.8
CMS-4102	CMS-SS-4102-1019-01	11/22/2002	1-1.9
CMS-4102	CMS-SS-4102-3038-01	11/22/2002	3-3.8
CMS-4103	CMS-SS-4103-0010-01	11/22/2002	0-1
CMS-4104	CMS-DU-112202A-01	11/22/2002	0-1
CMS-4104	CMS-SS-4104-0010-01	11/22/2002	0-1
CMS-4105	CMS-SS-4105-0010-01	11/20/2002	0-1
CMS-4105	CMS-SS-4105-1015-01	11/20/2002	1-1.5
CMS-4105	CMS-SS-4105-3040-01	11/20/2002	3-4
CMS-4106	CMS-DU-111902A-01	11/19/2002	0-1
CMS-4106	CMS-SS-4106-0010-01	11/19/2002	0-1
CMS-4106	CMS-SS-4106-1016-01	11/19/2002	1-1.6
CMS-4106	CMS-SS-4106-3036-01	11/19/2002	3-3.6
CMS-4107	CMS-SS-4107-1030-01	11/21/2002	1-3
CMS-4107	CMS-SS-4107-3040-01	11/21/2002	3-4
CMS-4108	CMS-SS-4108-0010-01	11/21/2002	0-1
CMS-4108	CMS-SS-4108-1030-01	11/21/2002	1-3
CMS-4108	CMS-SS-4108-3040-01	11/21/2002	3-4
CMS-4109	CMS-SS-4109-0010-01	11/18/2002	0-1
CMS-4109	CMS-SS-4109-1014-01	11/18/2002	1-1.4
CMS-4109	CMS-SS-4109-3038-01	11/18/2002	3-3.8
CMS-411	CMS-411-A	6/24/1999	0-1
CMS-411	CMS-411-B	6/24/1999	1-2
CMS-411	CMS-411-C	6/24/1999	2-3
CMS-411	CMS-411-D	6/24/1999	3-4
CMS-411	CMS-411-E	6/24/1999	4-5
CMS-4110	CMS-SS-4110-0010-01	11/19/2002	0-1
CMS-4110	CMS-SS-4110-1015-01	11/19/2002	1-1.5
CMS-4110	CMS-SS-4110-3739-01	11/19/2002	3.7-3.9
CMS-4111	CMS-SS-4111-0009-01	11/21/2002	0-0.9
CMS-4111	CMS-SS-4111-1028-01	11/21/2002	1-2.8
CMS-4111	CMS-SS-4111-3046-01	11/21/2002	3-4.5
CMS-412	CMS-412-A	6/25/1999	0-1
CMS-412	CMS-412-B	6/25/1999	1-2
CMS-412	CMS-412-C	6/25/1999	2-3
CMS-412	CMS-412-D	6/25/1999	3-4
CMS-413	CMS-413-A	6/25/1999	0-1
CMS-413	CMS-413-B	6/25/1999	1-2
CMS-413	CMS-413-C	6/25/1999	2-3
CMS-414	CMS-414-A	6/25/1999	0-1
CMS-414	CMS-414-B	6/25/1999	1-2
CMS-414	CMS-414-C	6/25/1999	2-3
CMS-414	CMS-414-D	6/25/1999	3-4

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-415	CMS-415-A	6/25/1999	0-1
CMS-415	CMS-415-B	6/25/1999	1-2
CMS-415	CMS-415-C	6/25/1999	2-3
CMS-415	CMS-415-D	6/25/1999	3-4
CMS-416	CMS-416-A	6/25/1999	0-1
CMS-416	CMS-416-B	6/25/1999	1-2
CMS-416	CMS-416-C	6/25/1999	2-3
CMS-416	CMS-416-D	6/25/1999	3-4
CMS-417	CMS-417-A	6/24/1999	0-1
CMS-417	CMS-417-B	6/24/1999	1-2
CMS-417	CMS-417-C	6/24/1999	2-3
CMS-417	CMS-417-D	6/24/1999	3-4
CMS-419	CMS-419-A	7/7/1999	0-1
CMS-419	CMS-419-B	7/7/1999	1-2
CMS-419	CMS-419-C	7/7/1999	2-3
CMS-419	CMS-419-D	7/7/1999	3-4
CMS-419	CMS-419-E	7/7/1999	4-5
CMS-420	CMS-420-A	7/2/1999	0-1
CMS-420	CMS-420-B	7/2/1999	1-2
CMS-420	CMS-420-C	7/2/1999	2-3
CMS-420	CMS-420-D	7/2/1999	3-4
CMS-421	CMS-421-A	7/8/1999	0-1
CMS-421	CMS-421-B	7/8/1999	1-2
CMS-421	CMS-421-C	7/8/1999	2-3
CMS-421	CMS-421-D	7/8/1999	3-4
CMS-421	CMS-421-E	7/8/1999	4-5
CMS-422	CMS-422-A	7/2/1999	0-1
CMS-422	CMS-422-B	7/2/1999	1-2
CMS-422	CMS-422-C	7/2/1999	2-3
CMS-422	CMS-422-D	7/2/1999	3-4
CMS-423	CMS-423-A	7/7/1999	0-1
CMS-423	CMS-423-B	7/7/1999	1-2
CMS-423	CMS-423-C	7/7/1999	2-3
CMS-423	CMS-423-D	7/7/1999	3-4
CMS-423	CMS-423-E	7/7/1999	4-5
CMS-424	CMS-424-A	7/2/1999	0-1
CMS-424	CMS-424-B	7/2/1999	1-2
CMS-424	CMS-424-C	7/2/1999	2-3
CMS-424	CMS-424-D	7/2/1999	3-4
CMS-424	CMS-424-E	7/2/1999	4-5
CMS-425	CMS-425-A	7/8/1999	0-1
CMS-425	CMS-425-B	7/8/1999	1-2
CMS-425	CMS-425-C	7/8/1999	2-3
CMS-425	CMS-425-D	7/8/1999	3-4
CMS-425	CMS-425-E	7/8/1999	4-5
CMS-426	CMS-426-A	7/7/1999	0-1
CMS-426	CMS-426-B	7/7/1999	1-2
CMS-426	CMS-426-C	7/7/1999	2-3
CMS-426	CMS-426-D	7/7/1999	3-4
CMS-426	CMS-426-E	7/7/1999	4-5
CMS-427	CMS-427-A	7/6/1999	0-1
CMS-427	CMS-427-B	7/6/1999	1-2
CMS-427	CMS-427-C	7/6/1999	2-3
CMS-427	CMS-427-D	7/6/1999	3-4
CMS-427	CMS-427-E	7/6/1999	4-5
CMS-428	CMS-428-A	7/20/1999	0-1
CMS-428	CMS-428-B	7/20/1999	1-2
CMS-428	CMS-428-C	7/20/1999	2-3
CMS-428	CMS-428-D	7/20/1999	3-4
CMS-428	CMS-428-E	7/20/1999	4-5
CMS-429	CMS-429-A	7/8/1999	0-1
CMS-429	CMS-429-B	7/8/1999	1-2
CMS-429	CMS-429-C	7/8/1999	2-3
CMS-429	CMS-429-D	7/8/1999	3-4
CMS-429	CMS-429-E	7/8/1999	4-5
CMS-430	CMS-430-A	7/9/1999	0-1
CMS-430	CMS-430-B	7/9/1999	1-2
CMS-430	CMS-430-C	7/9/1999	2-3
CMS-431	CMS-431-A	7/9/1999	0-1
CMS-431	CMS-431-B	7/9/1999	1-2
CMS-431	CMS-431-C	7/9/1999	2-3

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
CMS-432	CMS-432-A	7/9/1999	0-1
CMS-432	CMS-432-B	7/9/1999	1-2
CMS-432	CMS-432-C	7/9/1999	2-3
CMS-432	CMS-432-D	7/9/1999	3-4
CMS-432	CMS-432-E	7/9/1999	4-5
CMS-433	CMS-433-A	7/9/1999	0-1
CMS-433	CMS-433-B	7/9/1999	1-2
CMS-433	CMS-433-C	7/9/1999	2-3
CMS-433	CMS-433-D	7/9/1999	3-4
CMS-434	CMS-434-A	7/13/1999	0-1
CMS-435	CMS-435-A	7/13/1999	0-1
CMS-436	CMS-436-A	7/13/1999	0-1
CMS-436	CMS-436-B	7/13/1999	1-2
CMS-437	CMS-437-A	7/13/1999	0-1
CMS-437	CMS-437-B	7/13/1999	1-2
CMS-437	CMS-437-C	7/13/1999	2-3
CMS-437	CMS-437-D	7/13/1999	3-4
CMS-438	CMS-438-A	7/13/1999	0-1
CMS-438	CMS-438-B	7/13/1999	1-2
CMS-439	CMS-439-A	7/13/1999	0-1
CMS-439	CMS-439-B	7/13/1999	1-2
CMS-440	CMS-440-A	7/13/1999	0-1
CMS-441	CMS-441-A	7/13/1999	0-1
CMS-441	CMS-441-B	7/13/1999	1-2
CMS-442	CMS-442-A	7/13/1999	0-1
CMS-443	CMS-443-A	7/14/1999	0-1
CMS-445	CMS-445-A	7/14/1999	0-1
CMS-448	CMS-448-D	7/20/1999	3-4
CMS-448	CMS-448-E	7/20/1999	4-5
CMS-449	CMS-449-E	7/20/1999	4-5
CMS-450	CMS-450-D	7/21/1999	3-4
CMS-450	CMS-450-E	7/21/1999	4-5
CMS-453	CMS-453-E	7/21/1999	4-5
CMS-454	CMS-454-B	7/21/1999	1-2
CMS-454	CMS-454-C	7/21/1999	2-3
CMS-454	CMS-454-D	7/21/1999	3-4
CMS-454	CMS-454-E	7/21/1999	4-5
CMS-455	CMS-455-C	7/19/1999	2-3
CMS-455	CMS-455-D	7/19/1999	3-4
CMS-455	CMS-455-E	7/19/1999	4-5
CMS-456	CMS-456-A	7/20/1999	0-1
CMS-456	CMS-456-B	7/20/1999	1-2
CMS-481	CMS-481-A	7/30/1999	0-1
CMS-703	CMS-703-A	11/5/1999	0-1
CMS-703	CMS-703-COMP	11/5/1999	0-2
CMS-703	CMS-703-B	11/5/1999	1-2
CMW-SD-2016	CMW-SD-2016-01	10/26/1999	0-0.5
CMW-SD-2017	CMW-SD-2017-01	10/27/1999	0-0.5
CMW-SD-2018	CMW-SD-2018-01	10/26/1999	0-0.5
CMW-SD-2019	CMW-SD-2019-01	10/26/1999	0-0.5
CMW-SD-2020	CMW-SD-2020-01	10/26/1999	0-0.5
CMW-SD-2021	CMW-SD-2021-01	10/26/1999	0-0.5
CMW-SD-2022	CMW-SD-2022-0.502-01	10/27/1999	0.5-2
CMW-SD-2022	CMW-SD-2022-022.5-01	10/27/1999	2-2.5
GEC-6	B-6, S-2	3/12/1999	2.5-4.5
GEC-7	B-7, S-2	3/12/1999	2.5-4.5
MW01S	CM-SO-MW01-0102	12/28/2000	1-2
MW01S	CM-SO-MW01-0204	12/28/2000	2-4
MW01S	CM-SO-MW01-0406	12/28/2000	4-6
MW02S	CM-SO-MW02-0204	1/5/2001	2-4
MW02S	CM-SO-MW02-0406	1/5/2001	4-6
MW03S	CM-SO-MW03-0406	12/27/2000	4-6
MW04D	CM-SO-MW04-0204	6/12/2001	2-4
MW04D	CM-SO-MW04-0406	6/12/2001	4-6
MW06S	CM-SO-MW06-0204	12/19/2000	2-4
MW06S	CM-SO-MW06-0406	12/19/2000	4-6
MW07S	CM-SO-MW07-0304	12/21/2000	3-4
MW07S	CM-SO-MW07-0406	12/21/2000	4-6
MW08S	CM-SO-MW08-0102	12/26/2000	1-2
MW08S	CM-SO-MW08-0204	12/26/2000	2-4
MW08S	CM-SO-MW08-0406	12/26/2000	4-6

US EPA ARCHIVE DOCUMENT

Table A-1
Samples Used in Risk Assessment
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

BORING	SAMPLE ID	SAMPLE DATE	DEPTH (FT)
MW09S	CM-SO-MW09-0406	12/18/2000	4-6
MW14M	CM-SO-MW14-0102	7/13/2001	1-2
MW14M	CM-SO-MW14-0204	7/13/2001	2-4
MW15D	CM-SO-MW15D-0204	8/7/2001	2-4
MW15D	CM-SO-MW15D-0406	8/7/2001	4-6
RES-14-271-01	RES-SS-14-271-01	11/15/1999	0-1
RES-14-271-01A	RES-SS-14-271-01A	12/2/1999	0-1
RES-14-272-01	RES-SS-14-272-01	11/18/1999	0-1
RES-14-302-01	RES-SS-14-302-01	11/18/1999	0-1
RES-14-303-01	RES-SS-14-303-01	11/15/1999	0-1
RES-14-303-02	RES-SS-14-303-02	11/15/1999	0-1
RES-14-333-01	RES-SS-14-333-01	11/15/1999	0-1
SB02	CM-SO-SB02-0204	1/3/2001	2-4
SB02	CM-SO-SB02-0406	1/3/2001	4-6
SB03	CM-SO-SB03-0204	1/9/2001	2-4
SB03	CM-SO-SB03-0406	1/9/2001	4-6
SD-30	SD-30	9/9/1998	0-0.5
SD-31	SD-31	9/9/1998	0-0.5
SS-01	SS-01	9/9/1998	0-0
SS-02	SS-02	9/9/1998	0-1.3
SS-04	SS-04	9/9/1998	0-1.5
SS-05	SS-05	9/9/1998	0-1.5
SS-06	SS-06	9/9/1998	0-2
SS-99-00	SS-99-00	1/15/1999	0-0.25
SS-99-01	SS-99-01	1/15/1999	0-0.25
SS-99-02	SS-99-02	1/15/1999	0-0.25
SS-99-03	SS-99-03	1/15/1999	0-0.25
SS-99-04	SS-99-04	1/15/1999	0-0.25
SS-99-05	SS-99-05	1/15/1999	0-0.25
SS-99-06	SS-99-06	1/15/1999	0-0.25

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX B

Documentation of Exposure Point Concentrations – PRO UCL Outputs

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	ProUCL Input 0-1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2,3-trichlorobenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	12
		Percent Non-Detects	92.31%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3-trichlorobenzene OV was not processed!

HCX

General Statistics

Number of Valid Data	17	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	3
		Percent Non-Detects	17.65%

Raw Statistics		**Log-transformed Statistics**
Minimum Detected	2.52E-06	Log Statistics Not Avaliable
Maximum Detected	0.0938	
Mean of Detected	0.0246	
Mean of Detected	0.0246	
Mean of Detected	0.0246	
Maximum Non-Detect	0.00135	

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	8
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	9
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	47.06%

UCL Statistics

Normal Distribution Test with Detected Values Only | **Lognormal Distribution Test with Detected Values Only**

Shapiro Wilk Test Statistic	0.718	Not Available
5% Shapiro Wilk Critical Value	0.874	

Data not Normal at 5% Significance Level

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	N/A
Mean	0.0203		
SD	0.0329		
95% DL/2 (t) UCL	0.0342		
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	N/A
Mean	0.00187		
SD	0.0508		
95% MLE (t) UCL	0.0234		
95% MLE (Tiku) UCL	0.0276		

Gamma Distribution Test with Detected Values Only

Gamma Statistics Not Available

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Potential UCLs to Use	
95% KM (BCA) UCL	0.0345

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.0203
SD	0.0319
SE of Mean	0.00804
95% KM (t) UCL	0.0343
95% KM (z) UCL	0.0335
95% KM (jackknife) UCL	0.0342
95% KM (bootstrap t) UCL	0.0387
95% KM (BCA) UCL	0.0345
95% KM (Percentile Bootstrap) UCL	0.0344
95% KM (Chebyshev) UCL	0.0553
97.5% KM (Chebyshev) UCL	0.0705
99% KM (Chebyshev) UCL	0.1

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2,4-trichlorobenzene OV

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	13	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	11
		Percent Non-Detects	84.62%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0018	Minimum Detected	-6.32
Maximum Detected	340	Maximum Detected	5.829
Mean of Detected	170	Mean of Detected	-0.246
SD of Detected	240.4	SD of Detected	8.591
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.31%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	26.16	Mean	-4.678
SD	94.3	SD	3.216

95% DL/2 (t) UCL	72.77	95% H-Stat (DL/2) UCL	1598
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	26.16
5% K-S Critical Value	N/A	SD	90.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	35.54
		95% KM (t) UCL	89.49
Assuming Gamma Distribution		95% KM (z) UCL	84.61
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	257.2
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	340
Median	N/A	95% KM (Chebyshev) UCL	181.1
SD	N/A	97.5% KM (Chebyshev) UCL	248.1
k star	N/A	99% KM (Chebyshev) UCL	379.7
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	99% KM (Chebyshev) UCL	379.7
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

1,2,4-trimethylbenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	10
		Percent Non-Detects	76.92%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0017	Minimum Detected	-6.377
Maximum Detected	86	Maximum Detected	4.454
Mean of Detected	28.67	Mean of Detected	-2.457
SD of Detected	49.65	SD of Detected	6.004
Minimum Non-Detect	0.0048	Minimum Non-Detect	-5.339
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.75	Shapiro Wilk Test Statistic	0.814
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.62	Mean	-4.719
SD	23.85	SD	2.818
95% DL/2 (t) UCL	18.41	95% H-Stat (DL/2) UCL	97.52

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	-4.841
SD in Log Scale	2.918
Mean in Original Scale	6.62
SD in Original Scale	23.85
95% t UCL	18.41
95% Percentile Bootstrap UCL	19.85
95% BCA Bootstrap UCL	26.46
95% H-UCL	167.5

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.618
SD	22.92
SE of Mean	7.784
95% KM (t) UCL	20.49
95% KM (z) UCL	19.42
95% KM (jackknife) UCL	18.41
95% KM (bootstrap t) UCL	80863
95% KM (BCA) UCL	86
95% KM (Percentile Bootstrap) UCL	86
95% KM (Chebyshev) UCL	40.55
97.5% KM (Chebyshev) UCL	55.23
99% KM (Chebyshev) UCL	84.07

Potential UCLs to Use

99% KM (Chebyshev) UCL	84.07

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2-dichlorobenzene OV

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	13	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	12
		Percent Non-Detects	92.31%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV

The data set for variable 1,2-dichlorobenzene OV was not processed!

1,3-dichlorobenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	13
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,3-dichlorobenzene OV was not processed!

1,4-dichlorobenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	11
		Percent Non-Detects	84.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0041	Minimum Detected	-5.497
Maximum Detected	31	Maximum Detected	3.434
Mean of Detected	15.5	Mean of Detected	-1.031
SD of Detected	21.92	SD of Detected	6.315
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.389	Mean	-4.819
SD	8.597	SD	2.543
95% DL/2 (t) UCL	6.638	95% H-Stat (DL/2) UCL	16.26
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	**Data Distribution Test with Detected Values Only**

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data do not follow a Discernable Distribution (0.05)

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.388
SD	8.259
SE of Mean	3.24
95% KM (t) UCL	8.162
95% KM (z) UCL	7.717
95% KM (jackknife) UCL	23.45
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	31
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	16.51
97.5% KM (Chebyshev) UCL	22.62
99% KM (Chebyshev) UCL	34.62

Potential UCLs to Use

99% KM (Chebyshev) UCL	34.62

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4,4`-DDE PESTP

General Statistics

Number of Valid Data	31	Number of Detected Data	17
Number of Distinct Detected Data	16	Number of Non-Detect Data	14
		Percent Non-Detects	45.16%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0064	Minimum Detected	-5.051
Maximum Detected	2.1	Maximum Detected	0.742
Mean of Detected	0.277	Mean of Detected	-2.973

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD of Detected	0.553	SD of Detected	1.862
Minimum Non-Detect	0.0036	Minimum Non-Detect	-5.627
Maximum Non-Detect	0.22	Maximum Non-Detect	-1.514

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.87%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.566	Shapiro Wilk Test Statistic	0.878
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.162	Mean	-3.881
SD	0.424	SD	1.984
95% DL/2 (t) UCL	0.291	95% H-Stat (DL/2) UCL	0.582
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.555
		SD in Log Scale	2.328
		Mean in Original Scale	0.153
		SD in Original Scale	0.427
		95% t UCL	0.283
		95% Percentile Bootstrap UCL	0.285
		95% BCA Bootstrap UCL	0.346
		95% H-UCL	0.989

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.361	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.766		
nu star	12.28		
A-D Test Statistic	1.531	**Nonparametric Statistics**	
5% A-D Critical Value	0.822	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.822	Mean	0.156
5% K-S Critical Value	0.224	SD	0.419
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0776
		95% KM (t) UCL	0.288
Assuming Gamma Distribution		95% KM (z) UCL	0.284

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.285
Minimum	0.000001	95% KM (bootstrap t) UCL	0.536
Maximum	2.1	95% KM (BCA) UCL	0.309
Mean	0.152	95% KM (Percentile Bootstrap) UCL	0.297
Median	0.0077	95% KM (Chebyshev) UCL	0.494
SD	0.427	97.5% KM (Chebyshev) UCL	0.64
k star	0.14	99% KM (Chebyshev) UCL	0.928
Theta star	1.086		
Nu star	8.666	**Potential UCLs to Use**	
AppChi2	3.126	99% KM (Chebyshev) UCL	0.928
95% Gamma Approximate UCL (Use when n >= 40)	0.421		
95% Adjusted Gamma UCL (Use when n < 40)	0.447		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4-chloroaniline OS

General Statistics

Number of Valid Data	30	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	29
		Percent Non-Detects	96.67%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 4-chloroaniline OS was not processed!

4-iso-Propyltoluene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	13
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 4-iso-Propyltoluene OV was not processed!

Aldrin PESTP

General Statistics

Number of Valid Data	30	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	30
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin PESTP was not processed!

Aluminum M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	27

Raw Statistics		**Log-transformed Statistics**	
Minimum	1260	Minimum of Log Data	7.139
Maximum	13000	Maximum of Log Data	9.473
Mean	7063	Mean of log Data	8.716
Geometric Mean	6100	SD of log Data	0.601
Median	6650		
SD	3433		
Std. Error of Mean	648.8		
Coefficient of Variation	0.486		
Skewness	0.141		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	8168	95% H-UCL	9243
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11065
95% Adjusted-CLT UCL (Chen-1995)	8149	97.5% Chebyshev (MVUE) UCL	12714
95% Modified-t UCL (Johnson-1978)	8171	99% Chebyshev (MVUE) UCL	15954

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.211	**Data appear Normal at 5% Significance Level**
Theta Star	2200	
MLE of Mean	7063	
MLE of Standard Deviation	3941	
nu star	179.8	
Approximate Chi Square Value (.05)	149.8	**Nonparametric Statistics**
Adjusted Level of Significance	0.0404	95% CLT UCL 8130
Adjusted Chi Square Value	148.1	95% Jackknife UCL 8168
		95% Standard Bootstrap UCL 8126
Anderson-Darling Test Statistic	0.348	95% Bootstrap-t UCL 8155
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL 8138
Kolmogorov-Smirnov Test Statistic	0.106	95% Percentile Bootstrap UCL 8082
Kolmogorov-Smirnov 5% Critical Value	0.166	95% BCA Bootstrap UCL 8119
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 9891
		97.5% Chebyshev(Mean, Sd) UCL 11115
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 13519
95% Approximate Gamma UCL (Use when n >= 40)	8478	
95% Adjusted Gamma UCL (Use when n < 40)	8575	

Potential UCL to Use	
Use 95% Student's-t UCL	8168

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Antimony M

General Statistics

Number of Valid Data	27	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	17
		Percent Non-Detects	62.96%

Raw Statistics	Log-transformed Statistics

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Detected	0.387	Minimum Detected	-0.949
Maximum Detected	27.8	Maximum Detected	3.325
Mean of Detected	4.643	Mean of Detected	0.546
SD of Detected	8.448	SD of Detected	1.358
Minimum Non-Detect	0.52	Minimum Non-Detect	-0.654
Maximum Non-Detect	7.5	Maximum Non-Detect	2.015

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.59%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.563	Shapiro Wilk Test Statistic	0.895
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.776	Mean	0.295
SD	5.281	SD	1.108
95% DL/2 (t) UCL	4.509	95% H-Stat (DL/2) UCL	4.424
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.275
		SD in Log Scale	1.119
		Mean in Original Scale	2.06
		SD in Original Scale	5.369
		95% t UCL	3.823
		95% Percentile Bootstrap UCL	4.007
		95% BCA Bootstrap UCL	5.11
		95% H-UCL	2.555

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.502	**Data appear Lognormal at 5% Significance Level**	
Theta Star	9.254		
nu star	10.03		
A-D Test Statistic	0.901	**Nonparametric Statistics**	
5% A-D Critical Value	0.767	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.767	Mean	2.155
5% K-S Critical Value	0.278	SD	5.26

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	27.8
Mean	1.913
Median	0.000001
SD	5.453
k star	0.114
Theta star	16.74
Nu star	6.17
AppChi2	1.727
95% Gamma Approximate UCL (Use when n >= 40)	6.831
95% Adjusted Gamma UCL (Use when n < 40)	7.459

SE of Mean	1.073
95% KM (t) UCL	3.986
95% KM (z) UCL	3.921
95% KM (jackknife) UCL	3.885
95% KM (bootstrap t) UCL	9.128
95% KM (BCA) UCL	4.183
95% KM (Percentile Bootstrap) UCL	4.092
95% KM (Chebyshev) UCL	6.834
97.5% KM (Chebyshev) UCL	8.858
99% KM (Chebyshev) UCL	12.83

Potential UCLs to Use

95% KM (BCA) UCL	4.183

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1232 PESTP

General Statistics

Number of Valid Data	86	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	85
		Percent Non-Detects	98.84%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aroclor-1232 PESTP was not processed!

Aroclor-1242 PESTP

General Statistics

Number of Valid Data	87	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	83
		Percent Non-Detects	95.40%

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.19	Minimum Detected	-1.661
Maximum Detected	230	Maximum Detected	5.438
Mean of Detected	61.07	Mean of Detected	1.827
SD of Detected	112.7	SD of Detected	2.945
Minimum Non-Detect	0.0189	Minimum Non-Detect	-3.969
Maximum Non-Detect	140	Maximum Non-Detect	4.942

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.85%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.665	Shapiro Wilk Test Statistic	0.996
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.744	Mean	-1.843
SD	25.93	SD	2.245
95% DL/2 (t) UCL	9.366	95% H-Stat (DL/2) UCL	4.814
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-13.98
		SD in Log Scale	4.424
		Mean in Original Scale	2.808
		SD in Original Scale	24.67
		95% t UCL	7.206
		95% Percentile Bootstrap UCL	8.06
		95% BCA Bootstrap UCL	10.83
		95% H-UCL	0.366

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.242
Theta Star	252.3
nu star	1.936
A-D Test Statistic	0.322
5% A-D Critical Value	0.704
K-S Test Statistic	0.704
5% K-S Critical Value	0.418

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	230
Mean	2.808
Median	0.000001
SD	24.67
k star	0.0664
Theta star	42.31
Nu star	11.55
AppChi2	4.931
95% Gamma Approximate UCL (Use when n >= 40)	6.576
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.003
SD	24.51
SE of Mean	3.034
95% KM (t) UCL	8.048
95% KM (z) UCL	7.994
95% KM (jackknife) UCL	6.638
95% KM (bootstrap t) UCL	55.12
95% KM (BCA) UCL	230
95% KM (Percentile Bootstrap) UCL	21.07
95% KM (Chebyshev) UCL	16.23
97.5% KM (Chebyshev) UCL	21.95
99% KM (Chebyshev) UCL	33.19

Potential UCLs to Use

95% KM (t) UCL	8.048

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1248 PESTP

General Statistics

Number of Valid Data	85	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	77
		Percent Non-Detects	90.59%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.026	Minimum Detected	-3.65
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	1.042	Mean of Detected	-0.577

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD of Detected	0.93	SD of Detected	1.491
Minimum Non-Detect	0.0189	Minimum Non-Detect	-3.969
Maximum Non-Detect	190	Maximum Non-Detect	5.247

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	85
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.835	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.916	Mean	-1.612
SD	14.28	SD	2.307
95% DL/2 (t) UCL	6.492	95% H-Stat (DL/2) UCL	7.353
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.689
		SD in Log Scale	1.597
		Mean in Original Scale	0.105
		SD in Original Scale	0.405
		95% t UCL	0.178
		95% Percentile Bootstrap UCL	0.181
		95% BCA Bootstrap UCL	0.22
		95% H-UCL	0.0543

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.671	**Data appear Normal at 5% Significance Level**
Theta Star	1.553	
nu star	10.73	

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

A-D Test Statistic	0.381
5% A-D Critical Value	0.738
K-S Test Statistic	0.738
5% K-S Critical Value	0.302

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.3
Mean	0.0981
Median	0.000001
SD	0.407
k star	0.0862
Theta star	1.137
Nu star	14.66
AppChi2	7.025
95% Gamma Approximate UCL (Use when n >= 40)	0.205
95% Adjusted Gamma UCL (Use when n < 40)	0.207

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.151
SD	0.442
SE of Mean	0.0575
95% KM (t) UCL	0.247
95% KM (z) UCL	0.246
95% KM (jackknife) UCL	0.317
95% KM (bootstrap t) UCL	0.264
95% KM (BCA) UCL	0.661
95% KM (Percentile Bootstrap) UCL	0.594
95% KM (Chebyshev) UCL	0.402
97.5% KM (Chebyshev) UCL	0.51
99% KM (Chebyshev) UCL	0.724

Potential UCLs to Use

95% KM (t) UCL	0.247
95% KM (Percentile Bootstrap) UCL	0.594

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1254 PESTP

General Statistics

Number of Valid Data	81	Number of Detected Data	74
Number of Distinct Detected Data	63	Number of Non-Detect Data	7
		Percent Non-Detects	8.64%

Raw Statistics

Minimum Detected	0.041
Maximum Detected	560
Mean of Detected	18.18
SD of Detected	70.32
Minimum Non-Detect	0.035
Maximum Non-Detect	160

Log-transformed Statistics

Minimum Detected	-3.194
Maximum Detected	6.328
Mean of Detected	0.521
SD of Detected	2.043
Minimum Non-Detect	-3.352
Maximum Non-Detect	5.075

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect 79

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.53%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.398	Lilliefors Test Statistic	0.088
5% Lilliefors Critical Value	0.103	5% Lilliefors Critical Value	0.103
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	17.6	Mean	0.238
SD	67.71	SD	2.325
95% DL/2 (t) UCL	30.12	95% H-Stat (DL/2) UCL	50.52
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.174
		SD in Log Scale	2.299
		Mean in Original Scale	16.62
		SD in Original Scale	67.36
		95% t UCL	29.08
		95% Percentile Bootstrap UCL	29.18
		95% BCA Bootstrap UCL	37.67
		95% H-UCL	43.75

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.288	**Data appear Lognormal at 5% Significance Level**	
Theta Star	63.04		
nu star	42.68		
A-D Test Statistic	6.381	**Nonparametric Statistics**	
5% A-D Critical Value	0.869	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.869	Mean	16.71
5% K-S Critical Value	0.113	SD	66.97
Data not Gamma Distributed at 5% Significance Level		SE of Mean	7.496
		95% KM (t) UCL	29.18
Assuming Gamma Distribution		95% KM (z) UCL	29.04
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	29.17
Minimum	0.000001	95% KM (bootstrap t) UCL	55.85
Maximum	560	95% KM (BCA) UCL	30.18
Mean	16.61	95% KM (Percentile Bootstrap) UCL	30.14
Median	1.1	95% KM (Chebyshev) UCL	49.38

SD	67.37	97.5% KM (Chebyshev) UCL	63.52
k star	0.208	99% KM (Chebyshev) UCL	91.29
Theta star	79.87		
Nu star	33.69	**Potential UCLs to Use**	
AppChi2	21.42	97.5% KM (Chebyshev) UCL	63.52
95% Gamma Approximate UCL (Use when n >= 40)	26.13		
95% Adjusted Gamma UCL (Use when n < 40)	26.35		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1268 PESTP

General Statistics

Number of Valid Observations	2	Number of Distinct Observations	2

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Aroclor-1268 PESTP was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Arsenic M

General Statistics

Number of Valid Data	28	Number of Detected Data	25
Number of Distinct Detected Data	23	Number of Non-Detect Data	3
		Percent Non-Detects	10.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	17.3	Maximum Detected	2.851
Mean of Detected	5.145	Mean of Detected	1.403
SD of Detected	3.81	SD of Detected	0.704
Minimum Non-Detect	0.54	Minimum Non-Detect	-0.616

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Non-Detect	10.7	Maximum Non-Detect	2.37
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.86%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.849	Shapiro Wilk Test Statistic	0.984
5% Shapiro Wilk Critical Value	0.918	5% Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.829	Mean	1.264
SD	3.785	SD	0.879
95% DL/2 (t) UCL	6.047	95% H-Stat (DL/2) UCL	7.707
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.296
		SD in Log Scale	0.764
		Mean in Original Scale	4.79
		SD in Original Scale	3.76
		95% t UCL	6
		95% Percentile Bootstrap UCL	6.005
		95% BCA Bootstrap UCL	6.238
		95% H-UCL	6.75

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.032	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	2.532		
nu star	101.6		
A-D Test Statistic	0.223	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	4.832
5% K-S Critical Value	0.176	SD	3.696
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.719
		95% KM (t) UCL	6.057
Assuming Gamma Distribution		95% KM (z) UCL	6.015
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.052
Minimum	0.000001	95% KM (bootstrap t) UCL	6.394

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum	17.3	95% KM (BCA) UCL	6.039
Mean	4.763	95% KM (Percentile Bootstrap) UCL	6.104
Median	3.85	95% KM (Chebyshev) UCL	7.966
SD	3.836	97.5% KM (Chebyshev) UCL	9.321
k star	0.48	99% KM (Chebyshev) UCL	11.98
Theta star	9.926		
Nu star	26.87	**Potential UCLs to Use**	
AppChi2	16.05	95% KM (BCA) UCL	6.039
95% Gamma Approximate UCL (Use when n >= 40)	7.973		
95% Adjusted Gamma UCL (Use when n < 40)	8.239		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzene OV

General Statistics

Number of Valid Data	14	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	10
		Percent Non-Detects	71.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0064	Minimum Detected	-5.051
Maximum Detected	0.098	Maximum Detected	-2.323
Mean of Detected	0.0456	Mean of Detected	-3.598
SD of Detected	0.0433	SD of Detected	1.279
Minimum Non-Detect	0.0048	Minimum Non-Detect	-5.339
Maximum Non-Detect	59	Maximum Non-Detect	4.078

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	14
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.905
5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.924
5% Shapiro Wilk Critical Value	0.748
Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	2.123
SD	7.88
95% DL/2 (t) UCL	5.852
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-4.39
SD	2.526
95% H-Stat (DL/2) UCL	16.98
Log ROS Method	
Mean in Log Scale	-6.232
SD in Log Scale	1.894
Mean in Original Scale	0.0136
SD in Original Scale	0.0296
95% t UCL	0.0276
95% Percentile Bootstrap UCL	0.0275
95% BCA Bootstrap UCL	0.0333
95% H-UCL	0.123

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.446
Theta Star	0.102
nu star	3.568
A-D Test Statistic	0.331
5% A-D Critical Value	0.666
K-S Test Statistic	0.666
5% K-S Critical Value	0.402
Data appear Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	0.098
Mean	0.013
Median	0.000001
SD	0.0298
k star	0.143

Data Distribution Test with Detected Values Only
Data appear Normal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.0185
SD	0.0275
SE of Mean	0.00882
95% KM (t) UCL	0.0341
95% KM (z) UCL	0.033
95% KM (jackknife) UCL	0.0311
95% KM (bootstrap t) UCL	0.0323
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	0.0692
95% KM (Chebyshev) UCL	0.057
97.5% KM (Chebyshev) UCL	0.0736
99% KM (Chebyshev) UCL	0.106

US EPA ARCHIVE DOCUMENT

Theta star	0.0914
Nu star	3.992
AppChi2	0.719
95% Gamma Approximate UCL (Use when n >= 40)	0.0724
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Potential UCLs to Use

95% KM (t) UCL	0.0341
95% KM (Percentile Bootstrap) UCL	0.0692

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)anthracene OS

General Statistics

Number of Valid Data	33	Number of Detected Data	32
Number of Distinct Detected Data	27	Number of Non-Detect Data	1
		Percent Non-Detects	3.03%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.082	Minimum Detected	-2.501
Maximum Detected	8.5	Maximum Detected	2.14
Mean of Detected	1.508	Mean of Detected	-0.128
SD of Detected	1.845	SD of Detected	1.067
Minimum Non-Detect	35	Minimum Non-Detect	3.555
Maximum Non-Detect	35	Maximum Non-Detect	3.555

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.663	Shapiro Wilk Test Statistic	0.97
5% Shapiro Wilk Critical Value	0.93	5% Shapiro Wilk Critical Value	0.93
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.993	Mean	-0.0376
SD	3.324	SD	1.172
95% DL/2 (t) UCL	2.973	95% H-Stat (DL/2) UCL	3.319
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.128

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD in Log Scale	1.05
Mean in Original Scale	1.489
SD in Original Scale	1.819
95% t UCL	2.026
95% Percentile Bootstrap UCL	2.03
95% BCA Bootstrap UCL	2.24
95% H-UCL	2.429

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.984
Theta Star	1.533
nu star	62.98
A-D Test Statistic	0.797
5% A-D Critical Value	0.774
K-S Test Statistic	0.774
5% K-S Critical Value	0.16

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.082
Maximum	8.5
Mean	1.508
Median	0.99
SD	1.816
k star	1.014
Theta star	1.488
Nu star	66.9
AppChi2	49.07
95% Gamma Approximate UCL (Use when n >= 40)	2.056
95% Adjusted Gamma UCL (Use when n < 40)	2.089

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.508
SD	1.816
SE of Mean	0.326
95% KM (t) UCL	2.061
95% KM (z) UCL	2.045
95% KM (jackknife) UCL	2.061
95% KM (bootstrap t) UCL	2.55
95% KM (BCA) UCL	2.112
95% KM (Percentile Bootstrap) UCL	2.097
95% KM (Chebyshev) UCL	2.93
97.5% KM (Chebyshev) UCL	3.545
99% KM (Chebyshev) UCL	4.754

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	3.545

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene OS

General Statistics

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Number of Valid Data	33	Number of Detected Data	31
Number of Distinct Detected Data	28	Number of Non-Detect Data	2
		Percent Non-Detects	6.06%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.085	Minimum Detected	-2.465
Maximum Detected	8.9	Maximum Detected	2.186
Mean of Detected	1.523	Mean of Detected	-0.079
SD of Detected	1.799	SD of Detected	1.033
Minimum Non-Detect	6.2	Minimum Non-Detect	1.825
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	33
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.679	Shapiro Wilk Test Statistic	0.98
5% Shapiro Wilk Critical Value	0.929	5% Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.055	Mean	0.0468
SD	3.286	SD	1.141
95% DL/2 (t) UCL	3.024	95% H-Stat (DL/2) UCL	3.402
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.081
		SD in Log Scale	1.001
		Mean in Original Scale	1.485
		SD in Original Scale	1.749
		95% t UCL	2.001
		95% Percentile Bootstrap UCL	2.015
		95% BCA Bootstrap UCL	2.152
		95% H-UCL	2.343

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	1.049	**Data appear Gamma Distributed at 5% Significance Level**
Theta Star	1.452	
nu star	65.06	

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

A-D Test Statistic	0.59
5% A-D Critical Value	0.772
K-S Test Statistic	0.772
5% K-S Critical Value	0.162

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.085
Maximum	8.9
Mean	1.522
Median	1
SD	1.742
k star	1.115
Theta star	1.365
Nu star	73.58
AppChi2	54.82
95% Gamma Approximate UCL (Use when n >= 40)	2.042
95% Adjusted Gamma UCL (Use when n < 40)	2.074

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.516
SD	1.755
SE of Mean	0.318
95% KM (t) UCL	2.054
95% KM (z) UCL	2.038
95% KM (jackknife) UCL	2.054
95% KM (bootstrap t) UCL	2.532
95% KM (BCA) UCL	2.098
95% KM (Percentile Bootstrap) UCL	2.072
95% KM (Chebyshev) UCL	2.9
97.5% KM (Chebyshev) UCL	3.499
99% KM (Chebyshev) UCL	4.676

Potential UCLs to Use

95% KM (Chebyshev) UCL	2.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene OS

General Statistics

Number of Valid Data	32	Number of Detected Data	29
Number of Distinct Detected Data	26	Number of Non-Detect Data	3
		Percent Non-Detects	9.38%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.19	Minimum Detected	-1.661
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	1.933	Mean of Detected	0.215
SD of Detected	1.929	SD of Detected	0.973
Minimum Non-Detect	2.2	Minimum Non-Detect	0.788
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	32
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.795	Shapiro Wilk Test Statistic	0.963
5% Shapiro Wilk Critical Value	0.926	5% Shapiro Wilk Critical Value	0.926
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.43	Mean	0.323
SD	3.315	SD	1.047
95% DL/2 (t) UCL	3.423	95% H-Stat (DL/2) UCL	3.813
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.199
		SD in Log Scale	0.927
		Mean in Original Scale	1.851
		SD in Original Scale	1.852
		95% t UCL	2.406
		95% Percentile Bootstrap UCL	2.425
		95% BCA Bootstrap UCL	2.505
		95% H-UCL	2.772

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.16	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	1.666		
nu star	67.27		
A-D Test Statistic	0.728	**Nonparametric Statistics**	
5% A-D Critical Value	0.768	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.768	Mean	1.888
5% K-S Critical Value	0.166	SD	1.86
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.343
		95% KM (t) UCL	2.47
Assuming Gamma Distribution		95% KM (z) UCL	2.453
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.47
Minimum	0.19	95% KM (bootstrap t) UCL	2.593
Maximum	7.8	95% KM (BCA) UCL	2.482
Mean	1.906	95% KM (Percentile Bootstrap) UCL	2.461

Median	1.204	95% KM (Chebyshev) UCL	3.384
SD	1.838	97.5% KM (Chebyshev) UCL	4.032
k star	1.269	99% KM (Chebyshev) UCL	5.304
Theta star	1.502		
Nu star	81.24	**Potential UCLs to Use**	
AppChi2	61.47	95% KM (Chebyshev) UCL	3.384
95% Gamma Approximate UCL (Use when n >= 40)	2.519		
95% Adjusted Gamma UCL (Use when n < 40)	2.558		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(k)fluoranthene OS

General Statistics

Number of Valid Data	33	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	13
		Percent Non-Detects	39.39%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.12	Minimum Detected	-2.12
Maximum Detected	8.8	Maximum Detected	2.175
Mean of Detected	1.946	Mean of Detected	0.0121
SD of Detected	2.358	SD of Detected	1.215
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	33
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.744	Shapiro Wilk Test Statistic	0.978
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**
DL/2 Substitution Method	DL/2 Substitution Method

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	1.927
SD	3.432
95% DL/2 (t) UCL	2.939

Mean	-0.264
SD	1.3
95% H-Stat (DL/2) UCL	3.424

Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Log ROS Method	
Mean in Log Scale	-0.488
SD in Log Scale	1.157
Mean in Original Scale	1.301
SD in Original Scale	1.992
95% t UCL	1.888
95% Percentile Bootstrap UCL	1.908
95% BCA Bootstrap UCL	2.056
95% H-UCL	2.056

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.794
Theta Star	2.451
nu star	31.76
A-D Test Statistic	0.409
5% A-D Critical Value	0.773
K-S Test Statistic	0.773
5% K-S Critical Value	0.2

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	8.8
Mean	1.238
Median	0.41
SD	2.034
k star	0.192
Theta star	6.437
Nu star	12.69
AppChi2	5.687
95% Gamma Approximate UCL (Use when n >= 40)	2.763
95% Adjusted Gamma UCL (Use when n < 40)	2.885

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.345
SD	1.99
SE of Mean	0.363
95% KM (t) UCL	1.961
95% KM (z) UCL	1.943
95% KM (jackknife) UCL	1.956
95% KM (bootstrap t) UCL	2.418
95% KM (BCA) UCL	2.019
95% KM (Percentile Bootstrap) UCL	1.972
95% KM (Chebyshev) UCL	2.929
97.5% KM (Chebyshev) UCL	3.614
99% KM (Chebyshev) UCL	4.96

Potential UCLs to Use

95% KM (BCA) UCL	2.019

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For additional insight, the user may want to consult a statistician.

Bis(2-ethylhexyl)phthalate OS

General Statistics

Number of Valid Data	32	Number of Detected Data	18
Number of Distinct Detected Data	17	Number of Non-Detect Data	14
		Percent Non-Detects	43.75%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	460	Maximum Detected	6.131
Mean of Detected	32.02	Mean of Detected	0.512
SD of Detected	107.3	SD of Detected	2.472
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	7.1	Maximum Non-Detect	1.96

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.25%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.321	Shapiro Wilk Test Statistic	0.909
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.45	Mean	0.06
SD	81.01	SD	2.014
95% DL/2 (t) UCL	42.73	95% H-Stat (DL/2) UCL	32.52
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.26
		SD in Log Scale	2.052
		Mean in Original Scale	18.15
		SD in Original Scale	81.07
		95% t UCL	42.45
		95% Percentile Bootstrap UCL	46.13
		95% BCA Bootstrap UCL	62.5

95% H-UCL	26.77

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.238
Theta Star	134.3
nu star	8.585
A-D Test Statistic	1.771
5% A-D Critical Value	0.867
K-S Test Statistic	0.867
5% K-S Critical Value	0.223

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	460
Mean	18.01
Median	0.145
SD	81.1
k star	0.107
Theta star	169.1
Nu star	6.818
AppChi2	2.071
95% Gamma Approximate UCL (Use when n >= 40)	59.29
95% Adjusted Gamma UCL (Use when n < 40)	63.49

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	18.15
SD	79.79
SE of Mean	14.51
95% KM (t) UCL	42.75
95% KM (z) UCL	42.02
95% KM (jackknife) UCL	42.44
95% KM (bootstrap t) UCL	231.9
95% KM (BCA) UCL	47.73
95% KM (Percentile Bootstrap) UCL	46.2
95% KM (Chebyshev) UCL	81.41
97.5% KM (Chebyshev) UCL	108.8
99% KM (Chebyshev) UCL	162.6

Potential UCLs to Use

99% KM (Chebyshev) UCL	162.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cadmium M

General Statistics

Number of Valid Data	27	Number of Detected Data	16
Number of Distinct Detected Data	14	Number of Non-Detect Data	11
		Percent Non-Detects	40.74%

Raw Statistics

Minimum Detected	0.32

Log-transformed Statistics

Minimum Detected	-1.139

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Detected	14.7	Maximum Detected	2.688
Mean of Detected	4.144	Mean of Detected	0.821
SD of Detected	4.495	SD of Detected	1.189
Minimum Non-Detect	0.06	Minimum Non-Detect	-2.813
Maximum Non-Detect	0.62	Maximum Non-Detect	-0.478

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	14
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.85%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.803	Shapiro Wilk Test Statistic	0.959
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.522	Mean	-0.363
SD	3.954	SD	1.798
95% DL/2 (t) UCL	3.82	95% H-Stat (DL/2) UCL	12.96
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.347
		SD in Log Scale	1.705
		Mean in Original Scale	2.51
		SD in Original Scale	3.961
		95% t UCL	3.81
		95% Percentile Bootstrap UCL	3.815
		95% BCA Bootstrap UCL	4.077
		95% H-UCL	9.945

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.825	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	5.02		
nu star	26.41		
A-D Test Statistic	0.418	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	2.588
5% K-S Critical Value	0.221	SD	3.84
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.763

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% KM (t) UCL	3.89
95% KM (z) UCL	3.843
95% KM (jackknife) UCL	3.818
95% KM (bootstrap t) UCL	4.495
95% KM (BCA) UCL	4.138
95% KM (Percentile Bootstrap) UCL	3.897
95% KM (Chebyshev) UCL	5.915
97.5% KM (Chebyshev) UCL	7.354
99% KM (Chebyshev) UCL	10.18

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	14.7
Mean	2.456
Median	0.53
SD	3.995
k star	0.14
Theta star	17.52
Nu star	7.567
AppChi2	2.487
95% Gamma Approximate UCL (Use when n >= 40)	7.472
95% Adjusted Gamma UCL (Use when n < 40)	8.063

Potential UCLs to Use

95% KM (BCA) UCL	4.138

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Carbazole OS

General Statistics

Number of Valid Data	31	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	15
		Percent Non-Detects	48.39%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.051	Minimum Detected	-2.976
Maximum Detected	2	Maximum Detected	0.693
Mean of Detected	0.394	Mean of Detected	-1.369
SD of Detected	0.464	SD of Detected	0.958
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only | **Lognormal Distribution Test with Detected Values Only**

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Shapiro Wilk Test Statistic	0.633
5% Shapiro Wilk Critical Value	0.887

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.162
SD	3.109
95% DL/2 (t) UCL	2.11
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.086
Theta Star	0.363
nu star	34.74
A-D Test Statistic	0.486
5% A-D Critical Value	0.758
K-S Test Statistic	0.758
5% K-S Critical Value	0.22

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.051
Maximum	2
Mean	0.355
Median	0.32
SD	0.333
k star	2.032
Theta star	0.175
Nu star	126
AppChi2	101

Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.887

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.865
SD	1.221
95% H-Stat (DL/2) UCL	1.619
Log ROS Method	
Mean in Log Scale	-1.488
SD in Log Scale	0.694
Mean in Original Scale	0.3
SD in Original Scale	0.343
95% t UCL	0.405
95% Percentile Bootstrap UCL	0.414
95% BCA Bootstrap UCL	0.48
95% H-UCL	0.375

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.334
SD	0.372
SE of Mean	0.0787
95% KM (t) UCL	0.467
95% KM (z) UCL	0.463
95% KM (jackknife) UCL	0.467
95% KM (bootstrap t) UCL	0.572
95% KM (BCA) UCL	0.475
95% KM (Percentile Bootstrap) UCL	0.464
95% KM (Chebyshev) UCL	0.677
97.5% KM (Chebyshev) UCL	0.825
99% KM (Chebyshev) UCL	1.117

Potential UCLs to Use

95% KM (t) UCL	0.467

95% Gamma Approximate UCL (Use when n >= 40)	0.442
95% Adjusted Gamma UCL (Use when n < 40)	0.448

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlordane PESTP

General Statistics

Number of Valid Data	13	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	8
		Percent Non-Detects	61.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0061	Minimum Detected	-5.099
Maximum Detected	10.6	Maximum Detected	2.361
Mean of Detected	3.513	Mean of Detected	-0.665
SD of Detected	4.777	SD of Detected	2.992
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	1.8	Maximum Non-Detect	0.588

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.62%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.794	Shapiro Wilk Test Statistic	0.92
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

DL/2 Substitution Method	
Mean	1.432
SD	3.255
95% DL/2 (t) UCL	3.041

Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

DL/2 Substitution Method	
Mean	-2.702
SD	2.873
95% H-Stat (DL/2) UCL	1051

Log ROS Method	
Mean in Log Scale	-4.553
SD in Log Scale	3.721
Mean in Original Scale	1.352
SD in Original Scale	3.282
95% t UCL	2.974
95% Percentile Bootstrap UCL	2.957
95% BCA Bootstrap UCL	3.608
95% H-UCL	101008

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.273
Theta Star	12.85
nu star	2.733
A-D Test Statistic	0.329
5% A-D Critical Value	0.732
K-S Test Statistic	0.732
5% K-S Critical Value	0.378

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	10.6
Mean	1.351
Median	0.000001
SD	3.282
k star	0.121
Theta star	11.16
Nu star	3.148
AppChi2	0.418
95% Gamma Approximate UCL (Use when n >= 40)	10.19
95% Adjusted Gamma UCL (Use when n < 40)	13.81

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.36
SD	3.15
SE of Mean	0.977
95% KM (t) UCL	3.101
95% KM (z) UCL	2.966
95% KM (jackknife) UCL	2.887
95% KM (bootstrap t) UCL	28.93
95% KM (BCA) UCL	6.36
95% KM (Percentile Bootstrap) UCL	3.966
95% KM (Chebyshev) UCL	5.617
97.5% KM (Chebyshev) UCL	7.46
99% KM (Chebyshev) UCL	11.08

Potential UCLs to Use

95% KM (t) UCL	3.101
95% KM (Percentile Bootstrap) UCL	3.966

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlorobenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	8
		Percent Non-Detects	61.54%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0027	Minimum Detected	-5.915
Maximum Detected	360	Maximum Detected	5.886
Mean of Detected	72.01	Mean of Detected	-2.669
SD of Detected	161	SD of Detected	4.929
Minimum Non-Detect	0.0048	Minimum Non-Detect	-5.339
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.62%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.552	Shapiro Wilk Test Statistic	0.748
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	27.7	Mean	-4.408
SD	99.84	SD	3.225
95% DL/2 (t) UCL	77.06	95% H-Stat (DL/2) UCL	2242

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	-4.896
SD in Log Scale	3.434
Mean in Original Scale	27.7
SD in Original Scale	99.84
95% t UCL	77.05
95% Percentile Bootstrap UCL	83.08
95% BCA Bootstrap UCL	110.8
95% H-UCL	6826

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.179
Theta Star	401.7
nu star	1.793
A-D Test Statistic	0.974
5% A-D Critical Value	0.819
K-S Test Statistic	0.819
5% K-S Critical Value	0.397

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	360
Mean	27.7
Median	0.000001
SD	99.84
k star	0.102
Theta star	270.9
Nu star	2.659
AppChi2	0.279
95% Gamma Approximate UCL (Use when n >= 40)	264
95% Adjusted Gamma UCL (Use when n < 40)	360.1

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	27.7
SD	95.93
SE of Mean	29.75
95% KM (t) UCL	80.71
95% KM (z) UCL	76.63
95% KM (jackknife) UCL	77.05
95% KM (bootstrap t) UCL	798009
95% KM (BCA) UCL	83.09
95% KM (Percentile Bootstrap) UCL	83.08
95% KM (Chebyshev) UCL	157.4
97.5% KM (Chebyshev) UCL	213.5
99% KM (Chebyshev) UCL	323.7

Potential UCLs to Use

99% KM (Chebyshev) UCL	323.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chromium M

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	27

Raw Statistics		Log-transformed Statistics	
Minimum	2.5	Minimum of Log Data	0.916
Maximum	330	Maximum of Log Data	5.799
Mean	78.5	Mean of log Data	3.604
Geometric Mean	36.75	SD of log Data	1.363
Median	38.1		
SD	94.33		
Std. Error of Mean	17.83		
Coefficient of Variation	1.202		
Skewness	1.553		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.752	Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	108.9	95% H-UCL	200.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	208.3
95% Adjusted-CLT UCL (Chen-1995)	113.4	97.5% Chebyshev (MVUE) UCL	260.4
95% Modified-t UCL (Johnson-1978)	109.7	99% Chebyshev (MVUE) UCL	362.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.724	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	108.4		
MLE of Mean	78.5		
MLE of Standard Deviation	92.26		
nu star	40.54		
Approximate Chi Square Value (.05)	26.95	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0404	95% CLT UCL	107.8
Adjusted Chi Square Value	26.26	95% Jackknife UCL	108.9
		95% Standard Bootstrap UCL	106.9
Anderson-Darling Test Statistic	0.607	95% Bootstrap-t UCL	118.5
Anderson-Darling 5% Critical Value	0.783	95% Hall's Bootstrap UCL	111.9
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	109
Kolmogorov-Smirnov 5% Critical Value	0.172	95% BCA Bootstrap UCL	112.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	156.2

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	97.5% Chebyshev(Mean, Sd) UCL 189.8
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 255.9
95% Approximate Gamma UCL (Use when n >= 40) 118.1	
95% Adjusted Gamma UCL (Use when n < 40) 121.2	
Potential UCL to Use	Use 95% Approximate Gamma UCL 118.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Cis-1,2-dichloroethene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	11
		Percent Non-Detects	84.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0073	Minimum Detected	-4.92
Maximum Detected	180	Maximum Detected	5.193
Mean of Detected	90	Mean of Detected	0.137
SD of Detected	127.3	SD of Detected	7.151
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.31%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	13.85
SD	49.92
95% DL/2 (t) UCL	38.53
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-4.699
SD	3.018
95% H-Stat (DL/2) UCL	380.2
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	13.85
SD	47.96
SE of Mean	18.81
95% KM (t) UCL	47.38
95% KM (z) UCL	44.8
95% KM (jackknife) UCL	136.2
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	180
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	95.85

US EPA ARCHIVE DOCUMENT

SD	N/A	97.5% KM (Chebyshev) UCL	131.3
k star	N/A	99% KM (Chebyshev) UCL	201
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	99% KM (Chebyshev) UCL	201
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cobalt M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	25

Raw Statistics		**Log-transformed Statistics**	
Minimum	1	Minimum of Log Data	0
Maximum	30.1	Maximum of Log Data	3.405
Mean	6.376	Mean of log Data	1.534
Geometric Mean	4.636	SD of log Data	0.781
Median	4.15		
SD	6.253		
Std. Error of Mean	1.182		
Coefficient of Variation	0.981		
Skewness	2.577		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.709	Shapiro Wilk Test Statistic	0.982
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8.389	95% H-UCL	8.763
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10.58
95% Adjusted-CLT UCL (Chen-1995)	8.935	97.5% Chebyshev (MVUE) UCL	12.47
95% Modified-t UCL (Johnson-1978)	8.485	99% Chebyshev (MVUE) UCL	16.19

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test	
k star (bias corrected)	1.557
Theta Star	4.096
MLE of Mean	6.376
MLE of Standard Deviation	5.11
nu star	87.18
Approximate Chi Square Value (.05)	66.66
Adjusted Level of Significance	0.0404
Adjusted Chi Square Value	65.55
Anderson-Darling Test Statistic	0.687
Anderson-Darling 5% Critical Value	0.761
Kolmogorov-Smirnov Test Statistic	0.14
Kolmogorov-Smirnov 5% Critical Value	0.168
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL (Use when n >= 40)	8.339
95% Adjusted Gamma UCL (Use when n < 40)	8.481
Potential UCL to Use	
Use 95% Approximate Gamma UCL	8.339

Data Distribution
Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics	
95% CLT UCL	8.32
95% Jackknife UCL	8.389
95% Standard Bootstrap UCL	8.262
95% Bootstrap-t UCL	9.861
95% Hall's Bootstrap UCL	17.72
95% Percentile Bootstrap UCL	8.511
95% BCA Bootstrap UCL	9.016
95% Chebyshev(Mean, Sd) UCL	11.53
97.5% Chebyshev(Mean, Sd) UCL	13.76
99% Chebyshev(Mean, Sd) UCL	18.13

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Copper M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	26

Raw Statistics		**Log-transformed Statistics**	
Minimum	5.5	Minimum of Log Data	1.705
Maximum	288	Maximum of Log Data	5.663
Mean	82.75	Mean of log Data	3.843
Geometric Mean	46.65	SD of log Data	1.16
Median	46.55		
SD	84.92		
Std. Error of Mean	16.05		
Coefficient of Variation	1.026		

Skewness	1.309

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.809	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	110.1	95% H-UCL	165.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	187.4
95% Adjusted-CLT UCL (Chen-1995)	113.4	97.5% Chebyshev (MVUE) UCL	230.4
95% Modified-t UCL (Johnson-1978)	110.7	99% Chebyshev (MVUE) UCL	314.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.922	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	89.72		
MLE of Mean	82.75		
MLE of Standard Deviation	86.16		
nu star	51.65		
Approximate Chi Square Value (.05)	36.14	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0404	95% CLT UCL	109.1
Adjusted Chi Square Value	35.34	95% Jackknife UCL	110.1
		95% Standard Bootstrap UCL	108.5
Anderson-Darling Test Statistic	0.627	95% Bootstrap-t UCL	118.8
Anderson-Darling 5% Critical Value	0.774	95% Hall's Bootstrap UCL	113.7
Kolmogorov-Smirnov Test Statistic	0.151	95% Percentile Bootstrap UCL	109
Kolmogorov-Smirnov 5% Critical Value	0.17	95% BCA Bootstrap UCL	113.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	152.7
		97.5% Chebyshev(Mean, Sd) UCL	183
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	242.4
95% Approximate Gamma UCL (Use when n >= 40)	118.2		
95% Adjusted Gamma UCL (Use when n < 40)	120.9		
Potential UCL to Use		Use 95% Approximate Gamma UCL	118.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Dibenz(a,h)anthracene OS

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	33	Number of Detected Data	21
Number of Distinct Detected Data	20	Number of Non-Detect Data	12
		Percent Non-Detects	36.36%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.062	Minimum Detected	-2.781
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.469	Mean of Detected	-1.202
SD of Detected	0.518	SD of Detected	0.956
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	33
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.715	Shapiro Wilk Test Statistic	0.977
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.189	Mean	-0.821
SD	3.031	SD	1.229
95% DL/2 (t) UCL	2.083	95% H-Stat (DL/2) UCL	1.696
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.311
		SD in Log Scale	0.778
		Mean in Original Scale	0.381
		SD in Original Scale	0.427
		95% t UCL	0.507
		95% Percentile Bootstrap UCL	0.51
		95% BCA Bootstrap UCL	0.544
		95% H-UCL	0.493

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	1.115	**Data appear Gamma Distributed at 5% Significance Level**

Theta Star	0.421
nu star	46.81

A-D Test Statistic	0.469
5% A-D Critical Value	0.764
K-S Test Statistic	0.764
5% K-S Critical Value	0.194

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.062
Maximum	2.2
Mean	0.423
Median	0.35
SD	0.419
k star	1.594
Theta star	0.265
Nu star	105.2
AppChi2	82.56
95% Gamma Approximate UCL (Use when n >= 40)	0.539
95% Adjusted Gamma UCL (Use when n < 40)	0.546

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.409
SD	0.455
SE of Mean	0.0892
95% KM (t) UCL	0.561
95% KM (z) UCL	0.556
95% KM (jackknife) UCL	0.56
95% KM (bootstrap t) UCL	0.675
95% KM (BCA) UCL	0.563
95% KM (Percentile Bootstrap) UCL	0.566
95% KM (Chebyshev) UCL	0.798
97.5% KM (Chebyshev) UCL	0.967
99% KM (Chebyshev) UCL	1.297

Potential UCLs to Use

95% KM (Percentile Bootstrap) UCL	0.566

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Dieldrin PESTP

General Statistics

Number of Valid Data	28	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	15
		Percent Non-Detects	53.57%

Raw Statistics

Minimum Detected	0.006
Maximum Detected	1.9
Mean of Detected	0.21
SD of Detected	0.516
Minimum Non-Detect	0.0036

Log-transformed Statistics

Minimum Detected	-5.116
Maximum Detected	0.642
Mean of Detected	-3.14
SD of Detected	1.697
Minimum Non-Detect	-5.627

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Non-Detect	0.22	Maximum Non-Detect	-1.514
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.86%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.439	Shapiro Wilk Test Statistic	0.922
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.109	Mean	-4.23
SD	0.358	SD	1.882
95% DL/2 (t) UCL	0.224	95% H-Stat (DL/2) UCL	0.327
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.083
		SD in Log Scale	2.232
		Mean in Original Scale	0.0984
		SD in Original Scale	0.36
		95% t UCL	0.214
		95% Percentile Bootstrap UCL	0.229
		95% BCA Bootstrap UCL	0.305
		95% H-UCL	0.465

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.37	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	0.568		
nu star	9.617		
A-D Test Statistic	1.148	**Nonparametric Statistics**	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	0.103
5% K-S Critical Value	0.253	SD	0.352
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0693
		95% KM (t) UCL	0.221
Assuming Gamma Distribution		95% KM (z) UCL	0.217
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.218
Minimum	0.000001	95% KM (bootstrap t) UCL	0.793

Maximum	1.9	95% KM (BCA) UCL	0.24
Mean	0.0975	95% KM (Percentile Bootstrap) UCL	0.231
Median	0.000001	95% KM (Chebyshev) UCL	0.405
SD	0.36	97.5% KM (Chebyshev) UCL	0.536
k star	0.132	99% KM (Chebyshev) UCL	0.792
Theta star	0.739		
Nu star	7.395	**Potential UCLs to Use**	
AppChi2	2.39	95% KM (t) UCL	0.221
95% Gamma Approximate UCL (Use when n >= 40)	0.302		
95% Adjusted Gamma UCL (Use when n < 40)	0.325		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Di-n-octylphthalate OS

General Statistics

Number of Valid Data	33	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	31
		Percent Non-Detects	93.94%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.8	Minimum Detected	-0.223
Maximum Detected	7.6	Maximum Detected	2.028
Mean of Detected	4.2	Mean of Detected	0.903
SD of Detected	4.808	SD of Detected	1.592
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	7.1	Maximum Non-Detect	1.96

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	32
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.97%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.01
SD	1.466
95% DL/2 (t) UCL	1.442
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.586
SD	1.017
95% H-Stat (DL/2) UCL	1.453
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.006
SD	1.166
SE of Mean	0.287
95% KM (t) UCL	1.492
95% KM (z) UCL	1.478

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

95% KM (jackknife) UCL	5.455
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	7.6
95% KM (Chebyshev) UCL	2.257
97.5% KM (Chebyshev) UCL	2.798
99% KM (Chebyshev) UCL	3.861
Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	2.798

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

DIOXIN TEQ

General Statistics

Number of Valid Observations	280	Number of Distinct Observations	186

Raw Statistics		**Log-transformed Statistics**	
Minimum	7.1E-07	Minimum of Log Data	-14.16
Maximum	0.14	Maximum of Log Data	-1.966
Mean	0.00418	Mean of log Data	-8.072
Geometric Mean	0.0003122	SD of log Data	2.713
Median	0.00031		
SD	0.013		
Std. Error of Mean	0.0007764		
Coefficient of Variation	3.108		
Skewness	7.301		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.374	Lilliefors Test Statistic	0.0532
Lilliefors Critical Value	0.0529	Lilliefors Critical Value	0.0529
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution **Assuming Lognormal Distribution**

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% Student's-t UCL	0.00546	95% H-UCL	0.0235
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0282
95% Adjusted-CLT UCL (Chen-1995)	0.00582	97.5% Chebyshev (MVUE) UCL	0.0354
95% Modified-t UCL (Johnson-1978)	0.00552	99% Chebyshev (MVUE) UCL	0.0494

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	0.27	**Data do not follow a Discernable Distribution (0.05)**
Theta Star	0.0155	
MLE of Mean	0.00418	
MLE of Standard Deviation	0.00805	
nu star	151.1	
Approximate Chi Square Value (.05)	123.7	**Nonparametric Statistics**
Adjusted Level of Significance	0.0491	95% CLT UCL 0.00546
Adjusted Chi Square Value	123.5	95% Jackknife UCL 0.00546
		95% Standard Bootstrap UCL 0.00543
Anderson-Darling Test Statistic	7.861	95% Bootstrap-t UCL 0.00626
Anderson-Darling 5% Critical Value	0.884	95% Hall's Bootstrap UCL 0.00731
Kolmogorov-Smirnov Test Statistic	0.143	95% Percentile Bootstrap UCL 0.00546
Kolmogorov-Smirnov 5% Critical Value	0.0594	95% BCA Bootstrap UCL 0.00586
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 0.00757
		97.5% Chebyshev(Mean, Sd) UCL 0.00903
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 0.0119
95% Approximate Gamma UCL (Use when n >= 40)	0.00511	
95% Adjusted Gamma UCL (Use when n < 40)	0.00511	

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL 0.00757

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Endrin PESTP

General Statistics

Number of Valid Data	32	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	25
		Percent Non-Detects	78.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0072	Minimum Detected	-4.934
Maximum Detected	1.2	Maximum Detected	0.182

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean of Detected	0.198	Mean of Detected	-3.521
SD of Detected	0.444	SD of Detected	1.915
Minimum Non-Detect	0.000148	Minimum Non-Detect	-8.819
Maximum Non-Detect	1	Maximum Non-Detect	0

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	96.88%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.517	Shapiro Wilk Test Statistic	0.783
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.071	Mean	-4.934
SD	0.225	SD	2.097
95% DL/2 (t) UCL	0.139	95% H-Stat (DL/2) UCL	0.29
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.726
		SD in Log Scale	2.504
		Mean in Original Scale	0.0435
		SD in Original Scale	0.212
		95% t UCL	0.107
		95% Percentile Bootstrap UCL	0.118
		95% BCA Bootstrap UCL	0.159
		95% H-UCL	0.081

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.297	**Data do not follow a Discernable Distribution (0.05)**
Theta Star	0.667	
nu star	4.158	

A-D Test Statistic	1.097
5% A-D Critical Value	0.775
K-S Test Statistic	0.775
5% K-S Critical Value	0.333

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1.2
Mean	0.0433
Median	0.000001
SD	0.212
k star	0.109
Theta star	0.399
Nu star	6.947
AppChi2	2.142
95% Gamma Approximate UCL (Use when n >= 40)	0.141
95% Adjusted Gamma UCL (Use when n < 40)	0.15

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0496
SD	0.208
SE of Mean	0.0397
95% KM (t) UCL	0.117
95% KM (z) UCL	0.115
95% KM (jackknife) UCL	0.113
95% KM (bootstrap t) UCL	2.739
95% KM (BCA) UCL	0.125
95% KM (Percentile Bootstrap) UCL	0.124
95% KM (Chebyshev) UCL	0.223
97.5% KM (Chebyshev) UCL	0.298
99% KM (Chebyshev) UCL	0.445

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.298

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Ethyl benzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	12
		Percent Non-Detects	92.31%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl benzene OV was not processed!

Heptachlor PESTP

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	31	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	29
		Percent Non-Detects	93.55%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00031	Minimum Detected	-8.079
Maximum Detected	1.7	Maximum Detected	0.531
Mean of Detected	0.85	Mean of Detected	-3.774
SD of Detected	1.202	SD of Detected	6.088
Minimum Non-Detect	0.0001386	Minimum Non-Detect	-8.884
Maximum Non-Detect	0.52	Maximum Non-Detect	-0.654

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	30
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.77%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0735	Mean	-5.67
SD	0.306	SD	2.207

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% DL/2 (t) UCL	0.167	95% H-Stat (DL/2) UCL	0.208
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0551
5% K-S Critical Value	N/A	SD	0.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0763
		95% KM (t) UCL	0.185
Assuming Gamma Distribution		95% KM (z) UCL	0.181
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.169
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.7
Median	N/A	95% KM (Chebyshev) UCL	0.388
SD	N/A	97.5% KM (Chebyshev) UCL	0.531
k star	N/A	99% KM (Chebyshev) UCL	0.814
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	99% KM (Chebyshev) UCL	0.814
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Indeno(1,2,3-cd)pyrene OS

General Statistics

Number of Valid Data	33	Number of Detected Data	26
Number of Distinct Detected Data	24	Number of Non-Detect Data	7
		Percent Non-Detects	21.21%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.16	Minimum Detected	-1.833
Maximum Detected	5.3	Maximum Detected	1.668
Mean of Detected	1.132	Mean of Detected	-0.279
SD of Detected	1.208	SD of Detected	0.893
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	35	Maximum Non-Detect	3.555

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	33
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.706	Shapiro Wilk Test Statistic	0.969
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.568	Mean	-0.251
SD	3.076	SD	1.051
95% DL/2 (t) UCL	2.475	95% H-Stat (DL/2) UCL	2.153
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.391
		SD in Log Scale	0.836
		Mean in Original Scale	0.992
		SD in Original Scale	1.105
		95% t UCL	1.318
		95% Percentile Bootstrap UCL	1.329
		95% BCA Bootstrap UCL	1.447
		95% H-UCL	1.339

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.251
Theta Star	0.905
nu star	65.05
A-D Test Statistic	0.665
5% A-D Critical Value	0.764
K-S Test Statistic	0.764
5% K-S Critical Value	0.175

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	5.3
Mean	1.016
Median	0.81
SD	1.106
k star	0.743
Theta star	1.368
Nu star	49.01
AppChi2	33.94
95% Gamma Approximate UCL (Use when n >= 40)	1.467
95% Adjusted Gamma UCL (Use when n < 40)	1.496

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.013
SD	1.114
SE of Mean	0.203
95% KM (t) UCL	1.358
95% KM (z) UCL	1.348
95% KM (jackknife) UCL	1.357
95% KM (bootstrap t) UCL	1.693
95% KM (BCA) UCL	1.368
95% KM (Percentile Bootstrap) UCL	1.388
95% KM (Chebyshev) UCL	1.9
97.5% KM (Chebyshev) UCL	2.284
99% KM (Chebyshev) UCL	3.038

Potential UCLs to Use

95% KM (BCA) UCL	1.368

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Lead M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	28

Raw Statistics

Minimum	2.8
Maximum	1110
Mean	308
Geometric Mean	143
Median	201.5

Log-transformed Statistics

Minimum of Log Data	1.03
Maximum of Log Data	7.012
Mean of log Data	4.963
SD of log Data	1.6

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD	312
Std. Error of Mean	58.96
Coefficient of Variation	1.013
Skewness	1.14

Relevant UCL Statistics

Normal Distribution Test	
Shapiro Wilk Test Statistic	0.847
Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
95% Student's-t UCL	408.4
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL (Chen-1995)	418.6
95% Modified-t UCL (Johnson-1978)	410.5

Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.891
Shapiro Wilk Critical Value	0.924
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
95% H-UCL	1410
95% Chebyshev (MVUE) UCL	1253
97.5% Chebyshev (MVUE) UCL	1592
99% Chebyshev (MVUE) UCL	2258

Gamma Distribution Test	
k star (bias corrected)	0.717
Theta Star	429.5
MLE of Mean	308
MLE of Standard Deviation	363.7
nu star	40.16
Approximate Chi Square Value (.05)	26.64
Adjusted Level of Significance	0.0404
Adjusted Chi Square Value	25.96
Anderson-Darling Test Statistic	0.303
Anderson-Darling 5% Critical Value	0.784
Kolmogorov-Smirnov Test Statistic	0.114
Kolmogorov-Smirnov 5% Critical Value	0.172
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL (Use when n >= 40)	464.3
95% Adjusted Gamma UCL (Use when n < 40)	476.5

Data Distribution	
Data appear Gamma Distributed at 5% Significance Level	
Nonparametric Statistics	
95% CLT UCL	405
95% Jackknife UCL	408.4
95% Standard Bootstrap UCL	404.1
95% Bootstrap-t UCL	426.2
95% Hall's Bootstrap UCL	419.9
95% Percentile Bootstrap UCL	410.1
95% BCA Bootstrap UCL	410.9
95% Chebyshev(Mean, Sd) UCL	565
97.5% Chebyshev(Mean, Sd) UCL	676.2
99% Chebyshev(Mean, Sd) UCL	894.7

Potential UCL to Use	
Use 95% Approximate Gamma UCL	464.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

m&p-Xylene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	11
		Percent Non-Detects	84.62%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.019	Minimum Detected	-3.963
Maximum Detected	110	Maximum Detected	4.7
Mean of Detected	55.01	Mean of Detected	0.369
SD of Detected	77.77	SD of Detected	6.126
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.021	Maximum Non-Detect	-3.863

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.31%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution | **Assuming Lognormal Distribution**

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

DL/2 Substitution Method	
Mean	8.467
SD	30.51
95% DL/2 (t) UCL	23.55

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

DL/2 Substitution Method	
Mean	-4.673
SD	2.89
95% H-Stat (DL/2) UCL	163.6

Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	8.479
SD	29.31
SE of Mean	11.49
95% KM (t) UCL	28.97
95% KM (z) UCL	27.39
95% KM (jackknife) UCL	83.21
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	110
95% KM (Chebyshev) UCL	58.58
97.5% KM (Chebyshev) UCL	80.27
99% KM (Chebyshev) UCL	122.9

Potential UCLs to Use

99% KM (Chebyshev) UCL	122.9

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Manganese M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	28

Raw Statistics		**Log-transformed Statistics**	
Minimum	39.1	Minimum of Log Data	3.666
Maximum	1700	Maximum of Log Data	7.438
Mean	347.9	Mean of log Data	5.527
Geometric Mean	251.3	SD of log Data	0.812
Median	246		
SD	349.7		
Std. Error of Mean	66.08		
Coefficient of Variation	1.005		
Skewness	2.876		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.659	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	460.4	95% H-UCL	495.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	597.8
95% Adjusted-CLT UCL (Chen-1995)	494.9	97.5% Chebyshev (MVUE) UCL	707.6
95% Modified-t UCL (Johnson-1978)	466.4	99% Chebyshev (MVUE) UCL	923.2

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.528	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	227.6		
MLE of Mean	347.9		
MLE of Standard Deviation	281.4		
nu star	85.59		
Approximate Chi Square Value (.05)	65.26	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0404	95% CLT UCL	456.6
Adjusted Chi Square Value	64.17	95% Jackknife UCL	460.4

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

		95% Standard Bootstrap UCL	454.3
Anderson-Darling Test Statistic	0.733	95% Bootstrap-t UCL	595.2
Anderson-Darling 5% Critical Value	0.761	95% Hall's Bootstrap UCL	1069
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	457.6
Kolmogorov-Smirnov 5% Critical Value	0.168	95% BCA Bootstrap UCL	492.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	635.9
		97.5% Chebyshev(Mean, Sd) UCL	760.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1005
95% Approximate Gamma UCL (Use when n >= 40)	456.2		
95% Adjusted Gamma UCL (Use when n < 40)	464		
Potential UCL to Use		Use 95% Approximate Gamma UCL	456.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Mercury M

General Statistics

Number of Valid Data	27	Number of Detected Data	21
Number of Distinct Detected Data	18	Number of Non-Detect Data	6
		Percent Non-Detects	22.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	7.4	Maximum Detected	2.001
Mean of Detected	1.202	Mean of Detected	-0.757
SD of Detected	1.96	SD of Detected	1.397
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.16	Maximum Non-Detect	-1.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	40.74%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.603	Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.944
SD	1.788
95% DL/2 (t) UCL	1.531
Maximum Likelihood Estimate(MLE) Method	
Mean	0.175
SD	2.491
95% MLE (t) UCL	0.992
95% MLE (Tiku) UCL	1.1

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.378
SD	1.742
95% H-Stat (DL/2) UCL	3.952
Log ROS Method	
Mean in Log Scale	-1.383
SD in Log Scale	1.727
Mean in Original Scale	0.942
SD in Original Scale	1.789
95% t UCL	1.529
95% Percentile Bootstrap UCL	1.54
95% BCA Bootstrap UCL	1.754
95% H UCL	3.764

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.588
Theta Star	2.045
nu star	24.7
A-D Test Statistic	0.968
5% A-D Critical Value	0.792
K-S Test Statistic	0.792
5% K-S Critical Value	0.198

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	7.4
Mean	0.935
Median	0.27
SD	1.793
k star	0.206
Theta star	4.535
Nu star	11.14
AppChi2	4.664
95% Gamma Approximate UCL (Use when n >= 40)	2.233
95% Adjusted Gamma UCL (Use when n < 40)	2.368

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.945
SD	1.754
SE of Mean	0.346
95% KM (t) UCL	1.535
95% KM (z) UCL	1.514
95% KM (jackknife) UCL	1.524
95% KM (bootstrap t) UCL	2.317
95% KM (BCA) UCL	1.588
95% KM (Percentile Bootstrap) UCL	1.559
95% KM (Chebyshev) UCL	2.453
97.5% KM (Chebyshev) UCL	3.105
99% KM (Chebyshev) UCL	4.387

Potential UCLs to Use

95% KM (Chebyshev) UCL	2.453

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Naphthalene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	10
		Percent Non-Detects	76.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0033	Minimum Detected	-5.714
Maximum Detected	47	Maximum Detected	3.85
Mean of Detected	15.69	Mean of Detected	-1.527
SD of Detected	27.12	SD of Detected	4.892
Minimum Non-Detect	0.0048	Minimum Non-Detect	-5.339
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.62%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.751	Shapiro Wilk Test Statistic	0.956
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**
DL/2 Substitution Method	DL/2 Substitution Method

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	3.625
SD	13.03
95% DL/2 (t) UCL	10.07
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Mean	-4.505
SD	2.672
95% H-Stat (DL/2) UCL	48.2
Log ROS Method	
Mean in Log Scale	-5.183
SD in Log Scale	2.959
Mean in Original Scale	3.623
SD in Original Scale	13.03
95% t UCL	10.07
95% Percentile Bootstrap UCL	10.85
95% BCA Bootstrap UCL	14.47
95% H-UCL	156.8

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.623
SD	12.52
SE of Mean	4.253
95% KM (t) UCL	11.2
95% KM (z) UCL	10.62
95% KM (jackknife) UCL	10.03
95% KM (bootstrap t) UCL	2877
95% KM (BCA) UCL	47
95% KM (Percentile Bootstrap) UCL	47
95% KM (Chebyshev) UCL	22.16
97.5% KM (Chebyshev) UCL	30.19
99% KM (Chebyshev) UCL	45.94

Potential UCLs to Use

99% KM (Chebyshev) UCL	45.94

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For additional insight, the user may want to consult a statistician.

Sec-butylbenzene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	13
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Sec-butylbenzene OV was not processed!

Tetrachloroethene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	7
		Percent Non-Detects	53.85%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0075	Minimum Detected	-4.893
Maximum Detected	820	Maximum Detected	6.709
Mean of Detected	136.7	Mean of Detected	-1.761
SD of Detected	334.7	SD of Detected	4.335
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.0097	Maximum Non-Detect	-4.636

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.496
5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	63.1
SD	227.4
95% DL/2 (t) UCL	175.5
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.751
5% Shapiro Wilk Critical Value	0.788
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-3.922
SD	3.497
95% H-Stat (DL/2) UCL	29695
Log ROS Method	
Mean in Log Scale	-7.285
SD in Log Scale	6.113
Mean in Original Scale	63.1
SD in Original Scale	227.4
95% t UCL	175.5
95% Percentile Bootstrap UCL	189.2
95% BCA Bootstrap UCL	252.3
95% H-UCL	3.553E+15

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.171
Theta Star	801.6
nu star	2.047
A-D Test Statistic	1.218
5% A-D Critical Value	0.837
K-S Test Statistic	0.837
5% K-S Critical Value	0.368
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	820
Mean	63.1
Median	0.000001
SD	227.4

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	63.11
SD	218.5
SE of Mean	66.38
95% KM (t) UCL	181.4
95% KM (z) UCL	172.3
95% KM (jackknife) UCL	175.5
95% KM (bootstrap t) UCL	535704
95% KM (BCA) UCL	189.3
95% KM (Percentile Bootstrap) UCL	189.3
95% KM (Chebyshev) UCL	352.5
97.5% KM (Chebyshev) UCL	477.7

US EPA ARCHIVE DOCUMENT

k star	0.104	99% KM (Chebyshev) UCL	723.6
Theta star	607.1		
Nu star	2.702	**Potential UCLs to Use**	
AppChi2	0.29	99% KM (Chebyshev) UCL	723.6
95% Gamma Approximate UCL (Use when n >= 40)	588		
95% Adjusted Gamma UCL (Use when n < 40)	802.7		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Thallium M

General Statistics

Number of Valid Data	28	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	25
		Percent Non-Detects	89.29%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	6.8	Maximum Detected	1.917
Mean of Detected	2.405	Mean of Detected	-0.41
SD of Detected	3.806	SD of Detected	2.015
Minimum Non-Detect	0.36	Minimum Non-Detect	-1.022
Maximum Non-Detect	660	Maximum Non-Detect	6.492

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.752
5% Shapiro Wilk Critical Value	0.767

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	84.65
SD	104.5
95% DL/2 (t) UCL	118.3
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.765
5% Shapiro Wilk Critical Value	0.767

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	2.114
SD	3.075
95% H-Stat (DL/2) UCL	26228
Log ROS Method	
Mean in Log Scale	-1.25
SD in Log Scale	0.703
Mean in Original Scale	0.502
SD in Original Scale	1.238
95% t UCL	0.9
95% Percentile Bootstrap UCL	0.969
95% BCA Bootstrap UCL	1.231
95% H-UCL	0.489

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.678
SD	1.698
SE of Mean	0.556
95% KM (t) UCL	1.625
95% KM (z) UCL	1.593
95% KM (jackknife) UCL	1.496
95% KM (bootstrap t) UCL	72.13
95% KM (BCA) UCL	6.8
95% KM (Percentile Bootstrap) UCL	6.8
95% KM (Chebyshev) UCL	3.101
97.5% KM (Chebyshev) UCL	4.149
99% KM (Chebyshev) UCL	6.208

Potential UCLs to Use

AppChi2	N/A	99% KM (Chebyshev) UCL	6.208
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Trichloroethene OV

General Statistics

Number of Valid Data	13	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	8
		Percent Non-Detects	61.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0027	Minimum Detected	-5.915
Maximum Detected	630	Maximum Detected	6.446
Mean of Detected	126	Mean of Detected	-2.264
SD of Detected	281.7	SD of Detected	4.975
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.0097	Maximum Non-Detect	-4.636

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	76.92%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.552	Shapiro Wilk Test Statistic	0.741
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	48.47
SD	174.7
95% DL/2 (t) UCL	134.8
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-4.426
SD	3.387
95% H-Stat (DL/2) UCL	7542
Log ROS Method	
Mean in Log Scale	-5.726
SD in Log Scale	4.098
Mean in Original Scale	48.47
SD in Original Scale	174.7
95% t UCL	134.8
95% Percentile Bootstrap UCL	145.4
95% BCA Bootstrap UCL	193.9
95% H-UCL	929663

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.178
Theta Star	706.4
nu star	1.784
A-D Test Statistic	1.019
5% A-D Critical Value	0.82
K-S Test Statistic	0.82
5% K-S Critical Value	0.397
Data not Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	630
Mean	48.47
Median	0.000001
SD	174.7
k star	0.101
Theta star	480.6
Nu star	2.622
AppChi2	0.27
95% Gamma Approximate UCL (Use when n >= 40)	470.9
95% Adjusted Gamma UCL (Use when n < 40)	641.8

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	48.47
SD	167.9
SE of Mean	52.06
95% KM (t) UCL	141.2
95% KM (z) UCL	134.1
95% KM (jackknife) UCL	134.8
95% KM (bootstrap t) UCL	1029312
95% KM (BCA) UCL	193.9
95% KM (Percentile Bootstrap) UCL	145.4
95% KM (Chebyshev) UCL	275.4
97.5% KM (Chebyshev) UCL	373.6
99% KM (Chebyshev) UCL	566.4
Potential UCLs to Use	
99% KM (Chebyshev) UCL	566.4

Note: DL/2 is not a recommended method.

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Vanadium M

General Statistics

Number of Valid Data	28	Number of Detected Data	27
Number of Distinct Detected Data	26	Number of Non-Detect Data	1
		Percent Non-Detects	3.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	5.1	Minimum Detected	1.629
Maximum Detected	83.8	Maximum Detected	4.428
Mean of Detected	33.53	Mean of Detected	3.283
SD of Detected	22.23	SD of Detected	0.716
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	2.5	Maximum Non-Detect	0.916

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.949
5% Shapiro Wilk Critical Value	0.923	5% Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	32.38	Mean	3.174
SD	22.65	SD	0.91
95% DL/2 (t) UCL	39.67	95% H-Stat (DL/2) UCL	54.56
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	32.04	Mean in Log Scale	3.22
SD	22.85	SD in Log Scale	0.779
95% MLE (t) UCL	39.39	Mean in Original Scale	32.49
95% MLE (Tiku) UCL	39.22	SD in Original Scale	22.49
		95% t UCL	39.73
		95% Percentile Bootstrap UCL	39.58
		95% BCA Bootstrap UCL	40.03
		95% H UCL	47.12

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	2.097
Theta Star	15.99
nu star	113.2
A-D Test Statistic	0.714
5% A-D Critical Value	0.755
K-S Test Statistic	0.755
5% K-S Critical Value	0.17

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	83.8
Mean	32.33
Median	23.45
SD	22.72
k star	0.689
Theta star	46.9
Nu star	38.6
AppChi2	25.37
95% Gamma Approximate UCL (Use when n >= 40)	49.19
95% Adjusted Gamma UCL (Use when n < 40)	50.51

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	32.51
SD	22.06
SE of Mean	4.249
95% KM (t) UCL	39.75
95% KM (z) UCL	39.5
95% KM (jackknife) UCL	39.64
95% KM (bootstrap t) UCL	40.49
95% KM (BCA) UCL	40.05
95% KM (Percentile Bootstrap) UCL	39.36
95% KM (Chebyshev) UCL	51.04
97.5% KM (Chebyshev) UCL	59.05
99% KM (Chebyshev) UCL	74.79

Potential UCLs to Use

95% KM (BCA) UCL	40.05

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Vinyl Chloride OV

General Statistics

Number of Valid Data	13	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	13
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

The data set for variable Vinyl Chloride OV was not processed!

Xylene, o OV

General Statistics

Number of Valid Data	13	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	12
		Percent Non-Detects	92.31%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Xylene, o OV was not processed!

Xylenes, Total OV

General Statistics

Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.019	Minimum Detected	-3.963
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	80.01	Mean of Detected	0.556
SD of Detected	113.1	SD of Detected	6.391
Minimum Non-Detect	0.0043	Minimum Non-Detect	-5.449
Maximum Non-Detect	0.021	Maximum Non-Detect	-3.863

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates.

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

US EPA ARCHIVE DOCUMENT

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	13.34
SD	46.19
95% DL/2 (t) UCL	37.28
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-4.549
SD	3.103
95% H-Stat (DL/2) UCL	1359
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	13.35
SD	44.22
SE of Mean	18.05

		95% KM (t) UCL	45.77
Assuming Gamma Distribution		95% KM (z) UCL	43.04
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	122.8
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	160
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	92.03
SD	N/A	97.5% KM (Chebyshev) UCL	126.1
k star	N/A	99% KM (Chebyshev) UCL	193
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	99% KM (Chebyshev) UCL	193
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Zinc M

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	28

Raw Statistics		**Log-transformed Statistics**	
Minimum	39.1	Minimum of Log Data	3.666
Maximum	828	Maximum of Log Data	6.719
Mean	278.4	Mean of log Data	5.206
Geometric Mean	182.4	SD of log Data	0.994
Median	208		
SD	239.3		
Std. Error of Mean	45.23		
Coefficient of Variation	0.86		
Skewness	0.891		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.865	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924

Table B-1
ProUCL Output - Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	355.4

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	360.9
95% Modified-t UCL (Johnson-1978)	356.7

Gamma Distribution Test

k star (bias corrected)	1.207
Theta Star	230.7
MLE of Mean	278.4
MLE of Standard Deviation	253.4
nu star	67.57
Approximate Chi Square Value (.05)	49.65
Adjusted Level of Significance	0.0404
Adjusted Chi Square Value	48.7
Anderson-Darling Test Statistic	0.614
Anderson-Darling 5% Critical Value	0.767
Kolmogorov-Smirnov Test Statistic	0.137
Kolmogorov-Smirnov 5% Critical Value	0.169

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	378.9
95% Adjusted Gamma UCL (Use when n < 40)	386.3

Potential UCL to Use

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	477.3
95% Chebyshev (MVUE) UCL	564.1
97.5% Chebyshev (MVUE) UCL	682
99% Chebyshev (MVUE) UCL	913.8

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	352.8
95% Jackknife UCL	355.4
95% Standard Bootstrap UCL	351.6
95% Bootstrap-t UCL	360.7
95% Hall's Bootstrap UCL	358.3
95% Percentile Bootstrap UCL	353.2
95% BCA Bootstrap UCL	360.6
95% Chebyshev(Mean, Sd) UCL	475.6
97.5% Chebyshev(Mean, Sd) UCL	560.9
99% Chebyshev(Mean, Sd) UCL	728.4

Use 95% Approximate Gamma UCL 378.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	1-5_NoSpaces.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2,3-trichlorobenzene OV

General Statistics

Number of Valid Data	30	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	26
		Percent Non-Detects	86.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0028	Minimum Detected	-5.878
Maximum Detected	83	Maximum Detected	4.419
Mean of Detected	24.76	Mean of Detected	-0.406
SD of Detected	39.55	SD of Detected	4.821
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	29
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.67%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.76	Shapiro Wilk Test Statistic	0.925
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.833	Mean	-3.592

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD	15.3
95% DL/2 (t) UCL	8.58
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

SD	3.229
95% H-Stat (DL/2) UCL	181
Log ROS Method	
Mean in Log Scale	-5.716
SD in Log Scale	2.705
Mean in Original Scale	3.303
SD in Original Scale	15.33
95% t UCL	8.06
95% Percentile Bootstrap UCL	8.835
95% BCA Bootstrap UCL	11.61
95% H-UCL	1.646

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.217
Theta Star	113.9
nu star	1.739
A-D Test Statistic	0.31
5% A-D Critical Value	0.732
K-S Test Statistic	0.732
5% K-S Critical Value	0.424

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	83
Mean	3.302
Median	0.000001
SD	15.33
k star	0.0803
Theta star	41.1
Nu star	4.82
AppChi2	1.07
95% Gamma Approximate UCL (Use when n >= 40)	14.87
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.324
SD	15.08
SE of Mean	3.181
95% KM (t) UCL	8.73
95% KM (z) UCL	8.557
95% KM (jackknife) UCL	8.046
95% KM (bootstrap t) UCL	18.48
95% KM (BCA) UCL	83
95% KM (Percentile Bootstrap) UCL	22.7
95% KM (Chebyshev) UCL	17.19
97.5% KM (Chebyshev) UCL	23.19
99% KM (Chebyshev) UCL	34.98

Potential UCLs to Use

95% KM (t) UCL	8.73
95% KM (Percentile Bootstrap) UCL	22.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

HCX

General Statistics

Number of Valid Data	32	Number of Detected Data	31
Number of Distinct Detected Data	31	Number of Non-Detect Data	1
		Percent Non-Detects	3.13%

Raw Statistics		Log-transformed Statistics
Minimum Detected	1.25E-06	Log Statistics Not Avaliable
Maximum Detected	0.0559	
Mean of Detected	0.00285	
Mean of Detected	0.00285	
Mean of Detected	0.00285	
Maximum Non-Detect	0	

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only
Shapiro Wilk Test Statistic	0.308	Not Available
5% Shapiro Wilk Critical Value	0.929	
Data not Normal at 5% Significance Level		

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	N/A
Mean	0.00276		
SD	0.00999		
95% DL/2 (t) UCL	0.00576		
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	N/A
Mean	0.00254		
SD	0.01		
95% MLE (t) UCL	0.00554		
95% MLE (Tiku) UCL	0.0052		

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only
Gamma Statistics Not Available	Data appear Lognormal at 5% Significance Level

Potential UCLs to Use		Nonparametric Statistics	
99% KM (Chebyshev) UCL	0.0203	Kaplan-Meier (KM) Method	
		Mean	0.00276
		SD	0.00984
		SE of Mean	0.00177

95% KM (t) UCL	0.00576
95% KM (z) UCL	0.00567
95% KM (jackknife) UCL	0.00576
95% KM (bootstrap t) UCL	0.0185
95% KM (BCA) UCL	0.00649
95% KM (Percentile Bootstrap) UCL	0.00619
95% KM (Chebyshev) UCL	0.0105
97.5% KM (Chebyshev) UCL	0.0138
99% KM (Chebyshev) UCL	0.0203

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2,4-trimethylbenzene OV

General Statistics

Number of Valid Data	30	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	18
		Percent Non-Detects	60.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0024	Minimum Detected	-6.032
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	21.49	Mean of Detected	-0.993
SD of Detected	51.09	SD of Detected	3.34
Minimum Non-Detect	0.0045	Minimum Non-Detect	-5.404
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.33%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.496	Shapiro Wilk Test Statistic	0.938
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**
DL/2 Substitution Method	DL/2 Substitution Method

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	9.014
SD	33.17
95% DL/2 (t) UCL	19.3
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Mean	-3.071
SD	3.38
95% H-Stat (DL/2) UCL	700
Log ROS Method	
Mean in Log Scale	-4.643
SD in Log Scale	3.736
Mean in Original Scale	8.598
SD in Original Scale	33.24
95% t UCL	18.91
95% Percentile Bootstrap UCL	19.34
95% BCA Bootstrap UCL	23.14
95% H-UCL	1184

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.193
Theta Star	111.2
nu star	4.639
A-D Test Statistic	1.282
5% A-D Critical Value	0.871
K-S Test Statistic	0.871
5% K-S Critical Value	0.272

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	160
Mean	8.597
Median	0.000001
SD	33.24
k star	0.0918
Theta star	93.69
Nu star	5.506
AppChi2	1.393
95% Gamma Approximate UCL (Use when n >= 40)	33.99
95% Adjusted Gamma UCL (Use when n < 40)	37.03

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	8.614
SD	32.68
SE of Mean	6.231
95% KM (t) UCL	19.2
95% KM (z) UCL	18.86
95% KM (jackknife) UCL	18.92
95% KM (bootstrap t) UCL	594.5
95% KM (BCA) UCL	21.41
95% KM (Percentile Bootstrap) UCL	19.33
95% KM (Chebyshev) UCL	35.77
97.5% KM (Chebyshev) UCL	47.53
99% KM (Chebyshev) UCL	70.61

Potential UCLs to Use

99% KM (Chebyshev) UCL	70.61

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

1,2-dichlorobenzene OS

General Statistics

Number of Valid Data	34	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	28
		Percent Non-Detects	82.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.057	Minimum Detected	-2.865
Maximum Detected	440	Maximum Detected	6.087
Mean of Detected	101.4	Mean of Detected	1.317
SD of Detected	175.9	SD of Detected	3.836
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	32
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.12%

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.689	Shapiro Wilk Test Statistic	0.881
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.37	Mean	-0.603
SD	78.83	SD	2.042
95% DL/2 (t) UCL	42.25	95% H-Stat (DL/2) UCL	17.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.225
		SD in Log Scale	2.079

Mean in Original Scale	18.1
SD in Original Scale	78.87
95% t UCL	40.99
95% Percentile Bootstrap UCL	43.48
95% BCA Bootstrap UCL	64.87
95% H-UCL	10.81

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.221
Theta Star	459
nu star	2.651
A-D Test Statistic	0.433
5% A-D Critical Value	0.795
K-S Test Statistic	0.795
5% K-S Critical Value	0.362

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	440
Mean	18.48
Median	0.000001
SD	78.86
k star	0.0771
Theta star	239.7
Nu star	5.244
AppChi2	1.267
95% Gamma Approximate UCL (Use when n >= 40)	76.53
95% Adjusted Gamma UCL (Use when n < 40)	82.57

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	18.04
SD	77.72
SE of Mean	14.6
95% KM (t) UCL	42.75
95% KM (z) UCL	42.06
95% KM (jackknife) UCL	40.94
95% KM (bootstrap t) UCL	329.6
95% KM (BCA) UCL	51.89
95% KM (Percentile Bootstrap) UCL	47.86
95% KM (Chebyshev) UCL	81.69
97.5% KM (Chebyshev) UCL	109.2
99% KM (Chebyshev) UCL	163.3

Potential UCLs to Use

95% KM (t) UCL	42.75

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

1,2-dichlorobenzene OV

General Statistics

Number of Valid Data	55	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	37

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Percent Non-Detects	67.27%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0021	Minimum Detected	-6.166
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	164.5	Mean of Detected	-0.737
SD of Detected	658.1	SD of Detected	3.807
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	52
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	94.55%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.271	Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	53.97	Mean	-2.455
SD	377.4	SD	2.993
95% DL/2 (t) UCL	139.1	95% H-Stat (DL/2) UCL	64.64
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.684
		SD in Log Scale	3.682
		Mean in Original Scale	53.83
		SD in Original Scale	377.4
		95% t UCL	139
		95% Percentile Bootstrap UCL	155.5
		95% BCA Bootstrap UCL	255.8
		95% H-UCL	189.9

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.149	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1107		
nu star	5.347		
A-D Test Statistic	2.136	**Nonparametric Statistics**	
5% A-D Critical Value	0.91	Kaplan-Meier (KM) Method	

K-S Test Statistic	0.91	Mean	53.85
5% K-S Critical Value	0.228	SD	374
Data not Gamma Distributed at 5% Significance Level		SE of Mean	51.89
		95% KM (t) UCL	140.7
Assuming Gamma Distribution		95% KM (z) UCL	139.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	139
Minimum	0.000001	95% KM (bootstrap t) UCL	13241
Maximum	2800	95% KM (BCA) UCL	156.8
Mean	53.83	95% KM (Percentile Bootstrap) UCL	155.6
Median	0.000001	95% KM (Chebyshev) UCL	280
SD	377.4	97.5% KM (Chebyshev) UCL	377.9
k star	0.0719	99% KM (Chebyshev) UCL	570.1
Theta star	748.2		
Nu star	7.914	**Potential UCLs to Use**	
AppChi2	2.685	99% KM (Chebyshev) UCL	570.1
95% Gamma Approximate UCL (Use when n >= 40)	158.6		
95% Adjusted Gamma UCL (Use when n < 40)	163.6		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,3-dichlorobenzene OS

General Statistics

Number of Valid Data	34	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	34
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,3-dichlorobenzene OS was not processed!

1,3-dichlorobenzene OV

General Statistics

Number of Valid Data	54	Number of Detected Data	5

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Number of Distinct Detected Data	5	Number of Non-Detect Data	49
		Percent Non-Detects	90.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0013	Minimum Detected	-6.645
Maximum Detected	13	Maximum Detected	2.565
Mean of Detected	2.68	Mean of Detected	-3.267
SD of Detected	5.772	SD of Detected	3.945
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.572	Shapiro Wilk Test Statistic	0.848
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.811	Mean	-2.864
SD	9.014	SD	2.532
95% DL/2 (t) UCL	3.864	95% H-Stat (DL/2) UCL	6.743
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.526
		SD in Log Scale	1.555
		Mean in Original Scale	0.252
		SD in Original Scale	1.768
		95% t UCL	0.655
		95% Percentile Bootstrap UCL	0.733
		95% BCA Bootstrap UCL	0.982
		95% H-UCL	0.0256

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.204
Theta Star	13.14
nu star	2.039
A-D Test Statistic	0.627
5% A-D Critical Value	0.787
K-S Test Statistic	0.787
5% K-S Critical Value	0.391

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	13
Mean	0.323
Median	0.000001
SD	1.778
k star	0.0905
Theta star	3.573
Nu star	9.774
AppChi2	3.801
95% Gamma Approximate UCL (Use when n >= 40)	0.831
95% Adjusted Gamma UCL (Use when n < 40)	0.854

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.262
SD	1.785
SE of Mean	0.277
95% KM (t) UCL	0.725
95% KM (z) UCL	0.717
95% KM (jackknife) UCL	0.68
95% KM (bootstrap t) UCL	131.9
95% KM (BCA) UCL	1.01
95% KM (Percentile Bootstrap) UCL	0.776
95% KM (Chebyshev) UCL	1.468
97.5% KM (Chebyshev) UCL	1.99
99% KM (Chebyshev) UCL	3.015

Potential UCLs to Use

95% KM (t) UCL	0.725

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,4-dichlorobenzene OS

General Statistics

Number of Valid Data	34	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	31
		Percent Non-Detects	91.18%

Raw Statistics

Minimum Detected	0.14
Maximum Detected	6.6
Mean of Detected	3.247

Log-transformed Statistics

Minimum Detected	-1.966
Maximum Detected	1.887
Mean of Detected	0.34

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD of Detected	3.237	SD of Detected	2.036
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.996	Shapiro Wilk Test Statistic	0.896
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.795	Mean	-0.904
SD	6.366	SD	1.245
95% DL/2 (t) UCL	3.643	95% H-Stat (DL/2) UCL	1.601
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.753
		SD in Log Scale	0.975
		Mean in Original Scale	0.434
		SD in Original Scale	1.196
		95% t UCL	0.782
		95% Percentile Bootstrap UCL	0.804
		95% BCA Bootstrap UCL	1.014
		95% H-UCL	0.42

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**
Theta Star	N/A	
nu star	N/A	

A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.434
5% K-S Critical Value	N/A	SD	1.217
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.264
		95% KM (t) UCL	0.882
Assuming Gamma Distribution		95% KM (z) UCL	0.869
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.262
Minimum	N/A	95% KM (bootstrap t) UCL	0.65
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	6.6
Median	N/A	95% KM (Chebyshev) UCL	1.586
SD	N/A	97.5% KM (Chebyshev) UCL	2.085
k star	N/A	99% KM (Chebyshev) UCL	3.064
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (t) UCL	0.882
95% Gamma Approximate UCL (Use when n >= 40)	N/A	95% KM (Percentile Bootstrap) UCL	6.6
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,4-dichlorobenzene OV

General Statistics

Number of Valid Data	55	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	45
		Percent Non-Detects	81.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0074	Minimum Detected	-4.906
Maximum Detected	40	Maximum Detected	3.689
Mean of Detected	7.321	Mean of Detected	-1.756
SD of Detected	15.23	SD of Detected	3.223
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.36%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.542	Shapiro Wilk Test Statistic	0.855
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.674	Mean	-2.812
SD	6.885	SD	2.469
95% DL/2 (t) UCL	3.228	95% H-Stat (DL/2) UCL	5.707
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-8.018
		SD in Log Scale	3.574
		Mean in Original Scale	1.331
		SD in Original Scale	6.841
		95% t UCL	2.875
		95% Percentile Bootstrap UCL	2.921
		95% BCA Bootstrap UCL	3.827
		95% H-UCL	3.864

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.204	**Data appear Lognormal at 5% Significance Level**	
Theta Star	35.8		
nu star	4.09		
A-D Test Statistic	1.184	**Nonparametric Statistics**	
5% A-D Critical Value	0.855	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.855	Mean	1.344
5% K-S Critical Value	0.294	SD	6.776
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.963
		95% KM (t) UCL	2.956
Assuming Gamma Distribution		95% KM (z) UCL	2.928
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.887
Minimum	0.000001	95% KM (bootstrap t) UCL	93.17
Maximum	40	95% KM (BCA) UCL	3.372
Mean	1.331	95% KM (Percentile Bootstrap) UCL	2.936
Median	0.000001	95% KM (Chebyshev) UCL	5.542
SD	6.841	97.5% KM (Chebyshev) UCL	7.359

k star	0.0792	99% KM (Chebyshev) UCL	10.93
Theta star	16.8		
Nu star	8.715	**Potential UCLs to Use**	
AppChi2	3.156	99% KM (Chebyshev) UCL	10.93
95% Gamma Approximate UCL (Use when n >= 40)	3.676		
95% Adjusted Gamma UCL (Use when n < 40)	3.783		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4,4`-DDE PESTP

General Statistics

Number of Valid Data	53	Number of Detected Data	31
Number of Distinct Detected Data	30	Number of Non-Detect Data	22
		Percent Non-Detects	41.51%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00077	Minimum Detected	-7.169
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.208	Mean of Detected	-3.777
SD of Detected	0.474	SD of Detected	2.255
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.508	Shapiro Wilk Test Statistic	0.95
5% Shapiro Wilk Critical Value	0.929	5% Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.193	Mean	-3.885
SD	0.446	SD	2.328
95% DL/2 (t) UCL	0.296	95% H-Stat (DL/2) UCL	1.163

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	-4.651
SD in Log Scale	2.106
Mean in Original Scale	0.123
SD in Original Scale	0.374
95% t UCL	0.209
95% Percentile Bootstrap UCL	0.218
95% BCA Bootstrap UCL	0.244
95% H-UCL	0.263

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.302
Theta Star	0.688
nu star	18.74
A-D Test Statistic	1.877
5% A-D Critical Value	0.852
K-S Test Statistic	0.852
5% K-S Critical Value	0.171

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.2
Mean	0.124
Median	0.0024
SD	0.374
k star	0.147
Theta star	0.842
Nu star	15.56
AppChi2	7.655
95% Gamma Approximate UCL (Use when n >= 40)	0.251
95% Adjusted Gamma UCL (Use when n < 40)	0.256

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.13
SD	0.373
SE of Mean	0.0528
95% KM (t) UCL	0.218
95% KM (z) UCL	0.216
95% KM (jackknife) UCL	0.217
95% KM (bootstrap t) UCL	0.3
95% KM (BCA) UCL	0.231
95% KM (Percentile Bootstrap) UCL	0.225
95% KM (Chebyshev) UCL	0.36
97.5% KM (Chebyshev) UCL	0.459
99% KM (Chebyshev) UCL	0.655

Potential UCLs to Use

99% KM (Chebyshev) UCL	0.655

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4-chloroaniline OS

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	56	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	52
		Percent Non-Detects	92.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.059	Minimum Detected	-2.83
Maximum Detected	6.1	Maximum Detected	1.808
Mean of Detected	1.825	Mean of Detected	-0.557
SD of Detected	2.863	SD of Detected	1.909
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.719	Shapiro Wilk Test Statistic	0.987
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.531	Mean	-1.009
SD	5.446	SD	1.183
95% DL/2 (t) UCL	2.749	95% H-Stat (DL/2) UCL	1.114
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.874
		SD in Log Scale	1.037
		Mean in Original Scale	0.185
		SD in Original Scale	0.812
		95% t UCL	0.367

95% Percentile Bootstrap UCL	0.403
95% BCA Bootstrap UCL	0.602
95% H-UCL	0.135

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.302
Theta Star	6.041
nu star	2.417
A-D Test Statistic	0.321
5% A-D Critical Value	0.679
K-S Test Statistic	0.679
5% K-S Critical Value	0.409

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	6.1
Mean	0.199
Median	0.000001
SD	0.832
k star	0.101
Theta star	1.975
Nu star	11.31
AppChi2	4.776
95% Gamma Approximate UCL (Use when n >= 40)	0.472
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.206
SD	0.834
SE of Mean	0.134
95% KM (t) UCL	0.431
95% KM (z) UCL	0.428
95% KM (jackknife) UCL	0.459
95% KM (bootstrap t) UCL	0.811
95% KM (BCA) UCL	6.1
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.793
97.5% KM (Chebyshev) UCL	1.046
99% KM (Chebyshev) UCL	1.544

Potential UCLs to Use

95% KM (t) UCL	0.431

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4-iso-Propyltoluene OV

General Statistics

Number of Valid Data	30	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	27
		Percent Non-Detects	90.00%

Raw Statistics **Log-transformed Statistics**

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Detected	0.034	Minimum Detected	-3.381
Maximum Detected	0.18	Maximum Detected	-1.715
Mean of Detected	0.111	Mean of Detected	-2.405
SD of Detected	0.0734	SD of Detected	0.869
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	30
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.99	Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.17	Mean	-3.487
SD	12.05	SD	3.183
95% DL/2 (t) UCL	6.907	95% H-Stat (DL/2) UCL	157.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.543
		SD in Log Scale	1.527
		Mean in Original Scale	0.0121
		SD in Original Scale	0.0388
		95% t UCL	0.0241
		95% Percentile Bootstrap UCL	0.025
		95% BCA Bootstrap UCL	0.031
		95% H-UCL	0.0115

Gamma Distribution Test with Detected Values Only | **Data Distribution Test with Detected Values Only**

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.045
SD	0.0353
SE of Mean	0.00943
95% KM (t) UCL	0.0611
95% KM (z) UCL	0.0606
95% KM (jackknife) UCL	0.099
95% KM (bootstrap t) UCL	0.0531
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	0.18
95% KM (Chebyshev) UCL	0.0862
97.5% KM (Chebyshev) UCL	0.104
99% KM (Chebyshev) UCL	0.139

Potential UCLs to Use

95% KM (t) UCL	0.0611
95% KM (Percentile Bootstrap) UCL	0.18

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aldrin PESTP

General Statistics

Number of Valid Data	55	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	46
		Percent Non-Detects	83.64%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0012	Minimum Detected	-6.725
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.32	Mean of Detected	-3.777
SD of Detected	0.488	SD of Detected	2.894
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Non-Detect	2	Maximum Non-Detect	0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	55
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.696	Shapiro Wilk Test Statistic	0.823
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.112	Mean	-4.885
SD	0.282	SD	2.329
95% DL/2 (t) UCL	0.176	95% H-Stat (DL/2) UCL	0.434
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.655
		SD in Log Scale	1.963
		Mean in Original Scale	0.0534
		SD in Original Scale	0.222
		95% t UCL	0.104
		95% Percentile Bootstrap UCL	0.109
		95% BCA Bootstrap UCL	0.127
		95% H-UCL	0.0234
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.252	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.272		
nu star	4.531		
A-D Test Statistic	0.994	**Nonparametric Statistics**	
5% A-D Critical Value	0.82	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.82	Mean	0.0557

5% K-S Critical Value	0.303

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.000001
Maximum	1.2
Mean	0.0538
Median	0.000001
SD	0.223
k star	0.0993
Theta star	0.541
Nu star	10.93
AppChi2	4.529
95% Gamma Approximate UCL (Use when n >= 40)	0.13
95% Adjusted Gamma UCL (Use when n < 40)	0.133

SD	0.224
SE of Mean	0.0327
95% KM (t) UCL	0.11
95% KM (z) UCL	0.109
95% KM (jackknife) UCL	0.108
95% KM (bootstrap t) UCL	0.151
95% KM (BCA) UCL	0.116
95% KM (Percentile Bootstrap) UCL	0.112
95% KM (Chebyshev) UCL	0.198
97.5% KM (Chebyshev) UCL	0.26
99% KM (Chebyshev) UCL	0.381

Potential UCLs to Use

99% KM (Chebyshev) UCL	0.381

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aluminum M

General Statistics

Number of Valid Observations	55
Number of Distinct Observations	52

Raw Statistics

Minimum	1770
Maximum	11400
Mean	5534
Geometric Mean	5080
Median	5280
SD	2253
Std. Error of Mean	303.8
Coefficient of Variation	0.407
Skewness	0.64

Log-transformed Statistics

Minimum of Log Data	7.479
Maximum of Log Data	9.341
Mean of log Data	8.533
SD of log Data	0.43

Relevant UCL Statistics

Normal Distribution Test

Lilliefors Test Statistic	0.0892
Lilliefors Critical Value	0.119

Lognormal Distribution Test

Lilliefors Test Statistic	0.0877
Lilliefors Critical Value	0.119

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	6043

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	6062
95% Modified-t UCL (Johnson-1978)	6047

Gamma Distribution Test

k star (bias corrected)	5.687
Theta Star	973
MLE of Mean	5534
MLE of Standard Deviation	2321
nu star	625.6
Approximate Chi Square Value (.05)	568.6
Adjusted Level of Significance	0.0456
Adjusted Chi Square Value	567.1
Anderson-Darling Test Statistic	0.207
Anderson-Darling 5% Critical Value	0.753
Kolmogorov-Smirnov Test Statistic	0.0599
Kolmogorov-Smirnov 5% Critical Value	0.12

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	6089
95% Adjusted Gamma UCL (Use when n < 40)	6105

Potential UCL to Use

Use 95% Student's-t UCL	6043

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	6205
95% Chebyshev (MVUE) UCL	7020
97.5% Chebyshev (MVUE) UCL	7651
99% Chebyshev (MVUE) UCL	8891

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	6034
95% Jackknife UCL	6043
95% Standard Bootstrap UCL	6033
95% Bootstrap-t UCL	6087
95% Hall's Bootstrap UCL	6082
95% Percentile Bootstrap UCL	6036
95% BCA Bootstrap UCL	6068
95% Chebyshev(Mean, Sd) UCL	6859
97.5% Chebyshev(Mean, Sd) UCL	7432
99% Chebyshev(Mean, Sd) UCL	8557

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Antimony M

General Statistics

Number of Valid Data	54	Number of Detected Data	28
Number of Distinct Detected Data	26	Number of Non-Detect Data	26
		Percent Non-Detects	48.15%

Raw Statistics **Log-transformed Statistics**

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Detected	0.28	Minimum Detected	-1.273
Maximum Detected	21.4	Maximum Detected	3.063
Mean of Detected	4.715	Mean of Detected	0.591
SD of Detected	6.64	SD of Detected	1.43
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	9.4	Maximum Non-Detect	2.241

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.74%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.682	Shapiro Wilk Test Statistic	0.908
5% Shapiro Wilk Critical Value	0.924	5% Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.568	Mean	0.527
SD	4.986	SD	1.276
95% DL/2 (t) UCL	4.704	95% H-Stat (DL/2) UCL	6.14
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.0702
		SD in Log Scale	1.199
		Mean in Original Scale	2.766
		SD in Original Scale	5.163
		95% t UCL	3.942
		95% Percentile Bootstrap UCL	3.994
		95% BCA Bootstrap UCL	4.157
		95% H-UCL	3.373

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.594	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	7.942		
nu star	33.25		
A-D Test Statistic	1.484	**Nonparametric Statistics**	
5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.796	Mean	2.877
5% K-S Critical Value	0.173	SD	5.136
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.724

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% KM (t) UCL	4.088
95% KM (z) UCL	4.067
95% KM (jackknife) UCL	4.079
95% KM (bootstrap t) UCL	4.521
95% KM (BCA) UCL	4.052
95% KM (Percentile Bootstrap) UCL	4.157
95% KM (Chebyshev) UCL	6.031
97.5% KM (Chebyshev) UCL	7.395
99% KM (Chebyshev) UCL	10.08

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	21.4
Mean	2.62
Median	0.644
SD	5.237
k star	0.217
Theta star	12.08
Nu star	23.42
AppChi2	13.41
95% Gamma Approximate UCL (Use when n >= 40)	4.576
95% Adjusted Gamma UCL (Use when n < 40)	4.648

Potential UCLs to Use

95% KM (Chebyshev) UCL	6.031

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1232 PESTP

General Statistics

Number of Valid Data	188	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	184
		Percent Non-Detects	97.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	35	Maximum Detected	3.555
Mean of Detected	10.33	Mean of Detected	1.334
SD of Detected	16.49	SD of Detected	1.572
Minimum Non-Detect	0.034	Minimum Non-Detect	-3.381
Maximum Non-Detect	490	Maximum Non-Detect	6.194

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.685
5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	4.358
SD	21.41
95% DL/2 (t) UCL	6.939
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.842
5% Shapiro Wilk Critical Value	0.748
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.574
SD	2.148
95% H-Stat (DL/2) UCL	3.545
Log ROS Method	
Mean in Log Scale	-9.516
SD in Log Scale	2.815
Mean in Original Scale	0.22
SD in Original Scale	2.568
95% t UCL	0.53
95% Percentile Bootstrap UCL	0.586
95% BCA Bootstrap UCL	0.839
95% H-UCL	0.00922

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.32
Theta Star	32.22
nu star	2.564
A-D Test Statistic	0.572
5% A-D Critical Value	0.676
K-S Test Statistic	0.676
5% K-S Critical Value	0.408
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	35
Mean	0.22
Median	0.000001

Data Distribution Test with Detected Values Only	
Data appear Gamma Distributed at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	1.406
SD	2.533
SE of Mean	0.219
95% KM (t) UCL	1.769
95% KM (z) UCL	1.767
95% KM (jackknife) UCL	1.664
95% KM (bootstrap t) UCL	3.799
95% KM (BCA) UCL	35
95% KM (Percentile Bootstrap) UCL	4.323
95% KM (Chebyshev) UCL	2.362

US EPA ARCHIVE DOCUMENT

SD	2.568	97.5% KM (Chebyshev) UCL	2.776
k star	0.073	99% KM (Chebyshev) UCL	3.588
Theta star	3.008		
Nu star	27.46	**Potential UCLs to Use**	
AppChi2	16.51	95% KM (t) UCL	1.769
95% Gamma Approximate UCL (Use when n >= 40)	0.365		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1242 PESTP

General Statistics

Number of Valid Data	188	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	179
		Percent Non-Detects	95.21%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	24.12	Mean of Detected	1.27
SD of Detected	51.7	SD of Detected	2.28
Minimum Non-Detect	0.034	Minimum Non-Detect	-3.381
Maximum Non-Detect	270	Maximum Non-Detect	5.598

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.525	Shapiro Wilk Test Statistic	0.943

5% Shapiro Wilk Critical Value	0.829

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	4.066
SD	18.07
95% DL/2 (t) UCL	6.244
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.308
Theta Star	78.22
nu star	5.55
A-D Test Statistic	0.495
5% A-D Critical Value	0.798
K-S Test Statistic	0.798
5% K-S Critical Value	0.3

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	160
Mean	1.155
Median	0.000001
SD	11.87
k star	0.067
Theta star	17.23
Nu star	25.2
AppChi2	14.77
95% Gamma Approximate UCL (Use when n >= 40)	1.97
95% Adjusted Gamma UCL (Use when n < 40)	1.979

5% Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.584
SD	2.149
95% H-Stat (DL/2) UCL	3.521
Log ROS Method	
Mean in Log Scale	-10.1
SD in Log Scale	3.694
Mean in Original Scale	1.155
SD in Original Scale	11.87
95% t UCL	2.586
95% Percentile Bootstrap UCL	2.77
95% BCA Bootstrap UCL	3.912
95% H-UCL	0.159

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.374
SD	11.89
SE of Mean	0.926
95% KM (t) UCL	2.905
95% KM (z) UCL	2.897
95% KM (jackknife) UCL	2.794
95% KM (bootstrap t) UCL	10.66
95% KM (BCA) UCL	7.057
95% KM (Percentile Bootstrap) UCL	3.246
95% KM (Chebyshev) UCL	5.41
97.5% KM (Chebyshev) UCL	7.156
99% KM (Chebyshev) UCL	10.59

Potential UCLs to Use

95% KM (t) UCL	2.905

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1248 PESTP

General Statistics

Number of Valid Data	188	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	170
		Percent Non-Detects	90.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.057	Minimum Detected	-2.865
Maximum Detected	420	Maximum Detected	6.04
Mean of Detected	28.63	Mean of Detected	0.705
SD of Detected	97.98	SD of Detected	2.328
Minimum Non-Detect	0.034	Minimum Non-Detect	-3.381
Maximum Non-Detect	300	Maximum Non-Detect	5.704

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	187
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.31	Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.85	Mean	-1.363
SD	33.9	SD	2.196
95% DL/2 (t) UCL	9.937	95% H-Stat (DL/2) UCL	4.955
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.448
		SD in Log Scale	3.353
		Mean in Original Scale	2.742
		SD in Original Scale	30.73

95% t UCL	6.447
95% Percentile Bootstrap UCL	7.197
95% BCA Bootstrap UCL	11.4
95% H-UCL	0.534

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.258
Theta Star	110.9
nu star	9.298
A-D Test Statistic	1.556
5% A-D Critical Value	0.857
K-S Test Statistic	0.857
5% K-S Critical Value	0.222

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	420
Mean	2.741
Median	0.000001
SD	30.73
k star	0.0662
Theta star	41.42
Nu star	24.88
AppChi2	14.52
95% Gamma Approximate UCL (Use when n >= 40)	4.697
95% Adjusted Gamma UCL (Use when n < 40)	4.717

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.838
SD	30.64
SE of Mean	2.3
95% KM (t) UCL	6.641
95% KM (z) UCL	6.622
95% KM (jackknife) UCL	6.511
95% KM (bootstrap t) UCL	40.52
95% KM (BCA) UCL	7.473
95% KM (Percentile Bootstrap) UCL	7.204
95% KM (Chebyshev) UCL	12.87
97.5% KM (Chebyshev) UCL	17.2
99% KM (Chebyshev) UCL	25.73

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	17.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1254 PESTP

General Statistics

Number of Valid Data	185	Number of Detected Data	137
Number of Distinct Detected Data	99	Number of Non-Detect Data	48
		Percent Non-Detects	25.95%

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0074	Minimum Detected	-4.906
Maximum Detected	1300	Maximum Detected	7.17
Mean of Detected	35.83	Mean of Detected	0.385
SD of Detected	153.4	SD of Detected	2.44
Minimum Non-Detect	0.035	Minimum Non-Detect	-3.352
Maximum Non-Detect	48	Maximum Non-Detect	3.871

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	174
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.05%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.43	Lilliefors Test Statistic	0.0508
5% Lilliefors Critical Value	0.0757	5% Lilliefors Critical Value	0.0757
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	26.72	Mean	-0.291
SD	132.8	SD	2.51
95% DL/2 (t) UCL	42.87	95% H-Stat (DL/2) UCL	35.41
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.56
		SD in Log Scale	2.7
		Mean in Original Scale	26.55
		SD in Original Scale	132.8
		95% t UCL	42.7
		95% Percentile Bootstrap UCL	44.19
		95% BCA Bootstrap UCL	49.87
		95% H-UCL	49.09

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.226	**Data appear Lognormal at 5% Significance Level**	
Theta Star	158.6		
nu star	61.91		
A-D Test Statistic	12.99	**Nonparametric Statistics**	
5% A-D Critical Value	0.901	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.901	Mean	26.58
5% K-S Critical Value	0.088	SD	132.5

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1300
Mean	26.54
Median	0.44
SD	132.8
k star	0.122
Theta star	217.3
Nu star	45.19
AppChi2	30.77
95% Gamma Approximate UCL (Use when n >= 40)	38.97
95% Adjusted Gamma UCL (Use when n < 40)	39.09

SE of Mean	9.775
95% KM (t) UCL	42.74
95% KM (z) UCL	42.66
95% KM (jackknife) UCL	42.72
95% KM (bootstrap t) UCL	57.1
95% KM (BCA) UCL	45.59
95% KM (Percentile Bootstrap) UCL	43.62
95% KM (Chebyshev) UCL	69.19
97.5% KM (Chebyshev) UCL	87.62
99% KM (Chebyshev) UCL	123.8
Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	87.62

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Arsenic M

General Statistics

Number of Valid Data	56	Number of Detected Data	55
Number of Distinct Detected Data	47	Number of Non-Detect Data	1
		Percent Non-Detects	1.79%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	49.3	Maximum Detected	3.898
Mean of Detected	6.08	Mean of Detected	1.518
SD of Detected	6.708	SD of Detected	0.722
Minimum Non-Detect	1.4	Minimum Non-Detect	0.336
Maximum Non-Detect	1.4	Maximum Non-Detect	0.336

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.229	Lilliefors Test Statistic	0.0884
5% Lilliefors Critical Value	0.119	5% Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	5.984
SD	6.686
95% DL/2 (t) UCL	7.479
Maximum Likelihood Estimate(MLE) Method	
Mean	5.782
SD	6.874
95% MLE (t) UCL	7.319
95% MLE (Tiku) UCL	7.208

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	1.485
SD	0.758
95% H-Stat (DL/2) UCL	7.28
Log ROS Method	
Mean in Log Scale	1.491
SD in Log Scale	0.743
Mean in Original Scale	5.99
SD in Original Scale	6.682
95% t UCL	7.483
95% Percentile Bootstrap UCL	7.704
95% BCA Bootstrap UCL	8.543
95% H UCL	7.206

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.801
Theta Star	3.375
nu star	198.1
A-D Test Statistic	0.823
5% A-D Critical Value	0.764
K-S Test Statistic	0.764
5% K-S Critical Value	0.122

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	49.3
Mean	5.971
Median	5.15
SD	6.697
k star	1.012
Theta star	5.9
Nu star	113.4
AppChi2	89.78
95% Gamma Approximate UCL (Use when n >= 40)	7.54
95% Adjusted Gamma UCL (Use when n < 40)	7.586

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	5.992
SD	6.62
SE of Mean	0.893
95% KM (t) UCL	7.486
95% KM (z) UCL	7.46
95% KM (jackknife) UCL	7.485
95% KM (bootstrap t) UCL	8.814
95% KM (BCA) UCL	7.605
95% KM (Percentile Bootstrap) UCL	7.568
95% KM (Chebyshev) UCL	9.884
97.5% KM (Chebyshev) UCL	11.57
99% KM (Chebyshev) UCL	14.88

Potential UCLs to Use

95% KM (Chebyshev) UCL	9.884

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzene OV

General Statistics

Number of Valid Data	59	Number of Detected Data	16
Number of Distinct Detected Data	16	Number of Non-Detect Data	43
		Percent Non-Detects	72.88%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0017	Minimum Detected	-6.377
Maximum Detected	480	Maximum Detected	6.174
Mean of Detected	62.72	Mean of Detected	-0.545
SD of Detected	125.1	SD of Detected	4.431
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	55
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.22%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.577	Shapiro Wilk Test Statistic	0.854
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.56	Mean	-2.295
SD	69.7	SD	3.256
95% DL/2 (t) UCL	33.72	95% H-Stat (DL/2) UCL	261
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.808
		SD in Log Scale	4.252
		Mean in Original Scale	17.01
		SD in Original Scale	69.54
		95% t UCL	32.15
		95% Percentile Bootstrap UCL	33.45

95% BCA Bootstrap UCL	43.35
95% H-UCL	1688

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.173
Theta Star	361.6
nu star	5.551
A-D Test Statistic	1.325
5% A-D Critical Value	0.893
K-S Test Statistic	0.893
5% K-S Critical Value	0.239

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	480
Mean	17.01
Median	0.000001
SD	69.54
k star	0.0733
Theta star	232
Nu star	8.652
AppChi2	3.118
95% Gamma Approximate UCL (Use when n >= 40)	47.2
95% Adjusted Gamma UCL (Use when n < 40)	48.49

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	17.06
SD	68.95
SE of Mean	9.273
95% KM (t) UCL	32.56
95% KM (z) UCL	32.31
95% KM (jackknife) UCL	32.19
95% KM (bootstrap t) UCL	57.41
95% KM (BCA) UCL	34.76
95% KM (Percentile Bootstrap) UCL	33.67
95% KM (Chebyshev) UCL	57.48
97.5% KM (Chebyshev) UCL	74.97
99% KM (Chebyshev) UCL	109.3

Potential UCLs to Use

99% KM (Chebyshev) UCL	109.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)anthracene OS

General Statistics

Number of Valid Data	56	Number of Detected Data	41
Number of Distinct Detected Data	37	Number of Non-Detect Data	15
		Percent Non-Detects	26.79%

Raw Statistics

Minimum Detected	0.046

Log-transformed Statistics

Minimum Detected	-3.079

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Detected	5.5	Maximum Detected	1.705
Mean of Detected	0.855	Mean of Detected	-0.704
SD of Detected	1.04	SD of Detected	1.09
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.693	Shapiro Wilk Test Statistic	0.985
5% Shapiro Wilk Critical Value	0.941	5% Shapiro Wilk Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.748	Mean	-0.669
SD	5.398	SD	1.293
95% DL/2 (t) UCL	2.955	95% H-Stat (DL/2) UCL	1.923
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.896
		SD in Log Scale	0.996
		Mean in Original Scale	0.695
		SD in Original Scale	0.927
		95% t UCL	0.902
		95% Percentile Bootstrap UCL	0.91
		95% BCA Bootstrap UCL	0.978
		95% H-UCL	0.917

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.987	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.867		
nu star	80.94		
A-D Test Statistic	0.533	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	0.716
5% K-S Critical Value	0.142	SD	0.943
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.132
		95% KM (t) UCL	0.936

Assuming Gamma Distribution			
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.932
Minimum	0.000001	95% KM (jackknife) UCL	0.936
Maximum	5.5	95% KM (bootstrap t) UCL	1.048
Mean	0.702	95% KM (BCA) UCL	0.952
Median	0.389	95% KM (Percentile Bootstrap) UCL	0.944
SD	0.932	95% KM (Chebyshev) UCL	1.29
k star	0.598	97.5% KM (Chebyshev) UCL	1.538
Theta star	1.174	99% KM (Chebyshev) UCL	2.026
Nu star	66.94		
AppChi2	49.11	**Potential UCLs to Use**	
95% Gamma Approximate UCL (Use when n >= 40)	0.957	95% KM (Chebyshev) UCL	1.29
95% Adjusted Gamma UCL (Use when n < 40)	0.964		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene OS

General Statistics

Number of Valid Data	54	Number of Detected Data	40
Number of Distinct Detected Data	37	Number of Non-Detect Data	14
		Percent Non-Detects	25.93%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.039	Minimum Detected	-3.244
Maximum Detected	7.1	Maximum Detected	1.96
Mean of Detected	0.841	Mean of Detected	-0.773
SD of Detected	1.211	SD of Detected	1.106
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.588	Shapiro Wilk Test Statistic	0.992
5% Shapiro Wilk Critical Value	0.94	5% Shapiro Wilk Critical Value	0.94

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.78
SD	5.52
95% DL/2 (t) UCL	3.038
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.909
Theta Star	0.926
nu star	72.73
A-D Test Statistic	0.674
5% A-D Critical Value	0.78
K-S Test Statistic	0.78
5% K-S Critical Value	0.144

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0321
Maximum	7.1
Mean	0.687
Median	0.365
SD	1.08
k star	0.798
Theta star	0.861
Nu star	86.16
AppChi2	65.76
95% Gamma Approximate UCL (Use when n >= 40)	0.9
95% Adjusted Gamma UCL (Use when n < 40)	0.907

Note: DL/2 is not a recommended method.

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.712
SD	1.319
95% H-Stat (DL/2) UCL	1.932
Log ROS Method	
Mean in Log Scale	-0.95
SD in Log Scale	1.007
Mean in Original Scale	0.687
SD in Original Scale	1.073
95% t UCL	0.931
95% Percentile Bootstrap UCL	0.951
95% BCA Bootstrap UCL	1.048
95% H-UCL	0.886

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.709
SD	1.092
SE of Mean	0.155
95% KM (t) UCL	0.969
95% KM (z) UCL	0.964
95% KM (jackknife) UCL	0.968
95% KM (bootstrap t) UCL	1.22
95% KM (BCA) UCL	1.001
95% KM (Percentile Bootstrap) UCL	0.978
95% KM (Chebyshev) UCL	1.386
97.5% KM (Chebyshev) UCL	1.678
99% KM (Chebyshev) UCL	2.254

Potential UCLs to Use

95% KM (Chebyshev) UCL	1.386

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene OS

General Statistics

Number of Valid Data	51	Number of Detected Data	36
Number of Distinct Detected Data	34	Number of Non-Detect Data	15
		Percent Non-Detects	29.41%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.053	Minimum Detected	-2.937
Maximum Detected	10	Maximum Detected	2.303
Mean of Detected	1.354	Mean of Detected	-0.338
SD of Detected	1.865	SD of Detected	1.169
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	51
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.64	Shapiro Wilk Test Statistic	0.994
5% Shapiro Wilk Critical Value	0.935	5% Shapiro Wilk Critical Value	0.935
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.185	Mean	-0.416
SD	5.736	SD	1.367
95% DL/2 (t) UCL	3.531	95% H-Stat (DL/2) UCL	2.841
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.632
		SD in Log Scale	1.101
		Mean in Original Scale	1.039
		SD in Original Scale	1.638
		95% t UCL	1.424

95% Percentile Bootstrap UCL	1.44
95% BCA Bootstrap UCL	1.556
95% H-UCL	1.418

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.854
Theta Star	1.585
nu star	61.48
A-D Test Statistic	0.563
5% A-D Critical Value	0.78
K-S Test Statistic	0.78
5% K-S Critical Value	0.152

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	10
Mean	1.02
Median	0.522
SD	1.657
k star	0.236
Theta star	4.329
Nu star	24.04
AppChi2	13.88
95% Gamma Approximate UCL (Use when n >= 40)	1.767
95% Adjusted Gamma UCL (Use when n < 40)	1.797

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.073
SD	1.656
SE of Mean	0.241
95% KM (t) UCL	1.477
95% KM (z) UCL	1.47
95% KM (jackknife) UCL	1.476
95% KM (bootstrap t) UCL	1.778
95% KM (BCA) UCL	1.489
95% KM (Percentile Bootstrap) UCL	1.492
95% KM (Chebyshev) UCL	2.124
97.5% KM (Chebyshev) UCL	2.58
99% KM (Chebyshev) UCL	3.473

Potential UCLs to Use

95% KM (Chebyshev) UCL	2.124

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(k)fluoranthene OS

General Statistics

Number of Valid Data	56	Number of Detected Data	20
Number of Distinct Detected Data	19	Number of Non-Detect Data	36
		Percent Non-Detects	64.29%

Raw Statistics **Log-transformed Statistics**

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Detected	0.041	Minimum Detected	-3.194
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.512	Mean of Detected	-1.173
SD of Detected	0.557	SD of Detected	1.056
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.768	Shapiro Wilk Test Statistic	0.984
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.519	Mean	-0.977
SD	5.406	SD	1.229
95% DL/2 (t) UCL	2.728	95% H-Stat (DL/2) UCL	1.252
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.598
		SD in Log Scale	0.74
		Mean in Original Scale	0.29
		SD in Original Scale	0.369
		95% t UCL	0.372
		95% Percentile Bootstrap UCL	0.377
		95% BCA Bootstrap UCL	0.397
		95% H-UCL	0.327

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.994	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.515		
nu star	39.76		
A-D Test Statistic	0.368	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	0.31
5% K-S Critical Value	0.199	SD	0.391
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0595

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% KM (t) UCL	0.41
95% KM (z) UCL	0.408
95% KM (jackknife) UCL	0.409
95% KM (bootstrap t) UCL	0.453
95% KM (BCA) UCL	0.419
95% KM (Percentile Bootstrap) UCL	0.41
95% KM (Chebyshev) UCL	0.57
97.5% KM (Chebyshev) UCL	0.682
99% KM (Chebyshev) UCL	0.902

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.2
Mean	0.343
Median	0.276
SD	0.368
k star	0.611
Theta star	0.562
Nu star	68.39
AppChi2	50.36
95% Gamma Approximate UCL (Use when n >= 40)	0.466
95% Adjusted Gamma UCL (Use when n < 40)	0.47

Potential UCLs to Use

95% KM (t) UCL	0.41

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Bis(2-ethylhexyl)phthalate OS

General Statistics

Number of Valid Data	50	Number of Detected Data	37
Number of Distinct Detected Data	35	Number of Non-Detect Data	13
		Percent Non-Detects	26.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.061	Minimum Detected	-2.797
Maximum Detected	390	Maximum Detected	5.966
Mean of Detected	16	Mean of Detected	0.103
SD of Detected	64.86	SD of Detected	2.045
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	1.1	Maximum Non-Detect	0.0953

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	68.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.267	Shapiro Wilk Test Statistic	0.937

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

5% Shapiro Wilk Critical Value	0.936

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	11.91
SD	56.03
95% DL/2 (t) UCL	25.2
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.26
Theta Star	61.45
nu star	19.27
A-D Test Statistic	4.336
5% A-D Critical Value	0.873
K-S Test Statistic	0.873
5% K-S Critical Value	0.159

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	390
Mean	11.84
Median	0.475
SD	56.05
k star	0.136
Theta star	86.84
Nu star	13.64
AppChi2	6.323
95% Gamma Approximate UCL (Use when n >= 40)	25.54
95% Adjusted Gamma UCL (Use when n < 40)	26.15

5% Shapiro Wilk Critical Value	0.936

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.277
SD	1.878
95% H-Stat (DL/2) UCL	11.16
Log ROS Method	
Mean in Log Scale	-0.443
SD in Log Scale	1.998
Mean in Original Scale	11.88
SD in Original Scale	56.04
95% t UCL	25.17
95% Percentile Bootstrap UCL	27.47
95% BCA Bootstrap UCL	37.83
95% H-UCL	13.28

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	11.89
SD	55.47
SE of Mean	7.953
95% KM (t) UCL	25.22
95% KM (z) UCL	24.97
95% KM (jackknife) UCL	25.18
95% KM (bootstrap t) UCL	110.8
95% KM (BCA) UCL	27.41
95% KM (Percentile Bootstrap) UCL	27.7
95% KM (Chebyshev) UCL	46.56
97.5% KM (Chebyshev) UCL	61.56
99% KM (Chebyshev) UCL	91.02

Potential UCLs to Use

99% KM (Chebyshev) UCL	91.02

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cadmium M

General Statistics

Number of Valid Data	56	Number of Detected Data	44
Number of Distinct Detected Data	39	Number of Non-Detect Data	12
		Percent Non-Detects	21.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	180	Maximum Detected	5.193
Mean of Detected	8.183	Mean of Detected	0.373
SD of Detected	27.63	SD of Detected	1.65
Minimum Non-Detect	0.066	Minimum Non-Detect	-2.718
Maximum Non-Detect	0.64	Maximum Non-Detect	-0.446

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	29
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	27
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.79%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.307	Shapiro Wilk Test Statistic	0.921
5% Shapiro Wilk Critical Value	0.944	5% Shapiro Wilk Critical Value	0.944
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.451	Mean	-0.263
SD	24.66	SD	1.939
95% DL/2 (t) UCL	11.96	95% H-Stat (DL/2) UCL	13.06
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.347
		SD in Log Scale	2.031
		Mean in Original Scale	6.442
		SD in Original Scale	24.66

95% t UCL	11.96
95% Percentile Bootstrap UCL	12.63
95% BCA Bootstrap UCL	16.68
95% H-UCL	15.65

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.372
Theta Star	21.98
nu star	32.76
A-D Test Statistic	3.805
5% A-D Critical Value	0.841
K-S Test Statistic	0.841
5% K-S Critical Value	0.143

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	180
Mean	6.429
Median	0.54
SD	24.66
k star	0.17
Theta star	37.82
Nu star	19.04
AppChi2	10.15
95% Gamma Approximate UCL (Use when n >= 40)	12.06
95% Adjusted Gamma UCL (Use when n < 40)	12.27

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.469
SD	24.43
SE of Mean	3.303
95% KM (t) UCL	11.99
95% KM (z) UCL	11.9
95% KM (jackknife) UCL	11.98
95% KM (bootstrap t) UCL	27.99
95% KM (BCA) UCL	13.61
95% KM (Percentile Bootstrap) UCL	12.78
95% KM (Chebyshev) UCL	20.87
97.5% KM (Chebyshev) UCL	27.09
99% KM (Chebyshev) UCL	39.33

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	27.09

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Carbazole OS

General Statistics

Number of Valid Data	56	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	43
		Percent Non-Detects	76.79%

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics	
Minimum Detected	0.07
Maximum Detected	0.5
Mean of Detected	0.201
SD of Detected	0.13
Minimum Non-Detect	0.33
Maximum Non-Detect	74

Log-transformed Statistics	
Minimum Detected	-2.659
Maximum Detected	-0.693
Mean of Detected	-1.792
SD of Detected	0.636
Minimum Non-Detect	-1.109
Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	56
Number treated as Detected	0
Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.882
5% Shapiro Wilk Critical Value	0.866
Data appear Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.866
Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1.44
SD	5.414
95% DL/2 (t) UCL	2.651
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.104
SD	1.185
95% H-Stat (DL/2) UCL	1.017
Log ROS Method	
Mean in Log Scale	-1.889
SD in Log Scale	0.347
Mean in Original Scale	0.161
SD in Original Scale	0.0693
95% t UCL	0.177
95% Percentile Bootstrap UCL	0.177
95% BCA Bootstrap UCL	0.18
95% H-UCL	0.174

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	2.234
Theta Star	0.0899
nu star	58.08
A-D Test Statistic	0.383
5% A-D Critical Value	0.74
K-S Test Statistic	0.74
5% K-S Critical Value	0.238

Data Distribution Test with Detected Values Only
Data appear Normal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.179
SD	0.103

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.07
Maximum	0.5
Mean	0.198
Median	0.204
SD	0.0729
k star	6.974
Theta star	0.0284
Nu star	781.1
AppChi2	717.3
95% Gamma Approximate UCL (Use when n >= 40)	0.216
95% Adjusted Gamma UCL (Use when n < 40)	0.216

SE of Mean	0.0269
95% KM (t) UCL	0.224
95% KM (z) UCL	0.223
95% KM (jackknife) UCL	0.225
95% KM (bootstrap t) UCL	0.229
95% KM (BCA) UCL	0.225
95% KM (Percentile Bootstrap) UCL	0.222
95% KM (Chebyshev) UCL	0.296
97.5% KM (Chebyshev) UCL	0.347
99% KM (Chebyshev) UCL	0.447

Potential UCLs to Use

95% KM (t) UCL	0.224
95% KM (Percentile Bootstrap) UCL	0.222

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlordane PESTP

General Statistics

Number of Valid Data	28
Number of Distinct Detected Data	4

Number of Detected Data	4
Number of Non-Detect Data	24
Percent Non-Detects	85.71%

Raw Statistics

Minimum Detected	0.0022
Maximum Detected	0.27
Mean of Detected	0.095
SD of Detected	0.125
Minimum Non-Detect	0.0027
Maximum Non-Detect	2

Log-transformed Statistics

Minimum Detected	-6.119
Maximum Detected	-1.309
Mean of Detected	-3.653
SD of Detected	2.229
Minimum Non-Detect	-5.915
Maximum Non-Detect	0.693

Note: Data have multiple DLs - Use of KM Method is recommended	
For all methods (except KM, DL/2, and ROS Methods),	
Observations < Largest ND are treated as NDs	

Number treated as Non-Detect	28
Number treated as Detected	0
Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.849
5% Shapiro Wilk Critical Value	0.748

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.183
SD	0.285
95% DL/2 (t) UCL	0.274
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.937
5% Shapiro Wilk Critical Value	0.748

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.703
SD	1.633
95% H-Stat (DL/2) UCL	0.724
Log ROS Method	
Mean in Log Scale	-5.263
SD in Log Scale	1.186
Mean in Original Scale	0.0179
SD in Original Scale	0.0527
95% t UCL	0.0348
95% Percentile Bootstrap UCL	0.0349
95% BCA Bootstrap UCL	0.0471
95% H-UCL	0.0193

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.289
Theta Star	0.328
nu star	2.315
A-D Test Statistic	0.298
5% A-D Critical Value	0.682
K-S Test Statistic	0.682
5% K-S Critical Value	0.411

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	0.27
Mean	0.0178

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0249
SD	0.0619
SE of Mean	0.0168
95% KM (t) UCL	0.0536
95% KM (z) UCL	0.0526
95% KM (jackknife) UCL	0.0495
95% KM (bootstrap t) UCL	0.0576
95% KM (BCA) UCL	0.27
95% KM (Percentile Bootstrap) UCL	0.118

US EPA ARCHIVE DOCUMENT

Median	0.000001	95% KM (Chebyshev) UCL	0.0983
SD	0.0543	97.5% KM (Chebyshev) UCL	0.13
k star	0.126	99% KM (Chebyshev) UCL	0.192
Theta star	0.141		
Nu star	7.055	**Potential UCLs to Use**	
AppChi2	2.201	95% KM (t) UCL	0.0536
95% Gamma Approximate UCL (Use when n >= 40)	0.0571	95% KM (Percentile Bootstrap) UCL	0.118
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlorobenzene OV

General Statistics

Number of Valid Data	57	Number of Detected Data	21
Number of Distinct Detected Data	21	Number of Non-Detect Data	36
		Percent Non-Detects	63.16%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0032	Minimum Detected	-5.745
Maximum Detected	1000	Maximum Detected	6.908
Mean of Detected	73.49	Mean of Detected	-0.933
SD of Detected	226.4	SD of Detected	3.806
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.98%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.375	Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	27.22	Mean	-2.387

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD	139.9
95% DL/2 (t) UCL	58.22
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

SD	3.044
95% H-Stat (DL/2) UCL	88.75
Log ROS Method	
Mean in Log Scale	-4.136
SD in Log Scale	3.484
Mean in Original Scale	27.08
SD in Original Scale	139.9
95% t UCL	58.08
95% Percentile Bootstrap UCL	61.97
95% BCA Bootstrap UCL	83.74
95% H-UCL	122

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.158
Theta Star	465
nu star	6.638
A-D Test Statistic	2.131
5% A-D Critical Value	0.911
K-S Test Statistic	0.911
5% K-S Critical Value	0.212

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1000
Mean	27.07
Median	0.000001
SD	139.9
k star	0.0767
Theta star	353.1
Nu star	8.742
AppChi2	3.172
95% Gamma Approximate UCL (Use when n >= 40)	74.62
95% Adjusted Gamma UCL (Use when n < 40)	76.72

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	27.09
SD	138.7
SE of Mean	18.83
95% KM (t) UCL	58.58
95% KM (z) UCL	58.06
95% KM (jackknife) UCL	58.09
95% KM (bootstrap t) UCL	138.2
95% KM (BCA) UCL	67.58
95% KM (Percentile Bootstrap) UCL	61.94
95% KM (Chebyshev) UCL	109.2
97.5% KM (Chebyshev) UCL	144.7
99% KM (Chebyshev) UCL	214.4

Potential UCLs to Use

99% KM (Chebyshev) UCL	214.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Chromium M

General Statistics

Number of Valid Observations	56	Number of Distinct Observations	55

Raw Statistics		Log-transformed Statistics	
Minimum	3.6	Minimum of Log Data	1.281
Maximum	350	Maximum of Log Data	5.858
Mean	44.3	Mean of log Data	3.092
Geometric Mean	22.02	SD of log Data	1.087
Median	19.25		
SD	72.09		
Std. Error of Mean	9.634		
Coefficient of Variation	1.627		
Skewness	3.12		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.304	Lilliefors Test Statistic	0.11
Lilliefors Critical Value	0.118	Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	60.42	95% H-UCL	56.95
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	69.02
95% Adjusted-CLT UCL (Chen-1995)	64.44	97.5% Chebyshev (MVUE) UCL	81.96
95% Modified-t UCL (Johnson-1978)	61.09	99% Chebyshev (MVUE) UCL	107.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.81	**Data appear Lognormal at 5% Significance Level**	
Theta Star	54.7		
MLE of Mean	44.3		
MLE of Standard Deviation	49.23		
nu star	90.72		
Approximate Chi Square Value (.05)	69.76	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0457	95% CLT UCL	60.15
Adjusted Chi Square Value	69.27	95% Jackknife UCL	60.42
		95% Standard Bootstrap UCL	59.92
Anderson-Darling Test Statistic	2.978	95% Bootstrap-t UCL	67.7
Anderson-Darling 5% Critical Value	0.788	95% Hall's Bootstrap UCL	67.51
Kolmogorov-Smirnov Test Statistic	0.152	95% Percentile Bootstrap UCL	62.45
Kolmogorov-Smirnov 5% Critical Value	0.123	95% BCA Bootstrap UCL	66.64

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	86.3
		97.5% Chebyshev(Mean, Sd) UCL	104.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	140.2
95% Approximate Gamma UCL (Use when n >= 40)	57.62		
95% Adjusted Gamma UCL (Use when n < 40)	58.02		
Potential UCL to Use		Use 95% H-UCL	56.95

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Cis-1,2-dichloroethene OV

General Statistics

Number of Valid Data	57	Number of Detected Data	16
Number of Distinct Detected Data	16	Number of Non-Detect Data	41
		Percent Non-Detects	71.93%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0016	Minimum Detected	-6.438
Maximum Detected	500	Maximum Detected	6.215
Mean of Detected	67.14	Mean of Detected	-1.05
SD of Detected	168	SD of Detected	3.959
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.98%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.445	Shapiro Wilk Test Statistic	0.905
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	19.03
SD	92.09
95% DL/2 (t) UCL	39.43
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.459
SD	2.869
95% H-Stat (DL/2) UCL	39.3
Log ROS Method	
Mean in Log Scale	-5.719
SD in Log Scale	3.911
Mean in Original Scale	18.85
SD in Original Scale	92.12
95% t UCL	39.26
95% Percentile Bootstrap UCL	37.74
95% BCA Bootstrap UCL	53.77
95% H-UCL	242.7

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.161
Theta Star	417.4
nu star	5.147
A-D Test Statistic	1.719
5% A-D Critical Value	0.899
K-S Test Statistic	0.899
5% K-S Critical Value	0.24

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	500
Mean	18.85
Median	0.000001
SD	92.12
k star	0.0731
Theta star	257.8
Nu star	8.333
AppChi2	2.929
95% Gamma Approximate UCL (Use when n >= 40)	53.62
95% Adjusted Gamma UCL (Use when n < 40)	55.17

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	18.86
SD	91.31
SE of Mean	12.49
95% KM (t) UCL	39.75
95% KM (z) UCL	39.41
95% KM (jackknife) UCL	39.26
95% KM (bootstrap t) UCL	185.3
95% KM (BCA) UCL	43.86
95% KM (Percentile Bootstrap) UCL	43.66
95% KM (Chebyshev) UCL	73.31
97.5% KM (Chebyshev) UCL	96.86
99% KM (Chebyshev) UCL	143.1

Potential UCLs to Use

99% KM (Chebyshev) UCL	143.1

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cobalt M

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	42

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.2	Minimum of Log Data	0.182
Maximum	93.3	Maximum of Log Data	4.536
Mean	7.827	Mean of log Data	1.618
Geometric Mean	5.045	SD of log Data	0.831
Median	4.6		
SD	12.71		
Std. Error of Mean	1.714		
Coefficient of Variation	1.624		
Skewness	5.872		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.301	Lilliefors Test Statistic	0.095
Lilliefors Critical Value	0.119	Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	10.7	95% H-UCL	9.092
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10.98
95% Adjusted-CLT UCL (Chen-1995)	12.1	97.5% Chebyshev (MVUE) UCL	12.67
95% Modified-t UCL (Johnson-1978)	10.92	99% Chebyshev (MVUE) UCL	15.99

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.222	**Data appear Lognormal at 5% Significance Level**	
Theta Star	6.407		
MLE of Mean	7.827		
MLE of Standard Deviation	7.082		
nu star	134.4		
Approximate Chi Square Value (.05)	108.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0456	95% CLT UCL	10.65
Adjusted Chi Square Value	108	95% Jackknife UCL	10.7
		95% Standard Bootstrap UCL	10.56
Anderson-Darling Test Statistic	2.147	95% Bootstrap-t UCL	14.55

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Anderson-Darling 5% Critical Value	0.773	95% Hall's Bootstrap UCL	21.46
Kolmogorov-Smirnov Test Statistic	0.165	95% Percentile Bootstrap UCL	10.82
Kolmogorov-Smirnov 5% Critical Value	0.123	95% BCA Bootstrap UCL	12.79
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.3
		97.5% Chebyshev(Mean, Sd) UCL	18.53
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	24.88
95% Approximate Gamma UCL (Use when n >= 40)	9.685		
95% Adjusted Gamma UCL (Use when n < 40)	9.741		
Potential UCL to Use		Use 95% H-UCL	9.092

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Copper M

General Statistics

Number of Valid Data	55	Number of Detected Data	54
Number of Distinct Detected Data	54	Number of Non-Detect Data	1
		Percent Non-Detects	1.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.8	Minimum Detected	1.03
Maximum Detected	934	Maximum Detected	6.839
Mean of Detected	97.16	Mean of Detected	3.606
SD of Detected	178.6	SD of Detected	1.355
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	2.5	Maximum Non-Detect	0.916

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.313	Lilliefors Test Statistic	0.0876
5% Lilliefors Critical Value	0.121	5% Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	95.42
SD	177.4
95% DL/2 (t) UCL	135.4
Maximum Likelihood Estimate(MLE) Method	
Mean	93.38
SD	177.9
95% MLE (t) UCL	133.5
95% MLE (Tiku) UCL	129.5

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	3.544
SD	1.418
95% H-Stat (DL/2) UCL	166.3
Log ROS Method	
Mean in Log Scale	3.541
SD in Log Scale	1.426
Mean in Original Scale	95.41
SD in Original Scale	177.4
95% t UCL	135.4
95% Percentile Bootstrap UCL	136.8
95% BCA Bootstrap UCL	150.7
95% H UCL	168.4

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.609
Theta Star	159.5
nu star	65.78
A-D Test Statistic	2.366
5% A-D Critical Value	0.803
K-S Test Statistic	0.803
5% K-S Critical Value	0.127
Data not Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	934
Mean	95.39
Median	31.7
SD	177.4
k star	0.485
Theta star	196.6
Nu star	53.39
AppChi2	37.6
95% Gamma Approximate UCL (Use when n >= 40)	135.4
95% Adjusted Gamma UCL (Use when n < 40)	136.7

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data appear Lognormal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	95.45
SD	175.8
SE of Mean	23.92
95% KM (t) UCL	135.5
95% KM (z) UCL	134.8
95% KM (jackknife) UCL	135.5
95% KM (bootstrap t) UCL	156.3
95% KM (BCA) UCL	136.8
95% KM (Percentile Bootstrap) UCL	138.3
95% KM (Chebyshev) UCL	199.7
97.5% KM (Chebyshev) UCL	244.8
99% KM (Chebyshev) UCL	333.5
Potential UCLs to Use	
95% KM (Chebyshev) UCL	199.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Dibenz(a,h)anthracene OS

General Statistics

Number of Valid Data	56	Number of Detected Data	16
Number of Distinct Detected Data	14	Number of Non-Detect Data	40
		Percent Non-Detects	71.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.045	Minimum Detected	-3.101
Maximum Detected	1	Maximum Detected	0
Mean of Detected	0.253	Mean of Detected	-1.688
SD of Detected	0.244	SD of Detected	0.792
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.71	Shapiro Wilk Test Statistic	0.959
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.436	Mean	-1.143
SD	5.416	SD	1.211
95% DL/2 (t) UCL	2.646	95% H-Stat (DL/2) UCL	1.024
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.827
		SD in Log Scale	0.479
		Mean in Original Scale	0.185
		SD in Original Scale	0.139
		95% t UCL	0.216
		95% Percentile Bootstrap UCL	0.218
		95% BCA Bootstrap UCL	0.231

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% H-UCL	0.204

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.458
Theta Star	0.173
nu star	46.66
A-D Test Statistic	0.629
5% A-D Critical Value	0.753
K-S Test Statistic	0.753
5% K-S Critical Value	0.218

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0417
Maximum	1
Mean	0.235
Median	0.229
SD	0.145
k star	3.164
Theta star	0.0742
Nu star	354.3
AppChi2	311.7
95% Gamma Approximate UCL (Use when n >= 40)	0.267
95% Adjusted Gamma UCL (Use when n < 40)	0.268

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.197
SD	0.158
SE of Mean	0.0292
95% KM (t) UCL	0.246
95% KM (z) UCL	0.245
95% KM (jackknife) UCL	0.246
95% KM (bootstrap t) UCL	0.262
95% KM (BCA) UCL	0.25
95% KM (Percentile Bootstrap) UCL	0.244
95% KM (Chebyshev) UCL	0.324
97.5% KM (Chebyshev) UCL	0.379
99% KM (Chebyshev) UCL	0.487

Potential UCLs to Use

95% KM (t) UCL	0.246

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Dieldrin PESTP

General Statistics

Number of Valid Data	48	Number of Detected Data	27
Number of Distinct Detected Data	25	Number of Non-Detect Data	21
		Percent Non-Detects	43.75%

Raw Statistics

Minimum Detected	0.00095
Maximum Detected	9.9

Log-transformed Statistics

Minimum Detected	-6.959
Maximum Detected	2.293

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean of Detected	0.512	Mean of Detected	-3.597
SD of Detected	1.937	SD of Detected	2.186
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	47
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.289	Shapiro Wilk Test Statistic	0.945
5% Shapiro Wilk Critical Value	0.923	5% Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.374	Mean	-3.651
SD	1.475	SD	2.314
95% DL/2 (t) UCL	0.731	95% H-Stat (DL/2) UCL	1.479
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.525
		SD in Log Scale	2.097
		Mean in Original Scale	0.291
		SD in Original Scale	1.462
		95% t UCL	0.645
		95% Percentile Bootstrap UCL	0.706
		95% BCA Bootstrap UCL	0.978
		95% H-UCL	0.306

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.241	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2.121		
nu star	13.03		
A-D Test Statistic	3.374	**Nonparametric Statistics**	
5% A-D Critical Value	0.877	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.877	Mean	0.297
5% K-S Critical Value	0.185	SD	1.447
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.213
		95% KM (t) UCL	0.655
Assuming Gamma Distribution		95% KM (z) UCL	0.648

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	9.9
Mean	0.29
Median	0.0044
SD	1.463
k star	0.133
Theta star	2.176
Nu star	12.81
AppChi2	5.765
95% Gamma Approximate UCL (Use when n >= 40)	0.645
95% Adjusted Gamma UCL (Use when n < 40)	0.662

95% KM (jackknife) UCL	0.652
95% KM (bootstrap t) UCL	5.153
95% KM (BCA) UCL	0.715
95% KM (Percentile Bootstrap) UCL	0.708
95% KM (Chebyshev) UCL	1.226
97.5% KM (Chebyshev) UCL	1.628
99% KM (Chebyshev) UCL	2.418
Potential UCLs to Use	
99% KM (Chebyshev) UCL	2.418

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Di-n-octylphthalate OS

General Statistics

Number of Valid Data	55	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	49
		Percent Non-Detects	89.09%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.15	Minimum Detected	-1.897
Maximum Detected	4.6	Maximum Detected	1.526
Mean of Detected	1.335	Mean of Detected	-0.453
SD of Detected	1.731	SD of Detected	1.36
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	55
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.767
5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1.556
SD	5.472
95% DL/2 (t) UCL	2.791
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.927
5% Shapiro Wilk Critical Value	0.788
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-0.968
SD	1.186
95% H-Stat (DL/2) UCL	1.167
Log ROS Method	
Mean in Log Scale	-1.426
SD in Log Scale	0.687
Mean in Original Scale	0.355
SD in Original Scale	0.638
95% t UCL	0.499
95% Percentile Bootstrap UCL	0.507
95% BCA Bootstrap UCL	0.605
95% H-UCL	0.368

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.511
Theta Star	2.611
nu star	6.135
A-D Test Statistic	0.374
5% A-D Critical Value	0.72
K-S Test Statistic	0.72
5% K-S Critical Value	0.343
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	4.6
Mean	0.43
Median	0.2
SD	0.712
k star	0.225

Data Distribution Test with Detected Values Only	
Data appear Gamma Distributed at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.348
SD	0.655
SE of Mean	0.106
95% KM (t) UCL	0.525
95% KM (z) UCL	0.522
95% KM (jackknife) UCL	0.521
95% KM (bootstrap t) UCL	0.721
95% KM (BCA) UCL	0.943
95% KM (Percentile Bootstrap) UCL	0.87
95% KM (Chebyshev) UCL	0.81
97.5% KM (Chebyshev) UCL	1.01
99% KM (Chebyshev) UCL	1.403

Theta star	1.912
Nu star	24.74
AppChi2	14.41
95% Gamma Approximate UCL (Use when n >= 40)	0.738
95% Adjusted Gamma UCL (Use when n < 40)	0.749

Potential UCLs to Use

95% KM (t) UCL	0.525

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

DioxinTEQ

General Statistics

Number of Valid Observations	234	Number of Distinct Observations	143

Raw Statistics

Minimum	0.0000005
Maximum	0.057
Mean	0.00102
Geometric Mean	6.371E-05
Median	0.0000555
SD	0.00529
Std. Error of Mean	0.0003457
Coefficient of Variation	5.182
Skewness	9.574

Log-transformed Statistics

Minimum of Log Data	-14.51
Maximum of Log Data	-2.865
Mean of log Data	-9.661
SD of log Data	2.274

Relevant UCL Statistics

Normal Distribution Test

Lilliefors Test Statistic	0.424
Lilliefors Critical Value	0.0579

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Lilliefors Test Statistic	0.0965
Lilliefors Critical Value	0.0579

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.00159

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.00182
95% Modified-t UCL (Johnson-1978)	0.00163

Assuming Lognormal Distribution

95% H-UCL	0.00142
95% Chebyshev (MVUE) UCL	0.00175
97.5% Chebyshev (MVUE) UCL	0.00216
99% Chebyshev (MVUE) UCL	0.00296

Gamma Distribution Test

k star (bias corrected)	0.255
Theta Star	0.004

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

MLE of Mean	0.00102
MLE of Standard Deviation	0.00202
nu star	119.3
Approximate Chi Square Value (.05)	95.04
Adjusted Level of Significance	0.049
Adjusted Chi Square Value	94.91
Anderson-Darling Test Statistic	18.14
Anderson-Darling 5% Critical Value	0.89
Kolmogorov-Smirnov Test Statistic	0.195
Kolmogorov-Smirnov 5% Critical Value	0.0654

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	0.00128
95% Adjusted Gamma UCL (Use when n < 40)	0.00128

Nonparametric Statistics

95% CLT UCL	0.00159
95% Jackknife UCL	0.00159
95% Standard Bootstrap UCL	0.00158
95% Bootstrap-t UCL	0.003
95% Hall's Bootstrap UCL	0.00424
95% Percentile Bootstrap UCL	0.00164
95% BCA Bootstrap UCL	0.00188
95% Chebyshev(Mean, Sd) UCL	0.00253
97.5% Chebyshev(Mean, Sd) UCL	0.00318
99% Chebyshev(Mean, Sd) UCL	0.00446

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL 0.00253

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Endrin PESTP

General Statistics

Number of Valid Data	55	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	41
		Percent Non-Detects	74.55%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00026	Minimum Detected	-8.255
Maximum Detected	2.1	Maximum Detected	0.742
Mean of Detected	0.255	Mean of Detected	-4.192
SD of Detected	0.617	SD of Detected	2.619
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	55
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.479
5% Shapiro Wilk Critical Value	0.874

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.141
SD	0.411
95% DL/2 (t) UCL	0.234
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.958
5% Shapiro Wilk Critical Value	0.874

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.592
SD	2.252
95% H-Stat (DL/2) UCL	0.448
Log ROS Method	
Mean in Log Scale	-6.314
SD in Log Scale	1.904
Mean in Original Scale	0.0658
SD in Original Scale	0.323
95% t UCL	0.139
95% Percentile Bootstrap UCL	0.147
95% BCA Bootstrap UCL	0.183
95% H-UCL	0.0279

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.245
Theta Star	1.041
nu star	6.86
A-D Test Statistic	1.175
5% A-D Critical Value	0.852
K-S Test Statistic	0.852
5% K-S Critical Value	0.25

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.1
Mean	0.0649
Median	0.000001
SD	0.323
k star	0.102
Theta star	0.639
Nu star	11.18

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0681
SD	0.323
SE of Mean	0.0456
95% KM (t) UCL	0.144
95% KM (z) UCL	0.143
95% KM (jackknife) UCL	0.142
95% KM (bootstrap t) UCL	1.203
95% KM (BCA) UCL	0.163
95% KM (Percentile Bootstrap) UCL	0.148
95% KM (Chebyshev) UCL	0.267
97.5% KM (Chebyshev) UCL	0.353
99% KM (Chebyshev) UCL	0.521

Potential UCLs to Use

AppChi2	4.695	99% KM (Chebyshev) UCL	0.521
95% Gamma Approximate UCL (Use when n >= 40)	0.155		
95% Adjusted Gamma UCL (Use when n < 40)	0.158		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Ethyl benzene OV

General Statistics

Number of Valid Data	57	Number of Detected Data	20
Number of Distinct Detected Data	19	Number of Non-Detect Data	37
		Percent Non-Detects	64.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0028	Minimum Detected	-5.878
Maximum Detected	81	Maximum Detected	4.394
Mean of Detected	10.13	Mean of Detected	-0.948
SD of Detected	22.84	SD of Detected	3.241
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	1	Maximum Non-Detect	0

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	85.96%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.508	Shapiro Wilk Test Statistic	0.947
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.616	Mean	-2.536
SD	14.15	SD	2.692
95% DL/2 (t) UCL	6.751	95% H-Stat (DL/2) UCL	17.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.115

SD in Log Scale	3.172
Mean in Original Scale	3.558
SD in Original Scale	14.17
95% t UCL	6.696
95% Percentile Bootstrap UCL	6.898
95% BCA Bootstrap UCL	8.258
95% H-UCL	27.9

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.222
Theta Star	45.64
nu star	8.876
A-D Test Statistic	0.977
5% A-D Critical Value	0.879
K-S Test Statistic	0.879
5% K-S Critical Value	0.214

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	81
Mean	3.553
Median	0.000001
SD	14.17
k star	0.0866
Theta star	41.05
Nu star	9.869
AppChi2	3.86
95% Gamma Approximate UCL (Use when n >= 40)	9.085
95% Adjusted Gamma UCL (Use when n < 40)	9.32

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.569
SD	14.04
SE of Mean	1.908
95% KM (t) UCL	6.759
95% KM (z) UCL	6.707
95% KM (jackknife) UCL	6.706
95% KM (bootstrap t) UCL	16.36
95% KM (BCA) UCL	7.106
95% KM (Percentile Bootstrap) UCL	7.111
95% KM (Chebyshev) UCL	11.88
97.5% KM (Chebyshev) UCL	15.48
99% KM (Chebyshev) UCL	22.55

Potential UCLs to Use

99% KM (Chebyshev) UCL	22.55

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Heptachlor PESTP

General Statistics

Number of Valid Data	54	Number of Detected Data	7

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Number of Distinct Detected Data	7	Number of Non-Detect Data	47
		Percent Non-Detects	87.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0019	Minimum Detected	-6.266
Maximum Detected	5.1	Maximum Detected	1.629
Mean of Detected	1.58	Mean of Detected	-2.435
SD of Detected	2.151	SD of Detected	3.593
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	0.33	Maximum Non-Detect	-1.109

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	51
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.44%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.775	Shapiro Wilk Test Statistic	0.827
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.229	Mean	-5
SD	0.896	SD	2.359
95% DL/2 (t) UCL	0.433	95% H-Stat (DL/2) UCL	0.427
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-12.98
		SD in Log Scale	5.075
		Mean in Original Scale	0.205
		SD in Original Scale	0.9
		95% t UCL	0.41
		95% Percentile Bootstrap UCL	0.429
		95% BCA Bootstrap UCL	0.517
		95% H-UCL	300.4

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.236
Theta Star	6.696
nu star	3.303
A-D Test Statistic	0.64
5% A-D Critical Value	0.804
K-S Test Statistic	0.804
5% K-S Critical Value	0.339

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	5.1
Mean	0.205
Median	0.000001
SD	0.9
k star	0.0858
Theta star	2.386
Nu star	9.27
AppChi2	3.491
95% Gamma Approximate UCL (Use when n >= 40)	0.544
95% Adjusted Gamma UCL (Use when n < 40)	0.559

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.207
SD	0.891
SE of Mean	0.131
95% KM (t) UCL	0.426
95% KM (z) UCL	0.422
95% KM (jackknife) UCL	0.411
95% KM (bootstrap t) UCL	0.749
95% KM (BCA) UCL	0.461
95% KM (Percentile Bootstrap) UCL	0.468
95% KM (Chebyshev) UCL	0.778
97.5% KM (Chebyshev) UCL	1.025
99% KM (Chebyshev) UCL	1.51

Potential UCLs to Use

95% KM (t) UCL	0.426

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Indeno(1,2,3-cd)pyrene OS

General Statistics

Number of Valid Data	56	Number of Detected Data	33
Number of Distinct Detected Data	28	Number of Non-Detect Data	23
		Percent Non-Detects	41.07%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.068	Minimum Detected	-2.688
Maximum Detected	3.3	Maximum Detected	1.194
Mean of Detected	0.497	Mean of Detected	-1.141

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD of Detected	0.615	SD of Detected	0.906
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.625	Shapiro Wilk Test Statistic	0.974
5% Shapiro Wilk Critical Value	0.931	5% Shapiro Wilk Critical Value	0.931
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.549	Mean	-0.948
SD	5.409	SD	1.236
95% DL/2 (t) UCL	2.758	95% H-Stat (DL/2) UCL	1.306
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.311
		SD in Log Scale	0.737
		Mean in Original Scale	0.382
		SD in Original Scale	0.491
		95% t UCL	0.492
		95% Percentile Bootstrap UCL	0.492
		95% BCA Bootstrap UCL	0.548
		95% H-UCL	0.434

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.177	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	0.422		
nu star	77.7		
A-D Test Statistic	0.829	**Nonparametric Statistics**	
5% A-D Critical Value	0.77	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.77	Mean	0.398
5% K-S Critical Value	0.157	SD	0.511
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0738
		95% KM (t) UCL	0.522
Assuming Gamma Distribution		95% KM (z) UCL	0.52
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.521

Minimum	0.000001	95% KM (bootstrap t) UCL	0.611
Maximum	3.3	95% KM (BCA) UCL	0.538
Mean	0.42	95% KM (Percentile Bootstrap) UCL	0.522
Median	0.281	95% KM (Chebyshev) UCL	0.72
SD	0.486	97.5% KM (Chebyshev) UCL	0.859
k star	0.792	99% KM (Chebyshev) UCL	1.133
Theta star	0.53		
Nu star	88.7	**Potential UCLs to Use**	
AppChi2	67.98	95% KM (t) UCL	0.522
95% Gamma Approximate UCL (Use when n >= 40)	0.548		
95% Adjusted Gamma UCL (Use when n < 40)	0.552		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Lead M

General Statistics

Number of Valid Observations	56	Number of Distinct Observations	53

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.6	Minimum of Log Data	1.526
Maximum	3160	Maximum of Log Data	8.058
Mean	276.2	Mean of log Data	4.491
Geometric Mean	89.22	SD of log Data	1.545
Median	90.6		
SD	537.5		
Std. Error of Mean	71.83		
Coefficient of Variation	1.946		
Skewness	3.789		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.307	Lilliefors Test Statistic	0.0704
Lilliefors Critical Value	0.118	Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	396.4	95% H-UCL	563.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	624.8

95% Adjusted-CLT UCL (Chen-1995)	433.2	97.5% Chebyshev (MVUE) UCL	773.2
95% Modified-t UCL (Johnson-1978)	402.4	99% Chebyshev (MVUE) UCL	1065

Gamma Distribution Test

k star (bias corrected)	0.536
Theta Star	515.6
MLE of Mean	276.2
MLE of Standard Deviation	377.4
nu star	60
Approximate Chi Square Value (.05)	43.19
Adjusted Level of Significance	0.0457
Adjusted Chi Square Value	42.81
Anderson-Darling Test Statistic	1.572
Anderson-Darling 5% Critical Value	0.81
Kolmogorov-Smirnov Test Statistic	0.153
Kolmogorov-Smirnov 5% Critical Value	0.125

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	383.7
95% Adjusted Gamma UCL (Use when n < 40)	387.1

Data Distribution

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	394.3
95% Jackknife UCL	396.4
95% Standard Bootstrap UCL	395.6
95% Bootstrap-t UCL	496.5
95% Hall's Bootstrap UCL	518.3
95% Percentile Bootstrap UCL	401.5
95% BCA Bootstrap UCL	461.6
95% Chebyshev(Mean, Sd) UCL	589.3
97.5% Chebyshev(Mean, Sd) UCL	724.7
99% Chebyshev(Mean, Sd) UCL	990.8

Potential UCL to Use — Use 95% H-UCL 563.1

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

m&p-Xylene OV

General Statistics

Number of Valid Data	33	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	16
		Percent Non-Detects	48.48%

Raw Statistics — **Log-transformed Statistics**

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Detected	0.0045	Minimum Detected	-5.404
Maximum Detected	270	Maximum Detected	5.598
Mean of Detected	38.28	Mean of Detected	0.291
SD of Detected	75.72	SD of Detected	3.587
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	0.33	Maximum Non-Detect	-1.109

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	22
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	66.67%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.589	Shapiro Wilk Test Statistic	0.941
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.73	Mean	-2.44
SD	56.95	SD	3.939
95% DL/2 (t) UCL	36.53	95% H-Stat (DL/2) UCL	26817
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.897
		SD in Log Scale	5.109
		Mean in Original Scale	19.72
		SD in Original Scale	56.96
		95% t UCL	36.52
		95% Percentile Bootstrap UCL	37.25
		95% BCA Bootstrap UCL	42.88
		95% H-UCL	31297154

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.218	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	175.9		
nu star	7.4		
A-D Test Statistic	0.614	**Nonparametric Statistics**	
5% A-D Critical Value	0.876	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.876	Mean	19.72
5% K-S Critical Value	0.231	SD	56.08
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	10.06

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

95% KM (t) UCL	36.77
95% KM (z) UCL	36.28
95% KM (jackknife) UCL	36.52
95% KM (bootstrap t) UCL	59.29
95% KM (BCA) UCL	39.53
95% KM (Percentile Bootstrap) UCL	37.09
95% KM (Chebyshev) UCL	63.59
97.5% KM (Chebyshev) UCL	82.57
99% KM (Chebyshev) UCL	119.9

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	270
Mean	19.72
Median	0.0045
SD	56.96
k star	0.099
Theta star	199.1
Nu star	6.536
AppChi2	1.92
95% Gamma Approximate UCL (Use when n >= 40)	67.15
95% Adjusted Gamma UCL (Use when n < 40)	71.85

Potential UCLs to Use

95% KM (BCA) UCL	39.53

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Manganese M

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	52

Raw Statistics

Minimum	35.7
Maximum	1060
Mean	252.5
Geometric Mean	204.7
Median	197
SD	178.9
Std. Error of Mean	24.12
Coefficient of Variation	0.708
Skewness	2.1

Log-transformed Statistics

Minimum of Log Data	3.575
Maximum of Log Data	6.966
Mean of log Data	5.321
SD of log Data	0.663

Relevant UCL Statistics

Normal Distribution Test

Lilliefors Test Statistic	0.164
Lilliefors Critical Value	0.119

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Lilliefors Test Statistic	0.0754
Lilliefors Critical Value	0.119

Data appear Lognormal at 5% Significance Level

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	292.9	95% H-UCL	305.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	361.3
95% Adjusted-CLT UCL (Chen-1995)	299.5	97.5% Chebyshev (MVUE) UCL	407.8
95% Modified-t UCL (Johnson-1978)	294.1	99% Chebyshev (MVUE) UCL	499.2

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	2.408	**Data appear Gamma Distributed at 5% Significance Level**
Theta Star	104.9	
MLE of Mean	252.5	
MLE of Standard Deviation	162.7	
nu star	264.9	
Approximate Chi Square Value (.05)	228.2	**Nonparametric Statistics**
Adjusted Level of Significance	0.0456	95% CLT UCL 292.2
Adjusted Chi Square Value	227.3	95% Jackknife UCL 292.9
		95% Standard Bootstrap UCL 291.3
Anderson-Darling Test Statistic	0.436	95% Bootstrap-t UCL 299.5
Anderson-Darling 5% Critical Value	0.76	95% Hall's Bootstrap UCL 306.3
Kolmogorov-Smirnov Test Statistic	0.0947	95% Percentile Bootstrap UCL 297.2
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL 300.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 357.7
		97.5% Chebyshev(Mean, Sd) UCL 403.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 492.6
95% Approximate Gamma UCL (Use when n >= 40)	293.1	
95% Adjusted Gamma UCL (Use when n < 40)	294.3	

Potential UCL to Use	Use 95% Approximate Gamma UCL 293.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Mercury M

General Statistics

Number of Valid Data	55	Number of Detected Data	41
Number of Distinct Detected Data	33	Number of Non-Detect Data	14
		Percent Non-Detects	25.45%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.023	Minimum Detected	-3.772
Maximum Detected	5.1	Maximum Detected	1.629

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean of Detected	0.528	Mean of Detected	-1.216
SD of Detected	0.829	SD of Detected	1.042
Minimum Non-Detect	0.043	Minimum Non-Detect	-3.147
Maximum Non-Detect	0.1	Maximum Non-Detect	-2.303

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	37
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	32.73%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.519	Shapiro Wilk Test Statistic	0.972
5% Shapiro Wilk Critical Value	0.941	5% Shapiro Wilk Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.401	Mean	-1.812
SD	0.747	SD	1.368
95% DL/2 (t) UCL	0.57	95% H-Stat (DL/2) UCL	0.709
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.183	Mean in Log Scale	-1.74
SD	0.952	SD in Log Scale	1.284
95% MLE (t) UCL	0.398	Mean in Original Scale	0.404
95% MLE (Tiku) UCL	0.411	SD in Original Scale	0.745
		95% t UCL	0.572
		95% Percentile Bootstrap UCL	0.583
		95% BCA Bootstrap UCL	0.675
		95% H UCL	0.647

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.942	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.561		
nu star	77.22		
A-D Test Statistic	1.432	**Nonparametric Statistics**	
5% A-D Critical Value	0.778	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.778	Mean	0.401
5% K-S Critical Value	0.142	SD	0.74
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.101
		95% KM (t) UCL	0.57
Assuming Gamma Distribution		95% KM (z) UCL	0.568

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.57
Minimum	0.000001	95% KM (bootstrap t) UCL	0.744
Maximum	5.1	95% KM (BCA) UCL	0.602
Mean	0.394	95% KM (Percentile Bootstrap) UCL	0.578
Median	0.17	95% KM (Chebyshev) UCL	0.842
SD	0.751	97.5% KM (Chebyshev) UCL	1.032
k star	0.21	99% KM (Chebyshev) UCL	1.406
Theta star	1.876		
Nu star	23.1	**Potential UCLs to Use**	
AppChi2	13.16	95% KM (Chebyshev) UCL	0.842
95% Gamma Approximate UCL (Use when n >= 40)	0.691		
95% Adjusted Gamma UCL (Use when n < 40)	0.702		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Methyl cyclohexane OV

General Statistics

Number of Valid Data	24	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	22
		Percent Non-Detects	91.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.805	Mean of Detected	-0.612
SD of Detected	0.841	SD of Detected	1.341
Minimum Non-Detect	0.11	Minimum Non-Detect	-2.207
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	95.83%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

US EPA ARCHIVE DOCUMENT

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.193
SD	0.263
95% DL/2 (t) UCL	0.285
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.952
SD	0.648
95% H-Stat (DL/2) UCL	0.233
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.26
SD	0.238
SE of Mean	0.0686
95% KM (t) UCL	0.377
95% KM (z) UCL	0.372

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.044
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.4
Median	N/A	95% KM (Chebyshev) UCL	0.559
SD	N/A	97.5% KM (Chebyshev) UCL	0.688
k star	N/A	99% KM (Chebyshev) UCL	0.943
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (BCA) UCL	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Naphthalene OS

General Statistics

Number of Valid Data	56	Number of Detected Data	17
Number of Distinct Detected Data	16	Number of Non-Detect Data	39
		Percent Non-Detects	69.64%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.052	Minimum Detected	-2.957
Maximum Detected	7.9	Maximum Detected	2.067
Mean of Detected	0.891	Mean of Detected	-1.52
SD of Detected	2.071	SD of Detected	1.436
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.458	Shapiro Wilk Test Statistic	0.816
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1.24
SD	5.031
95% DL/2 (t) UCL	2.365
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.206
SD	1.183
95% H-Stat (DL/2) UCL	0.913
Log ROS Method	
Mean in Log Scale	-1.846
SD in Log Scale	0.884
Mean in Original Scale	0.375
SD in Original Scale	1.17
95% t UCL	0.637
95% Percentile Bootstrap UCL	0.656
95% BCA Bootstrap UCL	0.805
95% H-UCL	0.304

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.417
Theta Star	2.139
nu star	14.17
A-D Test Statistic	2.493
5% A-D Critical Value	0.807
K-S Test Statistic	0.807
5% K-S Critical Value	0.222
Data not Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	7.9
Mean	0.433
Median	0.0904
SD	1.195
k star	0.263
Theta star	1.645
Nu star	29.5
AppChi2	18.1
95% Gamma Approximate UCL (Use when n >= 40)	0.706
95% Adjusted Gamma UCL (Use when n < 40)	0.715

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.377
SD	1.182
SE of Mean	0.167
95% KM (t) UCL	0.656
95% KM (z) UCL	0.651
95% KM (jackknife) UCL	0.65
95% KM (bootstrap t) UCL	1.93
95% KM (BCA) UCL	0.712
95% KM (Percentile Bootstrap) UCL	0.683
95% KM (Chebyshev) UCL	1.104
97.5% KM (Chebyshev) UCL	1.419
99% KM (Chebyshev) UCL	2.037
Potential UCLs to Use	
95% KM (BCA) UCL	0.712

Note: DL/2 is not a recommended method.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Naphthalene OV

General Statistics

Number of Valid Data	30	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	22
		Percent Non-Detects	73.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0033	Minimum Detected	-5.714
Maximum Detected	84	Maximum Detected	4.431
Mean of Detected	15.44	Mean of Detected	-1.831
SD of Detected	30.87	SD of Detected	4.03
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.33%

Warning: There are only 8 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.599	Shapiro Wilk Test Statistic	0.857
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.642	Mean	-3.388
SD	16.63	SD	3.279
95% DL/2 (t) UCL	9.801	95% H-Stat (DL/2) UCL	291.1

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	-4.504
SD in Log Scale	2.605
Mean in Original Scale	4.121
SD in Original Scale	16.68
95% t UCL	9.295
95% Percentile Bootstrap UCL	9.71
95% BCA Bootstrap UCL	12.54
95% H-UCL	3.554

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.187
Theta Star	82.59
nu star	2.991
A-D Test Statistic	0.865
5% A-D Critical Value	0.848
K-S Test Statistic	0.848
5% K-S Critical Value	0.325

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	84
Mean	4.117
Median	0.000001
SD	16.68
k star	0.0855
Theta star	48.15
Nu star	5.13
AppChi2	1.213
95% Gamma Approximate UCL (Use when n >= 40)	17.42
95% Adjusted Gamma UCL (Use when n < 40)	19.06

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	4.125
SD	16.4
SE of Mean	3.201
95% KM (t) UCL	9.563
95% KM (z) UCL	9.389
95% KM (jackknife) UCL	9.299
95% KM (bootstrap t) UCL	942.9
95% KM (BCA) UCL	9.756
95% KM (Percentile Bootstrap) UCL	9.703
95% KM (Chebyshev) UCL	18.08
97.5% KM (Chebyshev) UCL	24.11
99% KM (Chebyshev) UCL	35.97

Potential UCLs to Use

99% KM (Chebyshev) UCL	35.97

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Sec-butylbenzene OV

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	31	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	28
		Percent Non-Detects	90.32%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0029	Minimum Detected	-5.843
Maximum Detected	0.01	Maximum Detected	-4.605
Mean of Detected	0.00583	Mean of Detected	-5.277
SD of Detected	0.00371	SD of Detected	0.626
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.068	Mean	-3.593
SD	11.86	SD	3.159
95% DL/2 (t) UCL	6.682	95% H-Stat (DL/2) UCL	105.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.74
		SD in Log Scale	0.24
		Mean in Original Scale	0.00334
		SD in Original Scale	0.00129

95% t UCL	0.00373
95% Percentile Bootstrap UCL	0.00378
95% BCA Bootstrap UCL	0.00403
95% H-UCL	0.00357

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.00358
SD	0.00162
SE of Mean	0.0005367
95% KM (t) UCL	0.00449
95% KM (z) UCL	0.00446
95% KM (jackknife) UCL	0.00471
95% KM (bootstrap t) UCL	0.0041
95% KM (BCA) UCL	0.01
95% KM (Percentile Bootstrap) UCL	0.01
95% KM (Chebyshev) UCL	0.00592
97.5% KM (Chebyshev) UCL	0.00693
99% KM (Chebyshev) UCL	0.00892

Potential UCLs to Use

95% KM (t) UCL	0.00449
95% KM (Percentile Bootstrap) UCL	0.01

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Tetrachloroethene OV

General Statistics

Number of Valid Data	57	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	41
		Percent Non-Detects	71.93%

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.012	Minimum Detected	-4.423
Maximum Detected	1700	Maximum Detected	7.438
Mean of Detected	109.5	Mean of Detected	-0.568
SD of Detected	424.2	SD of Detected	2.815
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.74%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.284	Shapiro Wilk Test Statistic	0.777
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	30.92	Mean	-2.485
SD	225.1	SD	2.634
95% DL/2 (t) UCL	80.78	95% H-Stat (DL/2) UCL	15.05
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.894
		SD in Log Scale	3.334
		Mean in Original Scale	30.75
		SD in Original Scale	225.1
		95% t UCL	80.62
		95% Percentile Bootstrap UCL	90.27
		95% BCA Bootstrap UCL	149.9
		95% H-UCL	27.4

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.161	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	681.6		
nu star	5.142		
A-D Test Statistic	3.543	**Nonparametric Statistics**	
5% A-D Critical Value	0.899	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.899	Mean	30.77
5% K-S Critical Value	0.24	SD	223.1

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1700
Mean	30.75
Median	0.000001
SD	225.1
k star	0.0716
Theta star	429.2
Nu star	8.166
AppChi2	2.832
95% Gamma Approximate UCL (Use when n >= 40)	88.67
95% Adjusted Gamma UCL (Use when n < 40)	91.28

SE of Mean	30.52
95% KM (t) UCL	81.82
95% KM (z) UCL	80.98
95% KM (jackknife) UCL	80.59
95% KM (bootstrap t) UCL	5612
95% KM (BCA) UCL	90.22
95% KM (Percentile Bootstrap) UCL	90.04
95% KM (Chebyshev) UCL	163.8
97.5% KM (Chebyshev) UCL	221.4
99% KM (Chebyshev) UCL	334.5

Potential UCLs to Use

99% KM (Chebyshev) UCL	334.5

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Thallium M

General Statistics

Number of Valid Data	55	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	46
		Percent Non-Detects	83.64%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.58	Minimum Detected	-0.545
Maximum Detected	13.4	Maximum Detected	2.595
Mean of Detected	5.853	Mean of Detected	1.406
SD of Detected	4.487	SD of Detected	1.016
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	390	Maximum Non-Detect	5.966

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	55
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	75.54
SD	68.06
95% DL/2 (t) UCL	90.9
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.946
5% Shapiro Wilk Critical Value	0.829
Data appear Lognormal at 5% Significance Level	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	2.74
SD	2.583
95% H-Stat (DL/2) UCL	2244
Log ROS Method	
Mean in Log Scale	-0.399
SD in Log Scale	1.064
Mean in Original Scale	1.43
SD in Original Scale	2.642
95% t UCL	2.026
95% Percentile Bootstrap UCL	2.093
95% BCA Bootstrap UCL	2.254
95% H-UCL	1.675

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	1.095
Theta Star	5.346
nu star	19.71
A-D Test Statistic	0.152
5% A-D Critical Value	0.734
K-S Test Statistic	0.734
5% K-S Critical Value	0.284
Data appear Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	13.4
Mean	1.061

Data Distribution Test with Detected Values Only
Data appear Normal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	2.558
SD	3.637
SE of Mean	0.787
95% KM (t) UCL	3.875
95% KM (z) UCL	3.853
95% KM (jackknife) UCL	3.673
95% KM (bootstrap t) UCL	4.18
95% KM (BCA) UCL	5.748
95% KM (Percentile Bootstrap) UCL	4.742

US EPA ARCHIVE DOCUMENT

Median	0.000001	95% KM (Chebyshev) UCL	5.99
SD	2.774	97.5% KM (Chebyshev) UCL	7.475
k star	0.0882	99% KM (Chebyshev) UCL	10.39
Theta star	12.03		
Nu star	9.706	**Potential UCLs to Use**	
AppChi2	3.759	95% KM (t) UCL	3.875
95% Gamma Approximate UCL (Use when n >= 40)	2.741	95% KM (Percentile Bootstrap) UCL	4.742
95% Adjusted Gamma UCL (Use when n < 40)	2.815		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Trichloroethene OV

General Statistics

Number of Valid Data	57	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	39
		Percent Non-Detects	68.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0021	Minimum Detected	-6.166
Maximum Detected	2400	Maximum Detected	7.783
Mean of Detected	136.6	Mean of Detected	-1.064
SD of Detected	564.9	SD of Detected	3.389
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.74%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.261	Shapiro Wilk Test Statistic	0.932
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	43.3	Mean	-2.493

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD	317.8
95% DL/2 (t) UCL	113.7
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

SD	2.77
95% H-Stat (DL/2) UCL	25.47
Log ROS Method	
Mean in Log Scale	-4.432
SD in Log Scale	3.198
Mean in Original Scale	43.13
SD in Original Scale	317.8
95% t UCL	113.5
95% Percentile Bootstrap UCL	127.1
95% BCA Bootstrap UCL	170.3
95% H-UCL	22.89

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.146
Theta Star	934.1
nu star	5.263
A-D Test Statistic	2.968
5% A-D Critical Value	0.911
K-S Test Statistic	0.911
5% K-S Critical Value	0.228

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2400
Mean	43.13
Median	0.000001
SD	317.8
k star	0.0715
Theta star	603.1
Nu star	8.153
AppChi2	2.824
95% Gamma Approximate UCL (Use when n >= 40)	124.5
95% Adjusted Gamma UCL (Use when n < 40)	128.2

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	43.15
SD	315
SE of Mean	42.93
95% KM (t) UCL	114.9
95% KM (z) UCL	113.8
95% KM (jackknife) UCL	113.5
95% KM (bootstrap t) UCL	6448
95% KM (BCA) UCL	127.4
95% KM (Percentile Bootstrap) UCL	127.1
95% KM (Chebyshev) UCL	230.3
97.5% KM (Chebyshev) UCL	311.2
99% KM (Chebyshev) UCL	470.3

Potential UCLs to Use

99% KM (Chebyshev) UCL	470.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Vanadium M

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	51

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.6	Minimum of Log Data	1.526
Maximum	210	Maximum of Log Data	5.347
Mean	22.22	Mean of log Data	2.806
Geometric Mean	16.55	SD of log Data	0.674
Median	15.7		
SD	28.54		
Std. Error of Mean	3.849		
Coefficient of Variation	1.284		
Skewness	5.561		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.268	Lilliefors Test Statistic	0.116
Lilliefors Critical Value	0.119	Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	28.66	95% H-UCL	24.96
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.57
95% Adjusted-CLT UCL (Chen-1995)	31.64	97.5% Chebyshev (MVUE) UCL	33.43
95% Modified-t UCL (Johnson-1978)	29.15	99% Chebyshev (MVUE) UCL	41

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.756	**Data appear Lognormal at 5% Significance Level**	
Theta Star	12.66		
MLE of Mean	22.22		
MLE of Standard Deviation	16.77		
nu star	193.2		
Approximate Chi Square Value (.05)	162	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0456	95% CLT UCL	28.55
Adjusted Chi Square Value	161.2	95% Jackknife UCL	28.66
		95% Standard Bootstrap UCL	28.61
Anderson-Darling Test Statistic	2.291	95% Bootstrap-t UCL	37.56
Anderson-Darling 5% Critical Value	0.764	95% Hall's Bootstrap UCL	54.26
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	29.14
Kolmogorov-Smirnov 5% Critical Value	0.122	95% BCA Bootstrap UCL	31.86

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	39
		97.5% Chebyshev(Mean, Sd) UCL	46.26
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	60.52
95% Approximate Gamma UCL (Use when n >= 40)	26.5		
95% Adjusted Gamma UCL (Use when n < 40)	26.62		
Potential UCL to Use		Use 95% H-UCL	24.96

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Vinyl Chloride OV

General Statistics

Number of Valid Data	56	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	52
		Percent Non-Detects	92.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.07	Minimum Detected	-2.659
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.704	Mean of Detected	-1.349
SD of Detected	1.073	SD of Detected	1.644
Minimum Non-Detect	0.0045	Minimum Non-Detect	-5.404
Maximum Non-Detect	270	Maximum Non-Detect	5.598

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.724
5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.876
5% Shapiro Wilk Critical Value	0.748
Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	3.323
SD	18.16
95% DL/2 (t) UCL	7.384
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-2.604
SD	2.543
95% H-Stat (DL/2) UCL	9.338
Log ROS Method	
Mean in Log Scale	-7.124
SD in Log Scale	1.912
Mean in Original Scale	0.0511
SD in Original Scale	0.31
95% t UCL	0.12
95% Percentile Bootstrap UCL	0.132
95% BCA Bootstrap UCL	0.189
95% H-UCL	0.0127

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.321
Theta Star	2.195
nu star	2.566
A-D Test Statistic	0.464
5% A-D Critical Value	0.676
K-S Test Statistic	0.676
5% K-S Critical Value	0.408
Data appear Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only
Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.3
Mean	0.0503
Median	0.000001
SD	0.31
k star	0.091
Theta star	0.553

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.122
SD	0.314
SE of Mean	0.0514
95% KM (t) UCL	0.208
95% KM (z) UCL	0.206
95% KM (jackknife) UCL	0.193
95% KM (bootstrap t) UCL	0.431
95% KM (BCA) UCL	2.3
95% KM (Percentile Bootstrap) UCL	0.491
95% KM (Chebyshev) UCL	0.346
97.5% KM (Chebyshev) UCL	0.443
99% KM (Chebyshev) UCL	0.634

US EPA ARCHIVE DOCUMENT

Nu star	10.19	**Potential UCLs to Use**	
AppChi2	4.06	95% KM (t) UCL	0.208
95% Gamma Approximate UCL (Use when n >= 40)	0.126		
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Xylene, o OV

General Statistics

Number of Valid Data	33	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	19
		Percent Non-Detects	57.58%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.011	Minimum Detected	-4.51
Maximum Detected	110	Maximum Detected	4.7
Mean of Detected	14.61	Mean of Detected	-0.532
SD of Detected	34.62	SD of Detected	2.852
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.94%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.485	Shapiro Wilk Test Statistic	0.939
5% Shapiro Wilk Critical Value	0.874	5% Shapiro Wilk Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.309	Mean	-3.071
SD	23.23	SD	3.224
95% DL/2 (t) UCL	13.16	95% H-Stat (DL/2) UCL	230.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

MLE method failed to converge properly

Mean in Log Scale	-4.616
SD in Log Scale	4.055
Mean in Original Scale	6.197
SD in Original Scale	23.25
95% t UCL	13.05
95% Percentile Bootstrap UCL	13.24
95% BCA Bootstrap UCL	16.26
95% H-UCL	6395

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.224
Theta Star	65.13
nu star	6.279
A-D Test Statistic	1.265
5% A-D Critical Value	0.863
K-S Test Statistic	0.863
5% K-S Critical Value	0.252

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	110
Mean	6.197
Median	0.000001
SD	23.25
k star	0.0957
Theta star	64.77
Nu star	6.315
AppChi2	1.803
95% Gamma Approximate UCL (Use when n >= 40)	21.71
95% Adjusted Gamma UCL (Use when n < 40)	23.27

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.219
SD	22.89
SE of Mean	4.135
95% KM (t) UCL	13.22
95% KM (z) UCL	13.02
95% KM (jackknife) UCL	13.07
95% KM (bootstrap t) UCL	113.1
95% KM (BCA) UCL	13.53
95% KM (Percentile Bootstrap) UCL	13.05
95% KM (Chebyshev) UCL	24.24
97.5% KM (Chebyshev) UCL	32.04
99% KM (Chebyshev) UCL	47.36

Potential UCLs to Use

99% KM (Chebyshev) UCL	47.36

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Xylenes, Total OV

General Statistics

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Number of Valid Data	55	Number of Detected Data	23
Number of Distinct Detected Data	21	Number of Non-Detect Data	32
		Percent Non-Detects	58.18%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0045	Minimum Detected	-5.404
Maximum Detected	380	Maximum Detected	5.94
Mean of Detected	37.93	Mean of Detected	0.00259
SD of Detected	92.75	SD of Detected	3.614
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	41
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	74.55%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.474	Shapiro Wilk Test Statistic	0.942
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	15.92	Mean	-1.935
SD	62.13	SD	3.17
95% DL/2 (t) UCL	29.94	95% H-Stat (DL/2) UCL	237.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.771
		SD in Log Scale	4.124
		Mean in Original Scale	15.86
		SD in Original Scale	62.14
		95% t UCL	29.89
		95% Percentile Bootstrap UCL	31.66
		95% BCA Bootstrap UCL	36.58
		95% H-UCL	5666

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.205	**Data Follow Appr. Gamma Distribution at 5% Significance Level**
Theta Star	185.2	
nu star	9.422	

A-D Test Statistic	0.86
5% A-D Critical Value	0.893
K-S Test Statistic	0.893
5% K-S Critical Value	0.201

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	380
Mean	15.86
Median	0.000001
SD	62.14
k star	0.0854
Theta star	185.7
Nu star	9.394
AppChi2	3.567
95% Gamma Approximate UCL (Use when n >= 40)	41.77
95% Adjusted Gamma UCL (Use when n < 40)	42.94

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	15.87
SD	61.57
SE of Mean	8.489
95% KM (t) UCL	30.08
95% KM (z) UCL	29.83
95% KM (jackknife) UCL	29.89
95% KM (bootstrap t) UCL	66.88
95% KM (BCA) UCL	30.74
95% KM (Percentile Bootstrap) UCL	30.37
95% KM (Chebyshev) UCL	52.87
97.5% KM (Chebyshev) UCL	68.88
99% KM (Chebyshev) UCL	100.3

Potential UCLs to Use

95% KM (t) UCL	30.08

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Zinc M

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	54

Raw Statistics

Minimum	20.1
Maximum	3330
Mean	467.4
Geometric Mean	137.9
Median	106
SD	896.5
Std. Error of Mean	120.9
Coefficient of Variation	1.918
Skewness	2.381

Log-transformed Statistics

Minimum of Log Data	3.001
Maximum of Log Data	8.111
Mean of log Data	4.927
SD of log Data	1.437

Relevant UCL Statistics

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Normal Distribution Test	
Lilliefors Test Statistic	0.371
Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
95% Student's-t UCL	669.7
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL (Chen-1995)	707.7
95% Modified-t UCL (Johnson-1978)	676.2

Lognormal Distribution Test	
Lilliefors Test Statistic	0.136
Lilliefors Critical Value	0.119
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
95% H-UCL	689.2
95% Chebyshev (MVUE) UCL	789.6
97.5% Chebyshev (MVUE) UCL	969.5
99% Chebyshev (MVUE) UCL	1323

Gamma Distribution Test	
k star (bias corrected)	0.501
Theta Star	932
MLE of Mean	467.4
MLE of Standard Deviation	660
nu star	55.16
Approximate Chi Square Value (.05)	39.1
Adjusted Level of Significance	0.0456
Adjusted Chi Square Value	38.73
Anderson-Darling Test Statistic	4.937
Anderson-Darling 5% Critical Value	0.814
Kolmogorov-Smirnov Test Statistic	0.233
Kolmogorov-Smirnov 5% Critical Value	0.127
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL (Use when n >= 40)	659.5
95% Adjusted Gamma UCL (Use when n < 40)	665.7

Data Distribution	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
95% CLT UCL	666.2
95% Jackknife UCL	669.7
95% Standard Bootstrap UCL	672.4
95% Bootstrap-t UCL	736.1
95% Hall's Bootstrap UCL	681.8
95% Percentile Bootstrap UCL	669.2
95% BCA Bootstrap UCL	720.7
95% Chebyshev(Mean, Sd) UCL	994.3
97.5% Chebyshev(Mean, Sd) UCL	1222
99% Chebyshev(Mean, Sd) UCL	1670

Potential UCL to Use	
Use 95% Chebyshev (Mean, Sd) UCL	994.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

1,2,4-trichlorobenzene OV

General Statistics			
Number of Valid Data	54	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	47
		Percent Non-Detects	87.04%

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0048	Minimum Detected	-5.339
Maximum Detected	270	Maximum Detected	5.598
Mean of Detected	47.47	Mean of Detected	-1.217
SD of Detected	100.8	SD of Detected	4.351
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	52
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	96.30%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.574	Shapiro Wilk Test Statistic	0.845
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.51	Mean	-2.725
SD	37.5	SD	2.584
95% DL/2 (t) UCL	15.05	95% H-Stat (DL/2) UCL	9.417
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-10.28
		SD in Log Scale	4.347
		Mean in Original Scale	6.154
		SD in Original Scale	37.54
		95% t UCL	14.71
		95% Percentile Bootstrap UCL	16.15
		95% BCA Bootstrap UCL	22.3
		95% H-UCL	32.53

Gamma Distribution Test with Detected Values Only | **Data Distribution Test with Detected Values Only**

Table B-2
ProUCL Output - Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

k star (bias corrected)	0.182
Theta Star	261.3
nu star	2.543
A-D Test Statistic	0.838
5% A-D Critical Value	0.84
K-S Test Statistic	0.84
5% K-S Critical Value	0.345

Data Follow Appr. Gamma Distribution at 5% Significance Level

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	270
Mean	6.153
Median	0.000001
SD	37.54
k star	0.0702
Theta star	87.59
Nu star	7.587
AppChi2	2.498
95% Gamma Approximate UCL (Use when n >= 40)	18.69
95% Adjusted Gamma UCL (Use when n < 40)	19.3

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.164
SD	37.19
SE of Mean	5.467
95% KM (t) UCL	15.32
95% KM (z) UCL	15.16
95% KM (jackknife) UCL	14.71
95% KM (bootstrap t) UCL	4182
95% KM (BCA) UCL	16.17
95% KM (Percentile Bootstrap) UCL	16.15
95% KM (Chebyshev) UCL	29.99
97.5% KM (Chebyshev) UCL	40.3
99% KM (Chebyshev) UCL	60.56

Potential UCLs to Use

95% KM (t) UCL	15.32

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	0-5_NoSpaces.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2,3-trichlorobenzene OV

General Statistics

Number of Valid Data	43	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	38
		Percent Non-Detects	88.37%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0028	Minimum Detected	-5.878
Maximum Detected	180	Maximum Detected	5.193
Mean of Detected	55.81	Mean of Detected	0.714
SD of Detected	77.41	SD of Detected	4.869
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	41
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	95.35%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.813	Shapiro Wilk Test Statistic	0.88
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.861	Mean	-3.918

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD	29.92
95% DL/2 (t) UCL	14.54
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

SD	3.17
95% H-Stat (DL/2) UCL	42.78
Log ROS Method	
Mean in Log Scale	-5.821
SD in Log Scale	2.985
Mean in Original Scale	6.491
SD in Original Scale	29.97
95% t UCL	14.18
95% Percentile Bootstrap UCL	14.91
95% BCA Bootstrap UCL	19.42
95% H-UCL	2.711

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.221
Theta Star	252.5
nu star	2.21
A-D Test Statistic	0.336
5% A-D Critical Value	0.768
K-S Test Statistic	0.768
5% K-S Critical Value	0.387

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	180
Mean	6.49
Median	0.000001
SD	29.97
k star	0.0725
Theta star	89.45
Nu star	6.239
AppChi2	1.763
95% Gamma Approximate UCL (Use when n >= 40)	22.96
95% Adjusted Gamma UCL (Use when n < 40)	24.07

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.502
SD	29.62
SE of Mean	5.051
95% KM (t) UCL	15
95% KM (z) UCL	14.81
95% KM (jackknife) UCL	14.15
95% KM (bootstrap t) UCL	55.5
95% KM (BCA) UCL	92.02
95% KM (Percentile Bootstrap) UCL	27.44
95% KM (Chebyshev) UCL	28.52
97.5% KM (Chebyshev) UCL	38.05
99% KM (Chebyshev) UCL	56.76

Potential UCLs to Use

95% KM (t) UCL	15
95% KM (Percentile Bootstrap) UCL	27.44

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

HCX

General Statistics

Number of Valid Data	49	Number of Detected Data	45
Number of Distinct Detected Data	45	Number of Non-Detect Data	4
		Percent Non-Detects	8.16%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.25E-06	Log Statistics Not Avaliable	
Maximum Detected	0.0938		
Mean of Detected	0.00962		
Mean of Detected	0.00962		
Mean of Detected	0.00962		
Maximum Non-Detect	0.00135		
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.39%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.475	Not Available	
5% Shapiro Wilk Critical Value	0.945		
Data not Normal at 5% Significance Level			

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	N/A
Mean	0.00884		
SD	0.0223		
95% DL/2 (t) UCL	0.0142		
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	N/A
Mean	-0.0264		
SD	0.0502		
95% MLE (t) UCL	-0.0143		
95% MLE (Tiku) UCL	-0.00549		

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only
Gamma Statistics Not Available	Data do not follow a Discernable Distribution (0.05)

Potential UCLs to Use		Nonparametric Statistics
99% KM (Chebyshev) UCL	0.0405	Kaplan-Meier (KM) Method

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	0.00883
SD	0.0221
SE of Mean	0.00319
95% KM (t) UCL	0.0142
95% KM (z) UCL	0.0141
95% KM (jackknife) UCL	0.0142
95% KM (bootstrap t) UCL	0.0169
95% KM (BCA) UCL	0.0144
95% KM (Percentile Bootstrap) UCL	0.0145
95% KM (Chebyshev) UCL	0.0227
97.5% KM (Chebyshev) UCL	0.0287
99% KM (Chebyshev) UCL	0.0405

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2,4-trichlorobenzene OS

General Statistics

Number of Valid Data	60	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	53
		Percent Non-Detects	88.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	69	Maximum Detected	4.234
Mean of Detected	13.85	Mean of Detected	0.232
SD of Detected	25.49	SD of Detected	2.723
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	60
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

US EPA ARCHIVE DOCUMENT

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.644
5% Shapiro Wilk Critical Value	0.803

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	2.711
SD	10.26
95% DL/2 (t) UCL	4.926
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.817
5% Shapiro Wilk Critical Value	0.803

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.804
SD	1.344
95% H-Stat (DL/2) UCL	1.868
Log ROS Method	
Mean in Log Scale	-1.398
SD in Log Scale	1.258
Mean in Original Scale	1.844
SD in Original Scale	9.246
95% t UCL	3.839
95% Percentile Bootstrap UCL	4.109
95% BCA Bootstrap UCL	5.975
95% H-UCL	0.872

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.261
Theta Star	53.13
nu star	3.649
A-D Test Statistic	0.692
5% A-D Critical Value	0.788
K-S Test Statistic	0.788
5% K-S Critical Value	0.336

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	69
Mean	2.333
Median	0.000001
SD	9.377
k star	0.0897

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.784
SD	9.257
SE of Mean	1.302
95% KM (t) UCL	3.959
95% KM (z) UCL	3.925
95% KM (jackknife) UCL	3.816
95% KM (bootstrap t) UCL	19.04
95% KM (BCA) UCL	4.399
95% KM (Percentile Bootstrap) UCL	4.244
95% KM (Chebyshev) UCL	7.459
97.5% KM (Chebyshev) UCL	9.914
99% KM (Chebyshev) UCL	14.74

Theta star	26.02
Nu star	10.76
AppChi2	4.421
95% Gamma Approximate UCL (Use when n >= 40)	5.677
95% Adjusted Gamma UCL (Use when n < 40)	5.809

Potential UCLs to Use

95% KM (t) UCL	3.959

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2,4-trichlorobenzene OV

General Statistics

Number of Valid Data	67	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	58
		Percent Non-Detects	86.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0018	Minimum Detected	-6.32
Maximum Detected	340	Maximum Detected	5.829
Mean of Detected	74.7	Mean of Detected	-1.001
SD of Detected	133.3	SD of Detected	4.858
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	95.52%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.633	Shapiro Wilk Test Statistic	0.848
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	10.32
SD	52.99
95% DL/2 (t) UCL	21.12
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-3.104
SD	2.802
95% H-Stat (DL/2) UCL	7.424
Log ROS Method	
Mean in Log Scale	-7.728
SD in Log Scale	3.495
Mean in Original Scale	10.03
SD in Original Scale	53.03
95% t UCL	20.84
95% Percentile Bootstrap UCL	22.16
95% BCA Bootstrap UCL	28.24
95% H-UCL	1.348

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.171
Theta Star	437
nu star	3.077
A-D Test Statistic	0.92
5% A-D Critical Value	0.865
K-S Test Statistic	0.865
5% K-S Critical Value	0.31
Data not Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only
Data appear Lognormal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	10.04
SD	52.63
SE of Mean	6.82
95% KM (t) UCL	21.42
95% KM (z) UCL	21.26
95% KM (jackknife) UCL	20.85
95% KM (bootstrap t) UCL	73.76
95% KM (BCA) UCL	24.1
95% KM (Percentile Bootstrap) UCL	22.26
95% KM (Chebyshev) UCL	39.77
97.5% KM (Chebyshev) UCL	52.63
99% KM (Chebyshev) UCL	77.9

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	340
Mean	10.03
Median	0.000001
SD	53.03
k star	0.067
Theta star	149.7
Nu star	8.982
AppChi2	3.316
95% Gamma Approximate UCL (Use when n >= 40)	27.18
95% Adjusted Gamma UCL (Use when n < 40)	27.81

Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	52.63

Note: DL/2 is not a recommended method.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2,4-trimethylbenzene OV

General Statistics

Number of Valid Data	43	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	28
		Percent Non-Detects	65.12%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0017	Minimum Detected	-6.377
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	22.93	Mean of Detected	-1.286
SD of Detected	49.11	SD of Detected	3.779
Minimum Non-Detect	0.0045	Minimum Non-Detect	-5.404
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	40
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.02%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.542	Shapiro Wilk Test Statistic	0.924
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.29	Mean	-3.57
SD	30.39	SD	3.278
95% DL/2 (t) UCL	16.08	95% H-Stat (DL/2) UCL	102.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.66
		SD in Log Scale	3.389
		Mean in Original Scale	8
		SD in Original Scale	30.43
		95% t UCL	15.81
		95% Percentile Bootstrap UCL	15.92

95% BCA Bootstrap UCL	19.35
95% H-UCL	59.88

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.181
Theta Star	126.7
nu star	5.429
A-D Test Statistic	1.3
5% A-D Critical Value	0.887
K-S Test Statistic	0.887
5% K-S Critical Value	0.246

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	160
Mean	7.998
Median	0.000001
SD	30.43
k star	0.0835
Theta star	95.77
Nu star	7.183
AppChi2	2.271
95% Gamma Approximate UCL (Use when n >= 40)	25.29
95% Adjusted Gamma UCL (Use when n < 40)	26.39

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	8.007
SD	30.08
SE of Mean	4.748
95% KM (t) UCL	15.99
95% KM (z) UCL	15.82
95% KM (jackknife) UCL	15.81
95% KM (bootstrap t) UCL	21.74
95% KM (BCA) UCL	16.94
95% KM (Percentile Bootstrap) UCL	15.86
95% KM (Chebyshev) UCL	28.7
97.5% KM (Chebyshev) UCL	37.66
99% KM (Chebyshev) UCL	55.24

Potential UCLs to Use

99% KM (Chebyshev) UCL	55.24

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2-dichlorobenzene OS

General Statistics

Number of Valid Data	60	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	53
		Percent Non-Detects	88.33%

Raw Statistics

Minimum Detected	0.057

Log-transformed Statistics

Minimum Detected	-2.865

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Detected	440	Maximum Detected	6.087
Mean of Detected	108.4	Mean of Detected	1.845
SD of Detected	161.6	SD of Detected	3.77
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.00%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.74	Shapiro Wilk Test Statistic	0.857
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.73	Mean	-0.618
SD	62.3	SD	1.777
95% DL/2 (t) UCL	27.17	95% H-Stat (DL/2) UCL	5.984
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.359
		SD in Log Scale	1.961
		Mean in Original Scale	12.91
		SD in Original Scale	62.29
		95% t UCL	26.34
		95% Percentile Bootstrap UCL	27.7
		95% BCA Bootstrap UCL	39.41
		95% H-UCL	4.678

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.238	**Data appear Gamma Distributed at 5% Significance Level**
Theta Star	455	
nu star	3.334	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

A-D Test Statistic	0.471
5% A-D Critical Value	0.803
K-S Test Statistic	0.803
5% K-S Critical Value	0.338

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	440
Mean	14.75
Median	0.000001
SD	62.62
k star	0.0787
Theta star	187.4
Nu star	9.449
AppChi2	3.6
95% Gamma Approximate UCL (Use when n >= 40)	38.72
95% Adjusted Gamma UCL (Use when n < 40)	39.7

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	12.78
SD	61.8
SE of Mean	8.617
95% KM (t) UCL	27.18
95% KM (z) UCL	26.96
95% KM (jackknife) UCL	26.23
95% KM (bootstrap t) UCL	43.85
95% KM (BCA) UCL	34.77
95% KM (Percentile Bootstrap) UCL	32.06
95% KM (Chebyshev) UCL	50.35
97.5% KM (Chebyshev) UCL	66.6
99% KM (Chebyshev) UCL	98.52

Potential UCLs to Use

95% KM (t) UCL	27.18

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2-dichlorobenzene OV

General Statistics

Number of Valid Data	68	Number of Detected Data	19
Number of Distinct Detected Data	19	Number of Non-Detect Data	49
		Percent Non-Detects	72.06%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0021	Minimum Detected	-6.166
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	234.8	Mean of Detected	-0.313
SD of Detected	709.2	SD of Detected	4.135
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended — Number treated as Non-Detect 64

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.12%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.385	Shapiro Wilk Test Statistic	0.951
5% Shapiro Wilk Critical Value	0.901	5% Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	65.71	Mean	-2.847
SD	382.6	SD	3.194
95% DL/2 (t) UCL	143.1	95% H-Stat (DL/2) UCL	44.78
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.655
		SD in Log Scale	4.161
		Mean in Original Scale	65.6
		SD in Original Scale	382.6
		95% t UCL	143
		95% Percentile Bootstrap UCL	149.5
		95% BCA Bootstrap UCL	191
		95% H-UCL	305.2

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.149	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1577		
nu star	5.658		
A-D Test Statistic	1.869	**Nonparametric Statistics**	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	65.61
5% K-S Critical Value	0.222	SD	379.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	47.32
		95% KM (t) UCL	144.5
Assuming Gamma Distribution		95% KM (z) UCL	143.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	143
Minimum	0.000001	95% KM (bootstrap t) UCL	2458
Maximum	2800	95% KM (BCA) UCL	169.1
Mean	65.6	95% KM (Percentile Bootstrap) UCL	150.1
Median	0.000001	95% KM (Chebyshev) UCL	271.9
SD	382.6	97.5% KM (Chebyshev) UCL	361.1

k star	0.0676	99% KM (Chebyshev) UCL	536.4
Theta star	971		
Nu star	9.188	**Potential UCLs to Use**	
AppChi2	3.441	97.5% KM (Chebyshev) UCL	361.1
95% Gamma Approximate UCL (Use when n >= 40)	175.2		
95% Adjusted Gamma UCL (Use when n < 40)	179.1		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,3-dichlorobenzene OS

General Statistics

Number of Valid Data	60	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	60
		Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,3-dichlorobenzene OS was not processed!

1,3-dichlorobenzene OV

General Statistics

Number of Valid Data	67	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	62
		Percent Non-Detects	92.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0013	Minimum Detected	-6.645
Maximum Detected	13	Maximum Detected	2.565
Mean of Detected	2.68	Mean of Detected	-3.267
SD of Detected	5.772	SD of Detected	3.945
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	67
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.572	Shapiro Wilk Test Statistic	0.848
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.901	Mean	-3.242
SD	8.801	SD	2.628
95% DL/2 (t) UCL	3.694	95% H-Stat (DL/2) UCL	3.503
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.59
		SD in Log Scale	1.435
		Mean in Original Scale	0.204
		SD in Original Scale	1.588
		95% t UCL	0.528
		95% Percentile Bootstrap UCL	0.588
		95% BCA Bootstrap UCL	0.797
		95% H-UCL	0.0157
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.204	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	13.14		
nu star	2.039		
A-D Test Statistic	0.627	**Nonparametric Statistics**	
5% A-D Critical Value	0.787	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.787	Mean	0.213
5% K-S Critical Value	0.391	SD	1.612
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.225

95% KM (t) UCL	0.589
95% KM (z) UCL	0.583
95% KM (jackknife) UCL	0.552
95% KM (bootstrap t) UCL	84.57
95% KM (BCA) UCL	0.809
95% KM (Percentile Bootstrap) UCL	0.632
95% KM (Chebyshev) UCL	1.195
97.5% KM (Chebyshev) UCL	1.62
99% KM (Chebyshev) UCL	2.454

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	13
Mean	0.275
Median	0.000001
SD	1.599
k star	0.0905
Theta star	3.039
Nu star	12.13
AppChi2	5.313
95% Gamma Approximate UCL (Use when n >= 40)	0.628
95% Adjusted Gamma UCL (Use when n < 40)	0.64

Potential UCLs to Use

95% KM (t) UCL	0.589

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,4-dichlorobenzene OS

General Statistics

Number of Valid Data	60	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	56
		Percent Non-Detects	93.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	6.6	Maximum Detected	1.887
Mean of Detected	3.16	Mean of Detected	0.521
SD of Detected	2.649	SD of Detected	1.701
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	60
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.943
5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1.322
SD	4.821
95% DL/2 (t) UCL	2.362
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.811
5% Shapiro Wilk Critical Value	0.748
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-0.854
SD	1.094
95% H-Stat (DL/2) UCL	1.108
Log ROS Method	
Mean in Log Scale	-1.775
SD in Log Scale	0.906
Mean in Original Scale	0.367
SD in Original Scale	0.966
95% t UCL	0.575
95% Percentile Bootstrap UCL	0.593
95% BCA Bootstrap UCL	0.684
95% H-UCL	0.332

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.398
Theta Star	7.939
nu star	3.184
A-D Test Statistic	0.45
5% A-D Critical Value	0.668
K-S Test Statistic	0.668
5% K-S Critical Value	0.403
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	6.6
Mean	0.439
Median	0.000001

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.354
SD	0.98
SE of Mean	0.15
95% KM (t) UCL	0.604
95% KM (z) UCL	0.6
95% KM (jackknife) UCL	2.088
95% KM (bootstrap t) UCL	0.551
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	6.6
95% KM (Chebyshev) UCL	1.007

SD	1.057	97.5% KM (Chebyshev) UCL	1.289
k star	0.106	99% KM (Chebyshev) UCL	1.845
Theta star	4.146		
Nu star	12.7	**Potential UCLs to Use**	
AppChi2	5.694	95% KM (t) UCL	0.604
95% Gamma Approximate UCL (Use when n >= 40)	0.979	95% KM (Percentile Bootstrap) UCL	6.6
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,4-dichlorobenzene OV

General Statistics

Number of Valid Data	68	Number of Detected Data	12
Number of Distinct Detected Data	11	Number of Non-Detect Data	56
		Percent Non-Detects	82.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0041	Minimum Detected	-5.497
Maximum Detected	40	Maximum Detected	3.689
Mean of Detected	8.684	Mean of Detected	-1.635
SD of Detected	15.61	SD of Detected	3.494
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.59%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.595	Shapiro Wilk Test Statistic	0.853
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.811	Mean	-3.196
SD	7.178	SD	2.589

95% DL/2 (t) UCL	3.263
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

95% H-Stat (DL/2) UCL	3.133
Log ROS Method	
Mean in Log Scale	-8.192
SD in Log Scale	3.67
Mean in Original Scale	1.533
SD in Original Scale	7.151
95% t UCL	2.979
95% Percentile Bootstrap UCL	3.055
95% BCA Bootstrap UCL	3.651
95% H-UCL	1.865

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.202
Theta Star	43.09
nu star	4.837
A-D Test Statistic	1.256
5% A-D Critical Value	0.867
K-S Test Statistic	0.867
5% K-S Critical Value	0.271

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	40
Mean	1.533
Median	0.000001
SD	7.151
k star	0.0767
Theta star	19.98
Nu star	10.43
AppChi2	4.215
95% Gamma Approximate UCL (Use when n >= 40)	3.794
95% Adjusted Gamma UCL (Use when n < 40)	3.873

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.54
SD	7.096
SE of Mean	0.899
95% KM (t) UCL	3.039
95% KM (z) UCL	3.019
95% KM (jackknife) UCL	2.984
95% KM (bootstrap t) UCL	3.564
95% KM (BCA) UCL	3.041
95% KM (Percentile Bootstrap) UCL	3.167
95% KM (Chebyshev) UCL	5.458
97.5% KM (Chebyshev) UCL	7.153
99% KM (Chebyshev) UCL	10.48

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	7.153

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

4,4`-DDE PESTP

General Statistics

Number of Valid Data	84	Number of Detected Data	48
Number of Distinct Detected Data	46	Number of Non-Detect Data	36
		Percent Non-Detects	42.86%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00077	Minimum Detected	-7.169
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.232	Mean of Detected	-3.493
SD of Detected	0.498	SD of Detected	2.14
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.527	Shapiro Wilk Test Statistic	0.948
5% Shapiro Wilk Critical Value	0.947	5% Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.182	Mean	-3.883
SD	0.436	SD	2.195
95% DL/2 (t) UCL	0.261	95% H-Stat (DL/2) UCL	0.547
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.57
		SD in Log Scale	2.138
		Mean in Original Scale	0.134
		SD in Original Scale	0.392
		95% t UCL	0.206
		95% Percentile Bootstrap UCL	0.214
		95% BCA Bootstrap UCL	0.224
		95% H-UCL	0.234

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.326	**Data appear Lognormal at 5% Significance Level**	

Theta Star	0.711
nu star	31.34
A-D Test Statistic	2.942
5% A-D Critical Value	0.854
K-S Test Statistic	0.854
5% K-S Critical Value	0.138

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.2
Mean	0.134
Median	0.00465
SD	0.392
k star	0.141
Theta star	0.95
Nu star	23.63
AppChi2	13.56
95% Gamma Approximate UCL (Use when n >= 40)	0.233
95% Adjusted Gamma UCL (Use when n < 40)	0.235

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.139
SD	0.392
SE of Mean	0.0435
95% KM (t) UCL	0.211
95% KM (z) UCL	0.21
95% KM (jackknife) UCL	0.211
95% KM (bootstrap t) UCL	0.245
95% KM (BCA) UCL	0.217
95% KM (Percentile Bootstrap) UCL	0.213
95% KM (Chebyshev) UCL	0.328
97.5% KM (Chebyshev) UCL	0.411
99% KM (Chebyshev) UCL	0.572

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.411

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4-chloroaniline OS

General Statistics

Number of Valid Data	86	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	81
		Percent Non-Detects	94.19%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.059	Minimum Detected	-2.83
Maximum Detected	280	Maximum Detected	5.635
Mean of Detected	57.46	Mean of Detected	0.681
SD of Detected	124.4	SD of Detected	3.225
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	85
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.84%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.567	Shapiro Wilk Test Statistic	0.947
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.495	Mean	-0.851
SD	30.38	SD	1.295
95% DL/2 (t) UCL	9.943	95% H-Stat (DL/2) UCL	1.413
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.513
		SD in Log Scale	1.656
		Mean in Original Scale	3.378
		SD in Original Scale	30.19
		95% t UCL	8.792
		95% Percentile Bootstrap UCL	9.881
		95% BCA Bootstrap UCL	16.4
		95% H-UCL	0.2

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.22	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	261.6		
nu star	2.197		
A-D Test Statistic	0.575	**Nonparametric Statistics**	
5% A-D Critical Value	0.77	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.77	Mean	3.413
5% K-S Critical Value	0.387	SD	30.01

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	280
Mean	3.61
Median	0.000001
SD	30.2
k star	0.0681
Theta star	53.02
Nu star	11.71
AppChi2	5.036
95% Gamma Approximate UCL (Use when n >= 40)	8.393
95% Adjusted Gamma UCL (Use when n < 40)	8.519

SE of Mean	3.618
95% KM (t) UCL	9.43
95% KM (z) UCL	9.364
95% KM (jackknife) UCL	8.54
95% KM (bootstrap t) UCL	426.3
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	10.37
95% KM (Chebyshev) UCL	19.18
97.5% KM (Chebyshev) UCL	26.01
99% KM (Chebyshev) UCL	39.41

Potential UCLs to Use

95% KM (t) UCL	9.43

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4-iso-Propyltoluene OV

General Statistics

Number of Valid Data	43	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	40
		Percent Non-Detects	93.02%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.034	Minimum Detected	-3.381
Maximum Detected	0.18	Maximum Detected	-1.715
Mean of Detected	0.111	Mean of Detected	-2.405
SD of Detected	0.0734	SD of Detected	0.869
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.99
5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	2.899
SD	10.93
95% DL/2 (t) UCL	5.703
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.767
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-3.887
SD	3.032
95% H-Stat (DL/2) UCL	23.25
Log ROS Method	
Mean in Log Scale	-7.633
SD in Log Scale	1.611
Mean in Original Scale	0.00815
SD in Original Scale	0.0328
95% t UCL	0.0166
95% Percentile Bootstrap UCL	0.0173
95% BCA Bootstrap UCL	0.0201
95% H-UCL	0.00385

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.041
SD	0.0286
SE of Mean	0.00611
95% KM (t) UCL	0.0513
95% KM (z) UCL	0.0511
95% KM (jackknife) UCL	0.0954
95% KM (bootstrap t) UCL	0.0453

Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.18
Median	N/A	95% KM (Chebyshev) UCL	0.0677
SD	N/A	97.5% KM (Chebyshev) UCL	0.0792
k star	N/A	99% KM (Chebyshev) UCL	0.102
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (t) UCL	0.0513
95% Gamma Approximate UCL (Use when n >= 40)	N/A	95% KM (Percentile Bootstrap) UCL	0.18
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aldrin PESTP

General Statistics

Number of Valid Data	85	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	76
		Percent Non-Detects	89.41%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0012	Minimum Detected	-6.725
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.32	Mean of Detected	-3.777
SD of Detected	0.488	SD of Detected	2.894
Minimum Non-Detect	0.000106	Minimum Non-Detect	-9.152
Maximum Non-Detect	2	Maximum Non-Detect	0.693

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	85
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.696
5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.0899
SD	0.249
95% DL/2 (t) UCL	0.135
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.823
5% Shapiro Wilk Critical Value	0.829
Data not Lognormal at 5% Significance Level	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-5.153
SD	2.294
95% H-Stat (DL/2) UCL	0.205
Log ROS Method	
Mean in Log Scale	-8.773
SD in Log Scale	2.497
Mean in Original Scale	0.0342
SD in Original Scale	0.18
95% t UCL	0.0667
95% Percentile Bootstrap UCL	0.0702
95% BCA Bootstrap UCL	0.079
95% H-UCL	0.0104

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.252
Theta Star	1.272
nu star	4.531
A-D Test Statistic	0.994
5% A-D Critical Value	0.82
K-S Test Statistic	0.82
5% K-S Critical Value	0.303
Data not Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1.2
Mean	0.0357
Median	0.000001
SD	0.18
k star	0.0945
Theta star	0.377
Nu star	16.07

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.0364
SD	0.182
SE of Mean	0.0213
95% KM (t) UCL	0.0719
95% KM (z) UCL	0.0715
95% KM (jackknife) UCL	0.07
95% KM (bootstrap t) UCL	0.0986
95% KM (BCA) UCL	0.0711
95% KM (Percentile Bootstrap) UCL	0.0744
95% KM (Chebyshev) UCL	0.129
97.5% KM (Chebyshev) UCL	0.17
99% KM (Chebyshev) UCL	0.249
Potential UCLs to Use	

AppChi2	8.014	97.5% KM (Chebyshev) UCL	0.17
95% Gamma Approximate UCL (Use when n >= 40)	0.0715		
95% Adjusted Gamma UCL (Use when n < 40)	0.0724		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Aluminum M

General Statistics

Number of Valid Observations	83	Number of Distinct Observations	78

Raw Statistics		**Log-transformed Statistics**	
Minimum	1260	Minimum of Log Data	7.139
Maximum	13000	Maximum of Log Data	9.473
Mean	6050	Mean of log Data	8.595
Geometric Mean	5404	SD of log Data	0.498
Median	5590		
SD	2785		
Std. Error of Mean	305.6		
Coefficient of Variation	0.46		
Skewness	0.631		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0985	Lilliefors Test Statistic	0.072
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6558	95% H-UCL	6770
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7642
95% Adjusted-CLT UCL (Chen-1995)	6575	97.5% Chebyshev (MVUE) UCL	8306
95% Modified-t UCL (Johnson-1978)	6562	99% Chebyshev (MVUE) UCL	9610

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	4.428	**Data appear Gamma Distributed at 5% Significance Level**
Theta Star	1366	
MLE of Mean	6050	
MLE of Standard Deviation	2875	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

nu star	735.1
Approximate Chi Square Value (.05)	673.1
Adjusted Level of Significance	0.0471
Adjusted Chi Square Value	672.1
Anderson-Darling Test Statistic	0.166
Anderson-Darling 5% Critical Value	0.755
Kolmogorov-Smirnov Test Statistic	0.0461
Kolmogorov-Smirnov 5% Critical Value	0.0984
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL (Use when n >= 40)	6606
95% Adjusted Gamma UCL (Use when n < 40)	6616
Potential UCL to Use	

Nonparametric Statistics

95% CLT UCL	6553
95% Jackknife UCL	6558
95% Standard Bootstrap UCL	6545
95% Bootstrap-t UCL	6558
95% Hall's Bootstrap UCL	6556
95% Percentile Bootstrap UCL	6553
95% BCA Bootstrap UCL	6581
95% Chebyshev(Mean, Sd) UCL	7382
97.5% Chebyshev(Mean, Sd) UCL	7959
99% Chebyshev(Mean, Sd) UCL	9091
Use 95% Approximate Gamma UCL	6606

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Antimony M

General Statistics

Number of Valid Data	81	Number of Detected Data	38
Number of Distinct Detected Data	36	Number of Non-Detect Data	43
		Percent Non-Detects	53.09%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.28	Minimum Detected	-1.273
Maximum Detected	27.8	Maximum Detected	3.325
Mean of Detected	4.696	Mean of Detected	0.58
SD of Detected	7.038	SD of Detected	1.394
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	9.4	Maximum Non-Detect	2.241

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	75
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	6
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.59%

UCL Statistics

Normal Distribution Test with Detected Values Only | **Lognormal Distribution Test with Detected Values Only**

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Shapiro Wilk Test Statistic	0.661
5% Shapiro Wilk Critical Value	0.938

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	3.304
SD	5.067
95% DL/2 (t) UCL	4.241
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Shapiro Wilk Test Statistic	0.91
5% Shapiro Wilk Critical Value	0.938

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	0.45
SD	1.22
95% H-Stat (DL/2) UCL	4.612
Log ROS Method	
Mean in Log Scale	-0.0257
SD in Log Scale	1.168
Mean in Original Scale	2.544
SD in Original Scale	5.206
95% t UCL	3.506
95% Percentile Bootstrap UCL	3.589
95% BCA Bootstrap UCL	3.779
95% H-UCL	2.635

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.601
Theta Star	7.81
nu star	45.7
A-D Test Statistic	2.103
5% A-D Critical Value	0.8
K-S Test Statistic	0.8
5% K-S Critical Value	0.15

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	27.8
Mean	2.402
Median	0.443
SD	5.297
k star	0.166
Theta star	14.46
Nu star	26.91
AppChi2	16.08
95% Gamma Approximate UCL (Use when n >= 40)	4.019

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.632
SD	5.189
SE of Mean	0.592
95% KM (t) UCL	3.617
95% KM (z) UCL	3.605
95% KM (jackknife) UCL	3.61
95% KM (bootstrap t) UCL	3.938
95% KM (BCA) UCL	3.522
95% KM (Percentile Bootstrap) UCL	3.688
95% KM (Chebyshev) UCL	5.211
97.5% KM (Chebyshev) UCL	6.327
99% KM (Chebyshev) UCL	8.52

Potential UCLs to Use

95% KM (BCA) UCL	3.522

US EPA ARCHIVE DOCUMENT

95% Adjusted Gamma UCL (Use when n < 40)	4.058

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1232 PESTP

General Statistics

Number of Valid Data	274	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	269
		Percent Non-Detects	98.18%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	250	Maximum Detected	5.521
Mean of Detected	58.26	Mean of Detected	2.171
SD of Detected	108.1	SD of Detected	2.315
Minimum Non-Detect	0.0189	Minimum Non-Detect	-3.969
Maximum Non-Detect	490	Maximum Non-Detect	6.194

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	274
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.643	Shapiro Wilk Test Statistic	0.88
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.338	Mean	-1.657

SD	26.45
95% DL/2 (t) UCL	7.975
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

SD	2.202
95% H-Stat (DL/2) UCL	3.37
Log ROS Method	
Mean in Log Scale	-14.69
SD in Log Scale	4.331
Mean in Original Scale	1.063
SD in Original Scale	15.24
95% t UCL	2.583
95% Percentile Bootstrap UCL	2.869
95% BCA Bootstrap UCL	4.585
95% H-UCL	0.0235

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.275
Theta Star	211.8
nu star	2.751
A-D Test Statistic	0.511
5% A-D Critical Value	0.731
K-S Test Statistic	0.731
5% K-S Critical Value	0.378

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	250
Mean	1.063
Median	0.000001
SD	15.24
k star	0.0647
Theta star	16.42
Nu star	35.48
AppChi2	22.85
95% Gamma Approximate UCL (Use when n >= 40)	1.651
95% Adjusted Gamma UCL (Use when n < 40)	1.655

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.256
SD	15.19
SE of Mean	1.03
95% KM (t) UCL	3.956
95% KM (z) UCL	3.95
95% KM (jackknife) UCL	3.691
95% KM (bootstrap t) UCL	61.98
95% KM (BCA) UCL	250
95% KM (Percentile Bootstrap) UCL	5.994
95% KM (Chebyshev) UCL	6.747
97.5% KM (Chebyshev) UCL	8.691
99% KM (Chebyshev) UCL	12.51

Potential UCLs to Use

95% KM (t) UCL	3.956

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Aroclor-1242 PESTP

General Statistics

Number of Valid Data	275	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	262
		Percent Non-Detects	95.27%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.19	Minimum Detected	-1.661
Maximum Detected	230	Maximum Detected	5.438
Mean of Detected	35.49	Mean of Detected	1.442
SD of Detected	72.61	SD of Detected	2.388
Minimum Non-Detect	0.0189	Minimum Non-Detect	-3.969
Maximum Non-Detect	270	Maximum Non-Detect	5.598

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	275
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.548	Shapiro Wilk Test Statistic	0.934
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.28	Mean	-1.666
SD	20.83	SD	2.18
95% DL/2 (t) UCL	6.353	95% H-Stat (DL/2) UCL	3.148
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-10.5
		SD in Log Scale	3.963
		Mean in Original Scale	1.678
		SD in Original Scale	16.97
		95% t UCL	3.367
		95% Percentile Bootstrap UCL	3.609
		95% BCA Bootstrap UCL	4.562
		95% H-UCL	0.265

Gamma Distribution Test with Detected Values Only	**Data Distribution Test with Detected Values Only**

k star (bias corrected)	0.298
Theta Star	119.1
nu star	7.745

Data appear Gamma Distributed at 5% Significance Level

A-D Test Statistic	0.735
5% A-D Critical Value	0.826
K-S Test Statistic	0.826
5% K-S Critical Value	0.256

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	230
Mean	1.678
Median	0.000001
SD	16.97
k star	0.0646
Theta star	25.96
Nu star	35.55
AppChi2	22.91
95% Gamma Approximate UCL (Use when n >= 40)	2.604
95% Adjusted Gamma UCL (Use when n < 40)	2.61

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.883
SD	16.96
SE of Mean	1.068
95% KM (t) UCL	3.645
95% KM (z) UCL	3.639
95% KM (jackknife) UCL	3.57
95% KM (bootstrap t) UCL	14.17
95% KM (BCA) UCL	4.115
95% KM (Percentile Bootstrap) UCL	3.848
95% KM (Chebyshev) UCL	6.537
97.5% KM (Chebyshev) UCL	8.55
99% KM (Chebyshev) UCL	12.51

Potential UCLs to Use

95% KM (t) UCL	3.645

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1248 PESTP

General Statistics

Number of Valid Data	273	Number of Detected Data	26
Number of Distinct Detected Data	26	Number of Non-Detect Data	247
		Percent Non-Detects	90.48%

Raw Statistics

Minimum Detected	0.026
Maximum Detected	420
Mean of Detected	20.14
SD of Detected	81.84
Minimum Non-Detect	0.0189

Log-transformed Statistics

Minimum Detected	-3.65
Maximum Detected	6.04
Mean of Detected	0.31
SD of Detected	2.161
Minimum Non-Detect	-3.969

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Non-Detect	300	Maximum Non-Detect	5.704
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	272
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.253	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.248	Mean	-1.441
SD	29.22	SD	2.23
95% DL/2 (t) UCL	8.167	95% H-Stat (DL/2) UCL	4.49
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.632
		SD in Log Scale	2.967
		Mean in Original Scale	1.921
		SD in Original Scale	25.51
		95% t UCL	4.469
		95% Percentile Bootstrap UCL	4.969
		95% BCA Bootstrap UCL	6.981
		95% H-UCL	0.231

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.257	**Data appear Lognormal at 5% Significance Level**	
Theta Star	78.29		
nu star	13.38		
A-D Test Statistic	2.665	**Nonparametric Statistics**	
5% A-D Critical Value	0.868	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.868	Mean	1.985
5% K-S Critical Value	0.187	SD	25.46
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.572
		95% KM (t) UCL	4.579
Assuming Gamma Distribution		95% KM (z) UCL	4.57
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.508
Minimum	0.000001	95% KM (bootstrap t) UCL	27.96
Maximum	420	95% KM (BCA) UCL	5.142

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	1.918	95% KM (Percentile Bootstrap) UCL	5.044
Median	0.000001	95% KM (Chebyshev) UCL	8.837
SD	25.51	97.5% KM (Chebyshev) UCL	11.8
k star	0.0667	99% KM (Chebyshev) UCL	17.63
Theta star	28.74		
Nu star	36.44	**Potential UCLs to Use**	
AppChi2	23.63	97.5% KM (Chebyshev) UCL	11.8
95% Gamma Approximate UCL (Use when n >= 40)	2.959		
95% Adjusted Gamma UCL (Use when n < 40)	2.966		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Aroclor-1254 PESTP

General Statistics

Number of Valid Data	266	Number of Detected Data	211
Number of Distinct Detected Data	141	Number of Non-Detect Data	55
		Percent Non-Detects	20.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0074	Minimum Detected	-4.906
Maximum Detected	1300	Maximum Detected	7.17
Mean of Detected	29.64	Mean of Detected	0.433
SD of Detected	130.5	SD of Detected	2.304
Minimum Non-Detect	0.035	Minimum Non-Detect	-3.352
Maximum Non-Detect	160	Maximum Non-Detect	5.075

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	257
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.62%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.41	Lilliefors Test Statistic	0.0515
5% Lilliefors Critical Value	0.061	5% Lilliefors Critical Value	0.061
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**
DL/2 Substitution Method	DL/2 Substitution Method

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	23.95
SD	116.8
95% DL/2 (t) UCL	35.77
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Mean	-0.13
SD	2.463
95% H-Stat (DL/2) UCL	31.67
Log ROS Method	
Mean in Log Scale	-0.321
SD in Log Scale	2.588
Mean in Original Scale	23.53
SD in Original Scale	116.8
95% t UCL	35.35
95% Percentile Bootstrap UCL	36.35
95% BCA Bootstrap UCL	39.23
95% H-UCL	37.72

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.241
Theta Star	122.8
nu star	101.8
A-D Test Statistic	19.66
5% A-D Critical Value	0.896
K-S Test Statistic	0.896
5% K-S Critical Value	0.0685

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1300
Mean	23.51
Median	0.59
SD	116.8
k star	0.138
Theta star	170.1
Nu star	73.53
AppChi2	54.79
95% Gamma Approximate UCL (Use when n >= 40)	31.56
95% Adjusted Gamma UCL (Use when n < 40)	31.61

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	23.57
SD	116.6
SE of Mean	7.165
95% KM (t) UCL	35.4
95% KM (z) UCL	35.35
95% KM (jackknife) UCL	35.39
95% KM (bootstrap t) UCL	43.42
95% KM (BCA) UCL	36.35
95% KM (Percentile Bootstrap) UCL	36.17
95% KM (Chebyshev) UCL	54.8
97.5% KM (Chebyshev) UCL	68.31
99% KM (Chebyshev) UCL	94.86

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	68.31

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Aroclor-1268 PESTP

General Statistics

Number of Valid Observations	2	Number of Distinct Observations	2

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Aroclor-1268 PESTP was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Arsenic M

General Statistics

Number of Valid Data	84	Number of Detected Data	80
Number of Distinct Detected Data	61	Number of Non-Detect Data	4
		Percent Non-Detects	4.76%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	49.3	Maximum Detected	3.898
Mean of Detected	5.788	Mean of Detected	1.482
SD of Detected	5.947	SD of Detected	0.714
Minimum Non-Detect	0.54	Minimum Non-Detect	-0.616
Maximum Non-Detect	10.7	Maximum Non-Detect	2.37

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.21	Lilliefors Test Statistic	0.063
5% Lilliefors Critical Value	0.0991	5% Lilliefors Critical Value	0.0991
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution **Assuming Lognormal Distribution**

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

DL/2 Substitution Method	
Mean	5.599
SD	5.881
95% DL/2 (t) UCL	6.666
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

DL/2 Substitution Method	
Mean	1.411
SD	0.802
95% H-Stat (DL/2) UCL	6.781
Log ROS Method	
Mean in Log Scale	1.428
SD in Log Scale	0.752
Mean in Original Scale	5.596
SD in Original Scale	5.872
95% t UCL	6.661
95% Percentile Bootstrap UCL	6.78
95% BCA Bootstrap UCL	7.263
95% H-UCL	6.542

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.912
Theta Star	3.028
nu star	305.9
A-D Test Statistic	0.784
5% A-D Critical Value	0.763
K-S Test Statistic	0.763
5% K-S Critical Value	0.101

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	49.3
Mean	5.578
Median	4.4
SD	5.901
k star	0.746
Theta star	7.481
Nu star	125.3
AppChi2	100.4
95% Gamma Approximate UCL (Use when n >= 40)	6.959
95% Adjusted Gamma UCL (Use when n < 40)	6.986

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	5.607
SD	5.838
SE of Mean	0.642
95% KM (t) UCL	6.675
95% KM (z) UCL	6.663
95% KM (jackknife) UCL	6.672
95% KM (bootstrap t) UCL	7.444
95% KM (BCA) UCL	6.851
95% KM (Percentile Bootstrap) UCL	6.799
95% KM (Chebyshev) UCL	8.404
97.5% KM (Chebyshev) UCL	9.615
99% KM (Chebyshev) UCL	11.99

Potential UCLs to Use

95% KM (Chebyshev) UCL	8.404

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For additional insight, the user may want to consult a statistician.

Benzene OV

General Statistics

Number of Valid Data	73	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	53
		Percent Non-Detects	72.60%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0017	Minimum Detected	-6.377
Maximum Detected	480	Maximum Detected	6.174
Mean of Detected	50.19	Mean of Detected	-1.156
SD of Detected	114.1	SD of Detected	4.163
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	130	Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	69
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.52%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.514	Shapiro Wilk Test Statistic	0.836
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	15.4	Mean	-2.697
SD	62.98	SD	3.222
95% DL/2 (t) UCL	27.69	95% H-Stat (DL/2) UCL	82.69
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.394
		SD in Log Scale	4.189
		Mean in Original Scale	13.75
		SD in Original Scale	62.78
		95% t UCL	25.99
		95% Percentile Bootstrap UCL	27.68
		95% BCA Bootstrap UCL	35.04
		95% H-UCL	258.9

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.162
Theta Star	309.8
nu star	6.479
A-D Test Statistic	2.163
5% A-D Critical Value	0.908
K-S Test Statistic	0.908
5% K-S Critical Value	0.216

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	480
Mean	13.75
Median	0.000001
SD	62.78
k star	0.0721
Theta star	190.6
Nu star	10.53
AppChi2	4.278
95% Gamma Approximate UCL (Use when n >= 40)	33.86
95% Adjusted Gamma UCL (Use when n < 40)	34.5

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	13.79
SD	62.35
SE of Mean	7.489
95% KM (t) UCL	26.27
95% KM (z) UCL	26.11
95% KM (jackknife) UCL	26.03
95% KM (bootstrap t) UCL	47.45
95% KM (BCA) UCL	28.62
95% KM (Percentile Bootstrap) UCL	26.54
95% KM (Chebyshev) UCL	46.43
97.5% KM (Chebyshev) UCL	60.55
99% KM (Chebyshev) UCL	88.3

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	60.55

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)anthracene OS

General Statistics

Number of Valid Data	89	Number of Detected Data	73
Number of Distinct Detected Data	59	Number of Non-Detect Data	16
		Percent Non-Detects	17.98%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.046	Minimum Detected	-3.079
Maximum Detected	8.5	Maximum Detected	2.14
Mean of Detected	1.142	Mean of Detected	-0.452

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

SD of Detected	1.474	SD of Detected	1.11
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.229	Lilliefors Test Statistic	0.0583
5% Lilliefors Critical Value	0.104	5% Lilliefors Critical Value	0.104
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.839	Mean	-0.435
SD	4.717	SD	1.28
95% DL/2 (t) UCL	2.67	95% H-Stat (DL/2) UCL	2.074
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.593
		SD in Log Scale	1.067
		Mean in Original Scale	0.995
		SD in Original Scale	1.372
		95% t UCL	1.237
		95% Percentile Bootstrap UCL	1.248
		95% BCA Bootstrap UCL	1.311
		95% H-UCL	1.269

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.958	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	1.192		
nu star	139.8		
A-D Test Statistic	0.925	**Nonparametric Statistics**	
5% A-D Critical Value	0.781	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.781	Mean	1.017
5% K-S Critical Value	0.108	SD	1.393
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.152
		95% KM (t) UCL	1.27
Assuming Gamma Distribution		95% KM (z) UCL	1.268
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.27

Minimum	0.000001	95% KM (bootstrap t) UCL	1.368
Maximum	8.5	95% KM (BCA) UCL	1.279
Mean	0.992	95% KM (Percentile Bootstrap) UCL	1.299
Median	0.56	95% KM (Chebyshev) UCL	1.681
SD	1.386	97.5% KM (Chebyshev) UCL	1.968
k star	0.384	99% KM (Chebyshev) UCL	2.533
Theta star	2.584		
Nu star	68.35	**Potential UCLs to Use**	
AppChi2	50.32	95% KM (Chebyshev) UCL	1.681
95% Gamma Approximate UCL (Use when n >= 40)	1.348		
95% Adjusted Gamma UCL (Use when n < 40)	1.355		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene OS

General Statistics

Number of Valid Data	87	Number of Detected Data	71
Number of Distinct Detected Data	59	Number of Non-Detect Data	16
		Percent Non-Detects	18.39%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.039	Minimum Detected	-3.244
Maximum Detected	8.9	Maximum Detected	2.186
Mean of Detected	1.139	Mean of Detected	-0.47
SD of Detected	1.523	SD of Detected	1.122
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	87
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.235	Lilliefors Test Statistic	0.05
5% Lilliefors Critical Value	0.105	5% Lilliefors Critical Value	0.105
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1.885
SD	4.776
95% DL/2 (t) UCL	2.736
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-0.424
SD	1.301
95% H-Stat (DL/2) UCL	2.182
Log ROS Method	
Mean in Log Scale	-0.609
SD in Log Scale	1.073
Mean in Original Scale	0.991
SD in Original Scale	1.412
95% t UCL	1.243
95% Percentile Bootstrap UCL	1.249
95% BCA Bootstrap UCL	1.333
95% H-UCL	1.265

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.934
Theta Star	1.22
nu star	132.6
A-D Test Statistic	0.949
5% A-D Critical Value	0.782
K-S Test Statistic	0.782
5% K-S Critical Value	0.109
Data follow Appr. Gamma Distribution at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	8.9
Mean	0.992
Median	0.57
SD	1.425
k star	0.337
Theta star	2.941
Nu star	58.69
AppChi2	42.07
95% Gamma Approximate UCL (Use when n >= 40)	1.384
95% Adjusted Gamma UCL (Use when n < 40)	1.392

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	1.017
SD	1.437
SE of Mean	0.159
95% KM (t) UCL	1.282
95% KM (z) UCL	1.279
95% KM (jackknife) UCL	1.282
95% KM (bootstrap t) UCL	1.381
95% KM (BCA) UCL	1.291
95% KM (Percentile Bootstrap) UCL	1.278
95% KM (Chebyshev) UCL	1.712
97.5% KM (Chebyshev) UCL	2.013
99% KM (Chebyshev) UCL	2.603
Potential UCLs to Use	
95% KM (Chebyshev) UCL	1.712

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene OS

General Statistics

Number of Valid Data	83	Number of Detected Data	65
Number of Distinct Detected Data	53	Number of Non-Detect Data	18
		Percent Non-Detects	21.69%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.053	Minimum Detected	-2.937
Maximum Detected	10	Maximum Detected	2.303
Mean of Detected	1.612	Mean of Detected	-0.0909
SD of Detected	1.901	SD of Detected	1.112
Minimum Non-Detect	0.35	Minimum Non-Detect	-1.05
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	83
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.217	Lilliefors Test Statistic	0.0508
5% Lilliefors Critical Value	0.11	5% Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.279	Mean	-0.131
SD	4.922	SD	1.298
95% DL/2 (t) UCL	3.178	95% H-Stat (DL/2) UCL	2.93
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.309
		SD in Log Scale	1.1
		Mean in Original Scale	1.349
		SD in Original Scale	1.758
		95% t UCL	1.67
		95% Percentile Bootstrap UCL	1.689
		95% BCA Bootstrap UCL	1.719

95% H-UCL	1.784

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.977
Theta Star	1.65
nu star	127
A-D Test Statistic	0.92
5% A-D Critical Value	0.78
K-S Test Statistic	0.78
5% K-S Critical Value	0.114

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	10
Mean	1.354
Median	0.68
SD	1.775
k star	0.307
Theta star	4.408
Nu star	50.99
AppChi2	35.59
95% Gamma Approximate UCL (Use when n >= 40)	1.94
95% Adjusted Gamma UCL (Use when n < 40)	1.952

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.386
SD	1.786
SE of Mean	0.203
95% KM (t) UCL	1.724
95% KM (z) UCL	1.72
95% KM (jackknife) UCL	1.724
95% KM (bootstrap t) UCL	1.787
95% KM (BCA) UCL	1.769
95% KM (Percentile Bootstrap) UCL	1.738
95% KM (Chebyshev) UCL	2.271
97.5% KM (Chebyshev) UCL	2.654
99% KM (Chebyshev) UCL	3.406

Potential UCLs to Use

95% KM (Chebyshev) UCL	2.271

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Benzo(k)fluoranthene OS

General Statistics

Number of Valid Data	89	Number of Detected Data	40
Number of Distinct Detected Data	37	Number of Non-Detect Data	49
		Percent Non-Detects	55.06%

Raw Statistics

Minimum Detected	0.041
Maximum Detected	8.8

Log-transformed Statistics

Minimum Detected	-3.194
Maximum Detected	2.175

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean of Detected	1.229	Mean of Detected	-0.58
SD of Detected	1.841	SD of Detected	1.274
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.632	Shapiro Wilk Test Statistic	0.983
5% Shapiro Wilk Critical Value	0.94	5% Shapiro Wilk Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.67	Mean	-0.712
SD	4.753	SD	1.296
95% DL/2 (t) UCL	2.508	95% H-Stat (DL/2) UCL	1.614
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.151
		SD in Log Scale	1.039
		Mean in Original Scale	0.67
		SD in Original Scale	1.328
		95% t UCL	0.904
		95% Percentile Bootstrap UCL	0.921
		95% BCA Bootstrap UCL	1.006
		95% H-UCL	0.699

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.719	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1.709		
nu star	57.55		
A-D Test Statistic	1.047	**Nonparametric Statistics**	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	0.703
5% K-S Critical Value	0.145	SD	1.357
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.151
		95% KM (t) UCL	0.954
Assuming Gamma Distribution		95% KM (z) UCL	0.952

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.953
Minimum	0.000001	95% KM (bootstrap t) UCL	1.097
Maximum	8.8	95% KM (BCA) UCL	0.987
Mean	0.657	95% KM (Percentile Bootstrap) UCL	0.969
Median	0.26	95% KM (Chebyshev) UCL	1.361
SD	1.345	97.5% KM (Chebyshev) UCL	1.646
k star	0.195	99% KM (Chebyshev) UCL	2.205
Theta star	3.365		
Nu star	34.76	**Potential UCLs to Use**	
AppChi2	22.28	95% KM (BCA) UCL	0.987
95% Gamma Approximate UCL (Use when n >= 40)	1.026		
95% Adjusted Gamma UCL (Use when n < 40)	1.033		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Bis(2-ethylhexyl)phthalate OS

General Statistics

Number of Valid Data	82	Number of Detected Data	55
Number of Distinct Detected Data	49	Number of Non-Detect Data	27
		Percent Non-Detects	32.93%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.061	Minimum Detected	-2.797
Maximum Detected	460	Maximum Detected	6.131
Mean of Detected	21.24	Mean of Detected	0.237
SD of Detected	80.55	SD of Detected	2.179
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	7.1	Maximum Non-Detect	1.96

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	70
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	85.37%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.396	Lilliefors Test Statistic	0.126
5% Lilliefors Critical Value	0.119	5% Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	14.46
SD	66.49
95% DL/2 (t) UCL	26.68
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-0.146
SD	1.927
95% H-Stat (DL/2) UCL	11.16
Log ROS Method	
Mean in Log Scale	-0.369
SD in Log Scale	2.008
Mean in Original Scale	14.33
SD in Original Scale	66.52
95% t UCL	26.55
95% Percentile Bootstrap UCL	27.22
95% BCA Bootstrap UCL	32.78
95% H-UCL	11.01

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.25
Theta Star	84.96
nu star	27.51
A-D Test Statistic	5.947
5% A-D Critical Value	0.885
K-S Test Statistic	0.885
5% K-S Critical Value	0.132
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	460
Mean	14.25
Median	0.28
SD	66.53
k star	0.117
Theta star	121.4
Nu star	19.25
AppChi2	10.3
95% Gamma Approximate UCL (Use when n >= 40)	26.63
95% Adjusted Gamma UCL (Use when n < 40)	26.94

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	14.34
SD	66.11
SE of Mean	7.368
95% KM (t) UCL	26.6
95% KM (z) UCL	26.46
95% KM (jackknife) UCL	26.56
95% KM (bootstrap t) UCL	84.57
95% KM (BCA) UCL	27.76
95% KM (Percentile Bootstrap) UCL	27.78
95% KM (Chebyshev) UCL	46.46
97.5% KM (Chebyshev) UCL	60.35
99% KM (Chebyshev) UCL	87.65
Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	60.35

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cadmium M

General Statistics

Number of Valid Data	83	Number of Detected Data	60
Number of Distinct Detected Data	50	Number of Non-Detect Data	23
		Percent Non-Detects	27.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	180	Maximum Detected	5.193
Mean of Detected	7.106	Mean of Detected	0.493
SD of Detected	23.76	SD of Detected	1.544
Minimum Non-Detect	0.06	Minimum Non-Detect	-2.813
Maximum Non-Detect	0.64	Maximum Non-Detect	-0.446

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	40
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.81%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.385	Lilliefors Test Statistic	0.113
5% Lilliefors Critical Value	0.114	5% Lilliefors Critical Value	0.114
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.173	Mean	-0.295
SD	20.4	SD	1.884
95% DL/2 (t) UCL	8.898	95% H-Stat (DL/2) UCL	8.574
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.38
		SD in Log Scale	1.949
		Mean in Original Scale	5.159
		SD in Original Scale	20.4
		95% t UCL	8.885
		95% Percentile Bootstrap UCL	9.382

95% BCA Bootstrap UCL	11.81
95% H-UCL	9.292

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.43
Theta Star	16.52
nu star	51.63
A-D Test Statistic	3.92
5% A-D Critical Value	0.83
K-S Test Statistic	0.83
5% K-S Critical Value	0.122

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	180
Mean	5.137
Median	0.54
SD	20.41
k star	0.153
Theta star	33.58
Nu star	25.4
AppChi2	14.91
95% Gamma Approximate UCL (Use when n >= 40)	8.746
95% Adjusted Gamma UCL (Use when n < 40)	8.831

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	5.191
SD	20.27
SE of Mean	2.244
95% KM (t) UCL	8.924
95% KM (z) UCL	8.882
95% KM (jackknife) UCL	8.912
95% KM (bootstrap t) UCL	18.01
95% KM (BCA) UCL	9.382
95% KM (Percentile Bootstrap) UCL	9.273
95% KM (Chebyshev) UCL	14.97
97.5% KM (Chebyshev) UCL	19.21
99% KM (Chebyshev) UCL	27.52

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	19.21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Carbazole OS

General Statistics

Number of Valid Data	87	Number of Detected Data	29
Number of Distinct Detected Data	27	Number of Non-Detect Data	58
		Percent Non-Detects	66.67%

Raw Statistics

Minimum Detected	0.051

Log-transformed Statistics

Minimum Detected	-2.976

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Detected	2	Maximum Detected	0.693
Mean of Detected	0.307	Mean of Detected	-1.558
SD of Detected	0.364	SD of Detected	0.844
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	87
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.588	Shapiro Wilk Test Statistic	0.957
5% Shapiro Wilk Critical Value	0.926	5% Shapiro Wilk Critical Value	0.926
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.341	Mean	-1.019
SD	4.705	SD	1.197
95% DL/2 (t) UCL	2.18	95% H-Stat (DL/2) UCL	1.012
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.724
		SD in Log Scale	0.534
		Mean in Original Scale	0.215
		SD in Original Scale	0.22
		95% t UCL	0.254
		95% Percentile Bootstrap UCL	0.258
		95% BCA Bootstrap UCL	0.278
		95% H-UCL	0.229

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.336	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.23		
nu star	77.49		
A-D Test Statistic	0.696	**Nonparametric Statistics**	
5% A-D Critical Value	0.764	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764	Mean	0.237
5% K-S Critical Value	0.166	SD	0.245
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.033
		95% KM (t) UCL	0.292

Assuming Gamma Distribution			
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.292
Minimum	0.0255	95% KM (jackknife) UCL	0.292
Maximum	2	95% KM (bootstrap t) UCL	0.309
Mean	0.274	95% KM (BCA) UCL	0.299
Median	0.272	95% KM (Percentile Bootstrap) UCL	0.298
SD	0.221	95% KM (Chebyshev) UCL	0.381
k star	2.661	97.5% KM (Chebyshev) UCL	0.444
Theta star	0.103	99% KM (Chebyshev) UCL	0.566
Nu star	462.9		
AppChi2	414	**Potential UCLs to Use**	
95% Gamma Approximate UCL (Use when n >= 40)	0.307	95% KM (t) UCL	0.292
95% Adjusted Gamma UCL (Use when n < 40)	0.307		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlordane PESTP

General Statistics

Number of Valid Data	41	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	32
		Percent Non-Detects	78.05%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0022	Minimum Detected	-6.119
Maximum Detected	10.6	Maximum Detected	2.361
Mean of Detected	1.994	Mean of Detected	-1.993
SD of Detected	3.829	SD of Detected	2.97
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	2	Maximum Non-Detect	0.693

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	39
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.12%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.599
5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.579
SD	1.892
95% DL/2 (t) UCL	1.076
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.829
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-2.703
SD	2.068
95% H-Stat (DL/2) UCL	1.93
Log ROS Method	
Mean in Log Scale	-5.745
SD in Log Scale	2.697
Mean in Original Scale	0.44
SD in Original Scale	1.905
95% t UCL	0.941
95% Percentile Bootstrap UCL	0.972
95% BCA Bootstrap UCL	1.221
95% H-UCL	0.885

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.249
Theta Star	8.003
nu star	4.485
A-D Test Statistic	0.598
5% A-D Critical Value	0.821
K-S Test Statistic	0.821
5% K-S Critical Value	0.304
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	10.6
Mean	0.438
Median	0.000001
SD	1.905

Data Distribution Test with Detected Values Only	
Data appear Gamma Distributed at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.448
SD	1.88
SE of Mean	0.312
95% KM (t) UCL	0.973
95% KM (z) UCL	0.96
95% KM (jackknife) UCL	0.947
95% KM (bootstrap t) UCL	8.915
95% KM (BCA) UCL	1.059
95% KM (Percentile Bootstrap) UCL	1.005
95% KM (Chebyshev) UCL	1.806
97.5% KM (Chebyshev) UCL	2.393

US EPA ARCHIVE DOCUMENT

k star	0.0906	99% KM (Chebyshev) UCL	3.548
Theta star	4.83		
Nu star	7.431	**Potential UCLs to Use**	
AppChi2	2.41	95% KM (t) UCL	0.973
95% Gamma Approximate UCL (Use when n >= 40)	1.35		
95% Adjusted Gamma UCL (Use when n < 40)	1.41		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chlorobenzene OV

General Statistics

Number of Valid Data	70	Number of Detected Data	26
Number of Distinct Detected Data	26	Number of Non-Detect Data	44
		Percent Non-Detects	62.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0027	Minimum Detected	-5.915
Maximum Detected	1000	Maximum Detected	6.908
Mean of Detected	73.2	Mean of Detected	-1.267
SD of Detected	212.5	SD of Detected	3.995
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.86%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.406	Shapiro Wilk Test Statistic	0.901
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	27.31	Mean	-2.762
SD	132.7	SD	3.156
95% DL/2 (t) UCL	53.77	95% H-Stat (DL/2) UCL	38.81

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Log ROS Method	
Mean in Log Scale	-4.247
SD in Log Scale	3.454
Mean in Original Scale	27.19
SD in Original Scale	132.8
95% t UCL	53.65
95% Percentile Bootstrap UCL	55.56
95% BCA Bootstrap UCL	76.52
95% H-UCL	32.2

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.149
Theta Star	490.7
nu star	7.758
A-D Test Statistic	2.692
5% A-D Critical Value	0.921
K-S Test Statistic	0.921
5% K-S Critical Value	0.192

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1000
Mean	27.19
Median	0.000001
SD	132.8
k star	0.0748
Theta star	363.7
Nu star	10.47
AppChi2	4.235
95% Gamma Approximate UCL (Use when n >= 40)	67.2
95% Adjusted Gamma UCL (Use when n < 40)	68.54

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	27.2
SD	131.8
SE of Mean	16.07
95% KM (t) UCL	53.99
95% KM (z) UCL	53.63
95% KM (jackknife) UCL	53.66
95% KM (bootstrap t) UCL	109.8
95% KM (BCA) UCL	59.89
95% KM (Percentile Bootstrap) UCL	54.76
95% KM (Chebyshev) UCL	97.24
97.5% KM (Chebyshev) UCL	127.5
99% KM (Chebyshev) UCL	187.1

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	127.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Chromium M

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Observations	84	Number of Distinct Observations	80

Raw Statistics		Log-transformed Statistics	
Minimum	2.5	Minimum of Log Data	0.916
Maximum	350	Maximum of Log Data	5.858
Mean	55.7	Mean of log Data	3.263
Geometric Mean	26.12	SD of log Data	1.203
Median	25		
SD	81.25		
Std. Error of Mean	8.865		
Coefficient of Variation	1.459		
Skewness	2.337		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.305	Lilliefors Test Statistic	0.0767
Lilliefors Critical Value	0.0967	Lilliefors Critical Value	0.0967
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	70.45	95% H-UCL	74.26
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	91.45
95% Adjusted-CLT UCL (Chen-1995)	72.7	97.5% Chebyshev (MVUE) UCL	108.1
95% Modified-t UCL (Johnson-1978)	70.82	99% Chebyshev (MVUE) UCL	140.7

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.766	**Data appear Lognormal at 5% Significance Level**
Theta Star	72.76	
MLE of Mean	55.7	
MLE of Standard Deviation	63.66	
nu star	128.6	
Approximate Chi Square Value (.05)	103.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0471	95% CLT UCL 70.28
Adjusted Chi Square Value	103	95% Jackknife UCL 70.45
		95% Standard Bootstrap UCL 70.32
Anderson-Darling Test Statistic	3.424	95% Bootstrap-t UCL 73.96
Anderson-Darling 5% Critical Value	0.792	95% Hall's Bootstrap UCL 73.14
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL 70.85
Kolmogorov-Smirnov 5% Critical Value	0.101	95% BCA Bootstrap UCL 73.49
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 94.34
		97.5% Chebyshev(Mean, Sd) UCL 111.1

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	143.9
95% Approximate Gamma UCL (Use when n >= 40)	69.27		
95% Adjusted Gamma UCL (Use when n < 40)	69.54		
Potential UCL to Use		Use 95% H-UCL	74.26

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Cis-1,2-dichloroethene OV

General Statistics

Number of Valid Data	70	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	52
		Percent Non-Detects	74.29%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0016	Minimum Detected	-6.438
Maximum Detected	500	Maximum Detected	6.215
Mean of Detected	69.68	Mean of Detected	-0.918
SD of Detected	161	SD of Detected	4.121
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.86%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.493	Shapiro Wilk Test Statistic	0.895
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution	**Assuming Lognormal Distribution**
DL/2 Substitution Method	DL/2 Substitution Method

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	18.07
SD	85.55
95% DL/2 (t) UCL	35.12
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Mean	-2.875
SD	3.005
95% H-Stat (DL/2) UCL	18.93
Log ROS Method	
Mean in Log Scale	-6.821
SD in Log Scale	4.367
Mean in Original Scale	17.92
SD in Original Scale	85.58
95% t UCL	34.97
95% Percentile Bootstrap UCL	35.74
95% BCA Bootstrap UCL	43.81
95% H-UCL	276.6

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.161
Theta Star	432.2
nu star	5.804
A-D Test Statistic	1.683
5% A-D Critical Value	0.904
K-S Test Statistic	0.904
5% K-S Critical Value	0.227

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	500
Mean	17.92
Median	0.000001
SD	85.59
k star	0.0706
Theta star	253.6
Nu star	9.891
AppChi2	3.874
95% Gamma Approximate UCL (Use when n >= 40)	45.75
95% Adjusted Gamma UCL (Use when n < 40)	46.71

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	17.93
SD	84.97
SE of Mean	10.45
95% KM (t) UCL	35.35
95% KM (z) UCL	35.12
95% KM (jackknife) UCL	34.98
95% KM (bootstrap t) UCL	100.9
95% KM (BCA) UCL	37.7
95% KM (Percentile Bootstrap) UCL	35.86
95% KM (Chebyshev) UCL	63.48
97.5% KM (Chebyshev) UCL	83.19
99% KM (Chebyshev) UCL	121.9

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	83.19

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Cobalt M

General Statistics

Number of Valid Observations	83	Number of Distinct Observations	61

Raw Statistics		Log-transformed Statistics	
Minimum	1	Minimum of Log Data	0
Maximum	93.3	Maximum of Log Data	4.536
Mean	7.338	Mean of log Data	1.59
Geometric Mean	4.903	SD of log Data	0.811
Median	4.5		
SD	10.94		
Std. Error of Mean	1.201		
Coefficient of Variation	1.491		
Skewness	6.227		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.281	Lilliefors Test Statistic	0.0735
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	9.336	95% H-UCL	8.198
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9.76
95% Adjusted-CLT UCL (Chen-1995)	10.19	97.5% Chebyshev (MVUE) UCL	11.05
95% Modified-t UCL (Johnson-1978)	9.472	99% Chebyshev (MVUE) UCL	13.59

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.341	**Data appear Lognormal at 5% Significance Level**	
Theta Star	5.471		
MLE of Mean	7.338		
MLE of Standard Deviation	6.336		
nu star	222.6		
Approximate Chi Square Value (.05)	189.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0471	95% CLT UCL	9.313
Adjusted Chi Square Value	188.6	95% Jackknife UCL	9.336
		95% Standard Bootstrap UCL	9.277
Anderson-Darling Test Statistic	2.603	95% Bootstrap-t UCL	11.32
Anderson-Darling 5% Critical Value	0.773	95% Hall's Bootstrap UCL	17.42
Kolmogorov-Smirnov Test Statistic	0.141	95% Percentile Bootstrap UCL	9.527

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Kolmogorov-Smirnov 5% Critical Value	0.1	95% BCA Bootstrap UCL	10.53
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	12.57
		97.5% Chebyshev(Mean, Sd) UCL	14.84
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19.29
95% Approximate Gamma UCL (Use when n >= 40)	8.639		
95% Adjusted Gamma UCL (Use when n < 40)	8.664		
Potential UCL to Use		Use 95% H-UCL	8.198

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Copper M

General Statistics

Number of Valid Data	83	Number of Detected Data	82
Number of Distinct Detected Data	79	Number of Non-Detect Data	1
		Percent Non-Detects	1.20%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.8	Minimum Detected	1.03
Maximum Detected	934	Maximum Detected	6.839
Mean of Detected	92.24	Mean of Detected	3.687
SD of Detected	152.7	SD of Detected	1.29
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	2.5	Maximum Non-Detect	0.916

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.279	Lilliefors Test Statistic	0.0717
5% Lilliefors Critical Value	0.0978	5% Lilliefors Critical Value	0.0978
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	91.14
SD	152.1
95% DL/2 (t) UCL	118.9

Mean	3.645
SD	1.337
95% H-Stat (DL/2) UCL	137

Maximum Likelihood Estimate(MLE) Method	
Mean	90.02
SD	152.4
95% MLE (t) UCL	117.9
95% MLE (Tiku) UCL	115.1

Log ROS Method	
Mean in Log Scale	3.645
SD in Log Scale	1.338
Mean in Original Scale	91.14
SD in Original Scale	152.1
95% t UCL	118.9
95% Percentile Bootstrap UCL	120.3
95% BCA Bootstrap UCL	128.9
95% H UCL	137.2

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.701
Theta Star	131.6
nu star	114.9
A-D Test Statistic	2.307
5% A-D Critical Value	0.796
K-S Test Statistic	0.796
5% K-S Critical Value	0.103

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	934
Mean	91.13
Median	32.3
SD	152.1
k star	0.583
Theta star	156.3
Nu star	96.8
AppChi2	75.1
95% Gamma Approximate UCL (Use when n >= 40)	117.5
95% Adjusted Gamma UCL (Use when n < 40)	118

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	91.16
SD	151.2
SE of Mean	16.69
95% KM (t) UCL	118.9
95% KM (z) UCL	118.6
95% KM (jackknife) UCL	118.9
95% KM (bootstrap t) UCL	132.8
95% KM (BCA) UCL	123.4
95% KM (Percentile Bootstrap) UCL	120.3
95% KM (Chebyshev) UCL	163.9
97.5% KM (Chebyshev) UCL	195.4
99% KM (Chebyshev) UCL	257.3

Potential UCLs to Use

95% KM (Chebyshev) UCL	163.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Dibenz(a,h)anthracene OS

General Statistics

Number of Valid Data	89	Number of Detected Data	37
Number of Distinct Detected Data	30	Number of Non-Detect Data	52
		Percent Non-Detects	58.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.045	Minimum Detected	-3.101
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.376	Mean of Detected	-1.412
SD of Detected	0.431	SD of Detected	0.91
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.683	Shapiro Wilk Test Statistic	0.975
5% Shapiro Wilk Critical Value	0.936	5% Shapiro Wilk Critical Value	0.936
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.344	Mean	-1.024
SD	4.657	SD	1.221
95% DL/2 (t) UCL	2.165	95% H-Stat (DL/2) UCL	1.043
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.617
		SD in Log Scale	0.646
		Mean in Original Scale	0.26
		SD in Original Scale	0.295
		95% t UCL	0.312
		95% Percentile Bootstrap UCL	0.315
		95% BCA Bootstrap UCL	0.334
		95% H-UCL	0.28

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	1.208
Theta Star	0.311
nu star	89.42
A-D Test Statistic	1.001
5% A-D Critical Value	0.771
K-S Test Statistic	0.771
5% K-S Critical Value	0.148

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.2
Mean	0.315
Median	0.263
SD	0.295
k star	1.062
Theta star	0.297
Nu star	189.1
AppChi2	158.2
95% Gamma Approximate UCL (Use when n >= 40)	0.377
95% Adjusted Gamma UCL (Use when n < 40)	0.378

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.276
SD	0.319
SE of Mean	0.0386
95% KM (t) UCL	0.34
95% KM (z) UCL	0.339
95% KM (jackknife) UCL	0.34
95% KM (bootstrap t) UCL	0.369
95% KM (BCA) UCL	0.343
95% KM (Percentile Bootstrap) UCL	0.34
95% KM (Chebyshev) UCL	0.444
97.5% KM (Chebyshev) UCL	0.517
99% KM (Chebyshev) UCL	0.66
Potential UCLs to Use	
95% KM (t) UCL	0.34

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Dieldrin PESTP

General Statistics

Number of Valid Data	76	Number of Detected Data	40
Number of Distinct Detected Data	35	Number of Non-Detect Data	36
		Percent Non-Detects	47.37%

Raw Statistics	
Minimum Detected	0.00095
Maximum Detected	9.9
Mean of Detected	0.414
SD of Detected	1.613

Log-transformed Statistics	
Minimum Detected	-6.959
Maximum Detected	2.293
Mean of Detected	-3.449
SD of Detected	2.029

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	75
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.68%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.281	Shapiro Wilk Test Statistic	0.96
5% Shapiro Wilk Critical Value	0.94	5% Shapiro Wilk Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.276	Mean	-3.864
SD	1.194	SD	2.17
95% DL/2 (t) UCL	0.504	95% H-Stat (DL/2) UCL	0.551
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.683
		SD in Log Scale	2.099
		Mean in Original Scale	0.22
		SD in Original Scale	1.181
		95% t UCL	0.445
		95% Percentile Bootstrap UCL	0.468
		95% BCA Bootstrap UCL	0.714
		95% H-UCL	0.198

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.269	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1.537		
nu star	21.53		
A-D Test Statistic	4.434	**Nonparametric Statistics**	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	0.225
5% K-S Critical Value	0.152	SD	1.174
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.136
		95% KM (t) UCL	0.452
Assuming Gamma Distribution		95% KM (z) UCL	0.449
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.451
Minimum	0.000001	95% KM (bootstrap t) UCL	1.141

Maximum	9.9	95% KM (BCA) UCL	0.475
Mean	0.218	95% KM (Percentile Bootstrap) UCL	0.488
Median	0.00355	95% KM (Chebyshev) UCL	0.82
SD	1.182	97.5% KM (Chebyshev) UCL	1.077
k star	0.126	99% KM (Chebyshev) UCL	1.583
Theta star	1.732		
Nu star	19.13	**Potential UCLs to Use**	
AppChi2	10.21	97.5% KM (Chebyshev) UCL	1.077
95% Gamma Approximate UCL (Use when n >= 40)	0.408		
95% Adjusted Gamma UCL (Use when n < 40)	0.413		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Di-n-octylphthalate OS

General Statistics

Number of Valid Data	88	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	80
		Percent Non-Detects	90.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.15	Minimum Detected	-1.897
Maximum Detected	7.6	Maximum Detected	2.028
Mean of Detected	2.051	Mean of Detected	-0.114
SD of Detected	2.684	SD of Detected	1.441
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.759
5% Shapiro Wilk Critical Value	0.818

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.351
SD	4.41
95% DL/2 (t) UCL	2.133
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.941
5% Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.825
SD	1.135
95% H-Stat (DL/2) UCL	1.115
Log ROS Method	
Mean in Log Scale	-1.463
SD in Log Scale	0.743
Mean in Original Scale	0.391
SD in Original Scale	0.932
95% t UCL	0.556
95% Percentile Bootstrap UCL	0.563
95% BCA Bootstrap UCL	0.675
95% H-UCL	0.359

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.535
Theta Star	3.833
nu star	8.562
A-D Test Statistic	0.376
5% A-D Critical Value	0.747
K-S Test Statistic	0.747
5% K-S Critical Value	0.305

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	7.6
Mean	0.481
Median	0.143
SD	1.017
k star	0.208
Theta star	2.315
Nu star	36.55

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.399
SD	0.953
SE of Mean	0.117
95% KM (t) UCL	0.593
95% KM (z) UCL	0.591
95% KM (jackknife) UCL	0.59
95% KM (bootstrap t) UCL	0.859
95% KM (BCA) UCL	0.894
95% KM (Percentile Bootstrap) UCL	0.695
95% KM (Chebyshev) UCL	0.908
97.5% KM (Chebyshev) UCL	1.129
99% KM (Chebyshev) UCL	1.562

Potential UCLs to Use

AppChi2	23.71	95% KM (t) UCL	0.593
95% Gamma Approximate UCL (Use when n >= 40)	0.741		
95% Adjusted Gamma UCL (Use when n < 40)	0.746		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

DioxinTEQ

General Statistics

Number of Valid Observations	514	Number of Distinct Observations	257

Raw Statistics

Minimum	0.0000005
Maximum	0.14
Mean	0.00274
Geometric Mean	0.0001514
Median	0.000145
SD	0.0103
Std. Error of Mean	0.0004562
Coefficient of Variation	3.772
Skewness	8.722

Log-transformed Statistics

Minimum of Log Data	-14.51
Maximum of Log Data	-1.966
Mean of log Data	-8.795
SD of log Data	2.642

Relevant UCL Statistics

Normal Distribution Test

Lilliefors Test Statistic	0.395
Lilliefors Critical Value	0.0391

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Lilliefors Test Statistic	0.0545
Lilliefors Critical Value	0.0391

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.00349

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.00368
95% Modified-t UCL (Johnson-1978)	0.00352

Assuming Lognormal Distribution

95% H-UCL	0.00784
95% Chebyshev (MVUE) UCL	0.00979
97.5% Chebyshev (MVUE) UCL	0.0119
99% Chebyshev (MVUE) UCL	0.0162

Gamma Distribution Test

k star (bias corrected)	0.246
Theta Star	0.0112
MLE of Mean	0.00274
MLE of Standard Deviation	0.00553

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

nu star	252.6
Approximate Chi Square Value (.05)	216.8
Adjusted Level of Significance	0.0495
Adjusted Chi Square Value	216.7
Anderson-Darling Test Statistic	26.09
Anderson-Darling 5% Critical Value	0.897
Kolmogorov-Smirnov Test Statistic	0.173
Kolmogorov-Smirnov 5% Critical Value	0.044

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	0.00319
95% Adjusted Gamma UCL (Use when n < 40)	0.0032

Nonparametric Statistics

95% CLT UCL	0.00349
95% Jackknife UCL	0.00349
95% Standard Bootstrap UCL	0.00348
95% Bootstrap-t UCL	0.00377
95% Hall's Bootstrap UCL	0.00385
95% Percentile Bootstrap UCL	0.00355
95% BCA Bootstrap UCL	0.00373
95% Chebyshev(Mean, Sd) UCL	0.00473
97.5% Chebyshev(Mean, Sd) UCL	0.00559
99% Chebyshev(Mean, Sd) UCL	0.00728

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 0.00473

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Endrin PESTP

General Statistics

Number of Valid Data	87	Number of Detected Data	21
Number of Distinct Detected Data	19	Number of Non-Detect Data	66
		Percent Non-Detects	75.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00026	Minimum Detected	-8.255
Maximum Detected	2.1	Maximum Detected	0.742
Mean of Detected	0.236	Mean of Detected	-3.968
SD of Detected	0.555	SD of Detected	2.38
Minimum Non-Detect	0.000148	Minimum Non-Detect	-8.819
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	87
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only **Lognormal Distribution Test with Detected Values Only**

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Shapiro Wilk Test Statistic	0.482
5% Shapiro Wilk Critical Value	0.908

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.115
SD	0.354
95% DL/2 (t) UCL	0.179
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.269
Theta Star	0.878
nu star	11.3
A-D Test Statistic	1.83
5% A-D Critical Value	0.856
K-S Test Statistic	0.856
5% K-S Critical Value	0.206

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.1
Mean	0.057
Median	0.000001
SD	0.286
k star	0.0997
Theta star	0.572
Nu star	17.34
AppChi2	8.918
95% Gamma Approximate UCL (Use when n >= 40)	0.111

Shapiro Wilk Test Statistic	0.957
5% Shapiro Wilk Critical Value	0.908

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.717
SD	2.19
95% H-Stat (DL/2) UCL	0.231
Log ROS Method	
Mean in Log Scale	-7.214
SD in Log Scale	2.377
Mean in Original Scale	0.0573
SD in Original Scale	0.286
95% t UCL	0.108
95% Percentile Bootstrap UCL	0.111
95% BCA Bootstrap UCL	0.138
95% H-UCL	0.0334

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0594
SD	0.286
SE of Mean	0.0316
95% KM (t) UCL	0.112
95% KM (z) UCL	0.111
95% KM (jackknife) UCL	0.111
95% KM (bootstrap t) UCL	0.152
95% KM (BCA) UCL	0.11
95% KM (Percentile Bootstrap) UCL	0.117
95% KM (Chebyshev) UCL	0.197
97.5% KM (Chebyshev) UCL	0.257
99% KM (Chebyshev) UCL	0.374

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.257

US EPA ARCHIVE DOCUMENT

95% Adjusted Gamma UCL (Use when n < 40)	0.112

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Ethyl benzene OV

General Statistics

Number of Valid Data	70	Number of Detected Data	21
Number of Distinct Detected Data	20	Number of Non-Detect Data	49
		Percent Non-Detects	70.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0028	Minimum Detected	-5.878
Maximum Detected	81	Maximum Detected	4.394
Mean of Detected	11.31	Mean of Detected	-0.734
SD of Detected	22.91	SD of Detected	3.309
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	1	Maximum Non-Detect	0

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.14%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.567	Shapiro Wilk Test Statistic	0.943
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.446	Mean	-2.956
SD	13.38	SD	2.796
95% DL/2 (t) UCL	6.112	95% H-Stat (DL/2) UCL	7.691
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.742
		SD in Log Scale	3.338
		Mean in Original Scale	3.396

SD in Original Scale	13.39
95% t UCL	6.065
95% Percentile Bootstrap UCL	6.337
95% BCA Bootstrap UCL	7.448
95% H-UCL	11.69

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.227
Theta Star	49.77
nu star	9.546
A-D Test Statistic	0.855
5% A-D Critical Value	0.878
K-S Test Statistic	0.878
5% K-S Critical Value	0.208

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	81
Mean	3.394
Median	0.000001
SD	13.39
k star	0.0818
Theta star	41.47
Nu star	11.46
AppChi2	4.872
95% Gamma Approximate UCL (Use when n >= 40)	7.981
95% Adjusted Gamma UCL (Use when n < 40)	8.132

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.403
SD	13.3
SE of Mean	1.628
95% KM (t) UCL	6.118
95% KM (z) UCL	6.082
95% KM (jackknife) UCL	6.072
95% KM (bootstrap t) UCL	10.52
95% KM (BCA) UCL	6.549
95% KM (Percentile Bootstrap) UCL	6.32
95% KM (Chebyshev) UCL	10.5
97.5% KM (Chebyshev) UCL	13.57
99% KM (Chebyshev) UCL	19.61

Potential UCLs to Use

95% KM (t) UCL	6.118

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Heptachlor PESTP

General Statistics

Number of Valid Data	85	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	76
		Percent Non-Detects	89.41%

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics	
Minimum Detected	0.00031
Maximum Detected	5.1
Mean of Detected	1.418
SD of Detected	1.937
Minimum Non-Detect	0.0001386
Maximum Non-Detect	0.52

Log-transformed Statistics	
Minimum Detected	-8.079
Maximum Detected	1.629
Mean of Detected	-2.733
SD of Detected	3.83
Minimum Non-Detect	-8.884
Maximum Non-Detect	-0.654

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect 81
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected 4
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage 95.29%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.775
5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.865
5% Shapiro Wilk Critical Value	0.829
Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.172
SD	0.739
95% DL/2 (t) UCL	0.305
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-5.244
SD	2.314
95% H-Stat (DL/2) UCL	0.199
Log ROS Method	
Mean in Log Scale	-12.21
SD in Log Scale	4.423
Mean in Original Scale	0.15
SD in Original Scale	0.742
95% t UCL	0.284
95% Percentile Bootstrap UCL	0.293
95% BCA Bootstrap UCL	0.353
95% H-UCL	2.196

Gamma Distribution Test with Detected Values Only

Data Distribution Test with Detected Values Only

k star (bias corrected)	0.229
Theta Star	6.178
nu star	4.13
A-D Test Statistic	0.659
5% A-D Critical Value	0.833
K-S Test Statistic	0.833
5% K-S Critical Value	0.305

Data appear Gamma Distributed at 5% Significance Level

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	5.1
Mean	0.15
Median	0.000001
SD	0.742
k star	0.083
Theta star	1.809
Nu star	14.1
AppChi2	6.642
95% Gamma Approximate UCL (Use when n >= 40)	0.319
95% Adjusted Gamma UCL (Use when n < 40)	0.323

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.151
SD	0.737
SE of Mean	0.0848
95% KM (t) UCL	0.292
95% KM (z) UCL	0.29
95% KM (jackknife) UCL	0.283
95% KM (bootstrap t) UCL	0.434
95% KM (BCA) UCL	0.312
95% KM (Percentile Bootstrap) UCL	0.301
95% KM (Chebyshev) UCL	0.52
97.5% KM (Chebyshev) UCL	0.68
99% KM (Chebyshev) UCL	0.994

Potential UCLs to Use

95% KM (t) UCL	0.292

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Indeno(1,2,3-cd)pyrene OS

General Statistics

Number of Valid Data	89	Number of Detected Data	59
Number of Distinct Detected Data	48	Number of Non-Detect Data	30
		Percent Non-Detects	33.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.068	Minimum Detected	-2.688
Maximum Detected	5.3	Maximum Detected	1.668
Mean of Detected	0.777	Mean of Detected	-0.761
SD of Detected	0.969	SD of Detected	0.992
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Non-Detect	74	Maximum Non-Detect	4.304
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.234	Lilliefors Test Statistic	0.0638
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.556	Mean	-0.69
SD	4.661	SD	1.213
95% DL/2 (t) UCL	2.377	95% H-Stat (DL/2) UCL	1.439
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.955
		SD in Log Scale	0.87
		Mean in Original Scale	0.608
		SD in Original Scale	0.824
		95% t UCL	0.753
		95% Percentile Bootstrap UCL	0.763
		95% BCA Bootstrap UCL	0.788
		95% H-UCL	0.684

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.075	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.722		
nu star	126.9		
A-D Test Statistic	1.238	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	0.63
5% K-S Critical Value	0.119	SD	0.848
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0946
		95% KM (t) UCL	0.787
Assuming Gamma Distribution		95% KM (z) UCL	0.785
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.787
Minimum	0.000001	95% KM (bootstrap t) UCL	0.84
Maximum	5.3	95% KM (BCA) UCL	0.781

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Mean	0.633	95% KM (Percentile Bootstrap) UCL	0.788
Median	0.38	95% KM (Chebyshev) UCL	1.042
SD	0.824	97.5% KM (Chebyshev) UCL	1.22
k star	0.789	99% KM (Chebyshev) UCL	1.571
Theta star	0.802		
Nu star	140.4	**Potential UCLs to Use**	
AppChi2	114	95% KM (BCA) UCL	0.781
95% Gamma Approximate UCL (Use when n >= 40)	0.779		
95% Adjusted Gamma UCL (Use when n < 40)	0.782		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Lead M

General Statistics

Number of Valid Observations	84	Number of Distinct Observations	80

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.8	Minimum of Log Data	1.03
Maximum	3160	Maximum of Log Data	8.058
Mean	286.8	Mean of log Data	4.648
Geometric Mean	104.4	SD of log Data	1.57
Median	105		
SD	472.6		
Std. Error of Mean	51.56		
Coefficient of Variation	1.648		
Skewness	3.711		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.274	Lilliefors Test Statistic	0.0571
Lilliefors Critical Value	0.0967	Lilliefors Critical Value	0.0967
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	372.6	95% H-UCL	584.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	709.9
95% Adjusted-CLT UCL (Chen-1995)	393.9	97.5% Chebyshev (MVUE) UCL	866.9
95% Modified-t UCL (Johnson-1978)	376	99% Chebyshev (MVUE) UCL	1175

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Gamma Distribution Test	
k star (bias corrected)	0.596
Theta Star	481.1
MLE of Mean	286.8
MLE of Standard Deviation	371.4
nu star	100.2
Approximate Chi Square Value (.05)	78.07
Adjusted Level of Significance	0.0471
Adjusted Chi Square Value	77.73
Anderson-Darling Test Statistic	0.917
Anderson-Darling 5% Critical Value	0.808
Kolmogorov-Smirnov Test Statistic	0.0981
Kolmogorov-Smirnov 5% Critical Value	0.102
Data follow Appr. Gamma Distribution at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL (Use when n >= 40)	367.9
95% Adjusted Gamma UCL (Use when n < 40)	369.5
Potential UCL to Use	

Data Distribution	
Data Follow Appr. Gamma Distribution at 5% Significance Level	
Nonparametric Statistics	
95% CLT UCL	371.6
95% Jackknife UCL	372.6
95% Standard Bootstrap UCL	371
95% Bootstrap-t UCL	410.3
95% Hall's Bootstrap UCL	442.9
95% Percentile Bootstrap UCL	369.1
95% BCA Bootstrap UCL	396.8
95% Chebyshev(Mean, Sd) UCL	511.5
97.5% Chebyshev(Mean, Sd) UCL	608.8
99% Chebyshev(Mean, Sd) UCL	799.8
Use 95% Approximate Gamma UCL	367.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

m&p-Xylene OV

General Statistics

Number of Valid Data	46	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	27
		Percent Non-Detects	58.70%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0045	Minimum Detected	-5.404
Maximum Detected	270	Maximum Detected	5.598
Mean of Detected	40.04	Mean of Detected	0.299
SD of Detected	73.89	SD of Detected	3.678
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	0.33	Maximum Non-Detect	-1.109

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	73.91%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.625	Shapiro Wilk Test Statistic	0.923
5% Shapiro Wilk Critical Value	0.901	5% Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	16.55	Mean	-3.071
SD	50.8	SD	3.781
95% DL/2 (t) UCL	29.13	95% H-Stat (DL/2) UCL	1935
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.398
		SD in Log Scale	5.445
		Mean in Original Scale	16.54
		SD in Original Scale	50.81
		95% t UCL	29.12
		95% Percentile Bootstrap UCL	29.67
		95% BCA Bootstrap UCL	33.21
		95% H-UCL	15026600

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.216	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	185.5		
nu star	8.202		
A-D Test Statistic	0.718	**Nonparametric Statistics**	
5% A-D Critical Value	0.881	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.881	Mean	16.54
5% K-S Critical Value	0.219	SD	50.25
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7.612
		95% KM (t) UCL	29.33
Assuming Gamma Distribution		95% KM (z) UCL	29.06
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	29.12
Minimum	0.000001	95% KM (bootstrap t) UCL	39.92
Maximum	270	95% KM (BCA) UCL	31.57
Mean	16.54	95% KM (Percentile Bootstrap) UCL	29.86
Median	0.000001	95% KM (Chebyshev) UCL	49.72

SD	50.81	97.5% KM (Chebyshev) UCL	64.08
k star	0.087	99% KM (Chebyshev) UCL	92.28
Theta star	190.1		
Nu star	8.004	**Potential UCLs to Use**	
AppChi2	2.738	95% KM (t) UCL	29.33
95% Gamma Approximate UCL (Use when n >= 40)	48.36		
95% Adjusted Gamma UCL (Use when n < 40)	50.17		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Manganese M

General Statistics

Number of Valid Observations	83	Number of Distinct Observations	79

Raw Statistics		**Log-transformed Statistics**	
Minimum	35.7	Minimum of Log Data	3.575
Maximum	1700	Maximum of Log Data	7.438
Mean	284.7	Mean of log Data	5.391
Geometric Mean	219.4	SD of log Data	0.718
Median	214		
SD	251.8		
Std. Error of Mean	27.64		
Coefficient of Variation	0.884		
Skewness	3.267		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.172	Lilliefors Test Statistic	0.0589
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	330.7	95% H-UCL	333.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	390.5
95% Adjusted-CLT UCL (Chen-1995)	340.7	97.5% Chebyshev (MVUE) UCL	437
95% Modified-t UCL (Johnson-1978)	332.3	99% Chebyshev (MVUE) UCL	528.5

Gamma Distribution Test	**Data Distribution**

k star (bias corrected)	2.002
Theta Star	142.2
MLE of Mean	284.7
MLE of Standard Deviation	201.2
nu star	332.3
Approximate Chi Square Value (.05)	291.1
Adjusted Level of Significance	0.0471
Adjusted Chi Square Value	290.4
Anderson-Darling Test Statistic	0.904
Anderson-Darling 5% Critical Value	0.763
Kolmogorov-Smirnov Test Statistic	0.0882
Kolmogorov-Smirnov 5% Critical Value	0.0993

Data follow Appr. Gamma Distribution at 5% Significance Level

Data Follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	325
95% Adjusted Gamma UCL (Use when n < 40)	325.8

Nonparametric Statistics

95% CLT UCL	330.2
95% Jackknife UCL	330.7
95% Standard Bootstrap UCL	330.3
95% Bootstrap-t UCL	351.7
95% Hall's Bootstrap UCL	356.8
95% Percentile Bootstrap UCL	331
95% BCA Bootstrap UCL	340.5
95% Chebyshev(Mean, Sd) UCL	405.2
97.5% Chebyshev(Mean, Sd) UCL	457.3
99% Chebyshev(Mean, Sd) UCL	559.7

Potential UCL to Use

Use 95% Approximate Gamma UCL 325

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Mercury M

General Statistics

Number of Valid Data	82	Number of Detected Data	62
Number of Distinct Detected Data	49	Number of Non-Detect Data	20
		Percent Non-Detects	24.39%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.023	Minimum Detected	-3.772
Maximum Detected	7.4	Maximum Detected	2.001
Mean of Detected	0.757	Mean of Detected	-1.06
SD of Detected	1.347	SD of Detected	1.183
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.16	Maximum Non-Detect	-1.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	37
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	45

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Observations < Largest ND are treated as NDs

Single DL Non-Detect Percentage 45.12%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.308
5% Lilliefors Critical Value	0.113

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.58
SD	1.21
95% DL/2 (t) UCL	0.802
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.118
5% Lilliefors Critical Value	0.113

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.669
SD	1.505
95% H-Stat (DL/2) UCL	0.928
Log ROS Method	
Mean in Log Scale	-1.642
SD in Log Scale	1.47
Mean in Original Scale	0.581
SD in Original Scale	1.21
95% t UCL	0.803
95% Percentile Bootstrap UCL	0.813
95% BCA Bootstrap UCL	0.874
95% H-UCL	0.89

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.738
Theta Star	1.026
nu star	91.48
A-D Test Statistic	2.906
5% A-D Critical Value	0.791
K-S Test Statistic	0.791
5% K-S Critical Value	0.117

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	7.4
Mean	0.572
Median	0.205
SD	1.214
k star	0.204

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.58
SD	1.203
SE of Mean	0.134
95% KM (t) UCL	0.803
95% KM (z) UCL	0.8
95% KM (jackknife) UCL	0.802
95% KM (bootstrap t) UCL	0.948
95% KM (BCA) UCL	0.819
95% KM (Percentile Bootstrap) UCL	0.814
95% KM (Chebyshev) UCL	1.163
97.5% KM (Chebyshev) UCL	1.416
99% KM (Chebyshev) UCL	1.912

Theta star	2.807
Nu star	33.44
AppChi2	21.21
95% Gamma Approximate UCL (Use when n >= 40)	0.902
95% Adjusted Gamma UCL (Use when n < 40)	0.909

Potential UCLs to Use

95% KM (Chebyshev) UCL	1.163

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Methyl cyclohexane OV

General Statistics

Number of Valid Data	24	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	22
		Percent Non-Detects	91.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.805	Mean of Detected	-0.612
SD of Detected	0.841	SD of Detected	1.341
Minimum Non-Detect	0.11	Minimum Non-Detect	-2.207
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	95.83%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.193
SD	0.263
95% DL/2 (t) UCL	0.285
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.952
SD	0.648
95% H-Stat (DL/2) UCL	0.233
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.26
SD	0.238
SE of Mean	0.0686
95% KM (t) UCL	0.377
95% KM (z) UCL	0.372
95% KM (jackknife) UCL	1.044
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.559
97.5% KM (Chebyshev) UCL	0.688
99% KM (Chebyshev) UCL	0.943

Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Potential UCLs to Use

95% KM (BCA) UCL	N/A

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Naphthalene OS

General Statistics

Number of Valid Data	88	Number of Detected Data	23
Number of Distinct Detected Data	19	Number of Non-Detect Data	65
		Percent Non-Detects	73.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.052	Minimum Detected	-2.957
Maximum Detected	7.9	Maximum Detected	2.067
Mean of Detected	0.883	Mean of Detected	-1.416
SD of Detected	1.905	SD of Detected	1.406
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	74	Maximum Non-Detect	4.304

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.485	Shapiro Wilk Test Statistic	0.835
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.072	Mean	-1.06
SD	4.047	SD	1.133
95% DL/2 (t) UCL	1.789	95% H-Stat (DL/2) UCL	0.878

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.832
		SD in Log Scale	0.825
		Mean in Original Scale	0.341
		SD in Original Scale	1.013
		95% t UCL	0.52
		95% Percentile Bootstrap UCL	0.531
		95% BCA Bootstrap UCL	0.638
		95% H-UCL	0.27

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.457	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.931		
nu star	21.04		
A-D Test Statistic	2.979	**Nonparametric Statistics**	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	0.345
5% K-S Critical Value	0.192	SD	1.028
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.115
		95% KM (t) UCL	0.537
Assuming Gamma Distribution		95% KM (z) UCL	0.535
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.534
Minimum	0.000001	95% KM (bootstrap t) UCL	0.739
Maximum	7.9	95% KM (BCA) UCL	0.547
Mean	0.4	95% KM (Percentile Bootstrap) UCL	0.556
Median	0.125	95% KM (Chebyshev) UCL	0.848
SD	1.031	97.5% KM (Chebyshev) UCL	1.065
k star	0.247	99% KM (Chebyshev) UCL	1.493
Theta star	1.623		
Nu star	43.42	**Potential UCLs to Use**	
AppChi2	29.31	95% KM (BCA) UCL	0.547
95% Gamma Approximate UCL (Use when n >= 40)	0.593		
95% Adjusted Gamma UCL (Use when n < 40)	0.597		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Naphthalene OV

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	43	Number of Detected Data	11
Number of Distinct Detected Data	10	Number of Non-Detect Data	32
		Percent Non-Detects	74.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0033	Minimum Detected	-5.714
Maximum Detected	84	Maximum Detected	4.431
Mean of Detected	15.51	Mean of Detected	-1.748
SD of Detected	28.53	SD of Detected	4.022
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	17	Maximum Non-Detect	2.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	40
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.02%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.628	Shapiro Wilk Test Statistic	0.835
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.335	Mean	-3.726
SD	15.48	SD	3.12
95% DL/2 (t) UCL	8.306	95% H-Stat (DL/2) UCL	40.86
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.535
		SD in Log Scale	2.619
		Mean in Original Scale	3.971
		SD in Original Scale	15.51
		95% t UCL	7.95
		95% Percentile Bootstrap UCL	8.31
		95% BCA Bootstrap UCL	9.867
		95% H-UCL	2.106

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.183	**Data do not follow a Discernable Distribution (0.05)**
Theta Star	84.74	
nu star	4.026	

A-D Test Statistic	1.167
5% A-D Critical Value	0.871
K-S Test Statistic	0.871
5% K-S Critical Value	0.283

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	84
Mean	3.967
Median	0.000001
SD	15.51
k star	0.0806
Theta star	49.25
Nu star	6.928
AppChi2	2.131
95% Gamma Approximate UCL (Use when n >= 40)	12.9
95% Adjusted Gamma UCL (Use when n < 40)	13.47

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.972
SD	15.33
SE of Mean	2.452
95% KM (t) UCL	8.097
95% KM (z) UCL	8.006
95% KM (jackknife) UCL	7.951
95% KM (bootstrap t) UCL	11.95
95% KM (BCA) UCL	8.153
95% KM (Percentile Bootstrap) UCL	8.114
95% KM (Chebyshev) UCL	14.66
97.5% KM (Chebyshev) UCL	19.29
99% KM (Chebyshev) UCL	28.37

Potential UCLs to Use

99% KM (Chebyshev) UCL	28.37

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Sec-butylbenzene OV

General Statistics

Number of Valid Data	44	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	41
		Percent Non-Detects	93.18%

Raw Statistics

Minimum Detected	0.0029
Maximum Detected	0.01
Mean of Detected	0.00583
SD of Detected	0.00371
Minimum Non-Detect	0.0041
Maximum Non-Detect	130

Log-transformed Statistics

Minimum Detected	-5.843
Maximum Detected	-4.605
Mean of Detected	-5.277
SD of Detected	0.626
Minimum Non-Detect	-5.497
Maximum Non-Detect	4.868

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 44

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.833	Mean	-3.952
SD	10.81	SD	3.01
95% DL/2 (t) UCL	5.573	95% H-Stat (DL/2) UCL	19.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.781
		SD in Log Scale	0.22
		Mean in Original Scale	0.00318
		SD in Original Scale	0.00112
		95% t UCL	0.00347
		95% Percentile Bootstrap UCL	0.00349
		95% BCA Bootstrap UCL	0.00369
		95% H-UCL	0.00335

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.00342
5% K-S Critical Value	N/A	SD	0.00139

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

SE of Mean	0.0004166
95% KM (t) UCL	0.00412
95% KM (z) UCL	0.0041
95% KM (jackknife) UCL	0.00448
95% KM (bootstrap t) UCL	0.00386
95% KM (BCA) UCL	0.01
95% KM (Percentile Bootstrap) UCL	0.01
95% KM (Chebyshev) UCL	0.00523
97.5% KM (Chebyshev) UCL	0.00602
99% KM (Chebyshev) UCL	0.00756

Potential UCLs to Use

95% KM (t) UCL	0.00412
95% KM (Percentile Bootstrap) UCL	0.01

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Tetrachloroethene OV

General Statistics

Number of Valid Data	70	Number of Detected Data	22
Number of Distinct Detected Data	20	Number of Non-Detect Data	48
		Percent Non-Detects	68.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0075	Minimum Detected	-4.893
Maximum Detected	1700	Maximum Detected	7.438
Mean of Detected	116.9	Mean of Detected	-0.894
SD of Detected	394.2	SD of Detected	3.229
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	66
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.29%

UCL Statistics

Normal Distribution Test with Detected Values Only | **Lognormal Distribution Test with Detected Values Only**

US EPA ARCHIVE DOCUMENT

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Shapiro Wilk Test Statistic	0.339
5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	36.9
SD	224.2
95% DL/2 (t) UCL	81.58
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Shapiro Wilk Test Statistic	0.816
5% Shapiro Wilk Critical Value	0.911
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-2.752
SD	2.842
95% H-Stat (DL/2) UCL	11.19
Log ROS Method	
Mean in Log Scale	-5.593
SD in Log Scale	3.945
Mean in Original Scale	36.76
SD in Original Scale	224.2
95% t UCL	81.44
95% Percentile Bootstrap UCL	85.32
95% BCA Bootstrap UCL	121.3
95% H-UCL	92.49

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.149
Theta Star	784.1
nu star	6.562
A-D Test Statistic	4.217
5% A-D Critical Value	0.918
K-S Test Statistic	0.918
5% K-S Critical Value	0.208
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1700
Mean	36.75
Median	0.000001
SD	224.2
k star	0.0708
Theta star	519.4
Nu star	9.906
AppChi2	3.883
95% Gamma Approximate UCL (Use when n >= 40)	93.76

Data Distribution Test with Detected Values Only	
Data do not follow a Discernable Distribution (0.05)	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	36.77
SD	222.6
SE of Mean	27.24
95% KM (t) UCL	82.18
95% KM (z) UCL	81.57
95% KM (jackknife) UCL	81.46
95% KM (bootstrap t) UCL	1739
95% KM (BCA) UCL	85.23
95% KM (Percentile Bootstrap) UCL	85.21
95% KM (Chebyshev) UCL	155.5
97.5% KM (Chebyshev) UCL	206.9
99% KM (Chebyshev) UCL	307.8
Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	206.9

95% Adjusted Gamma UCL (Use when n < 40)	95.71

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Thallium M

General Statistics

Number of Valid Data	83	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	71
		Percent Non-Detects	85.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	13.4	Maximum Detected	2.595
Mean of Detected	4.991	Mean of Detected	0.952
SD of Detected	4.44	SD of Detected	1.471
Minimum Non-Detect	0.36	Minimum Non-Detect	-1.022
Maximum Non-Detect	660	Maximum Non-Detect	6.492

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	83
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Test Statistic	0.883
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	78.61	Mean	2.529
SD	81.63	SD	2.756
95% DL/2 (t) UCL	93.52	95% H-Stat (DL/2) UCL	2104
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.72
		SD in Log Scale	1.029
		Mean in Original Scale	1.096

SD in Original Scale	2.308
95% t UCL	1.517
95% Percentile Bootstrap UCL	1.549
95% BCA Bootstrap UCL	1.638
95% H-UCL	1.068

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.725
Theta Star	6.883
nu star	17.4
A-D Test Statistic	0.312
5% A-D Critical Value	0.761
K-S Test Statistic	0.761
5% K-S Critical Value	0.253

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	13.4
Mean	1.123
Median	0.331
SD	2.443
k star	0.159
Theta star	7.059
Nu star	26.4
AppChi2	15.69
95% Gamma Approximate UCL (Use when n >= 40)	1.889
95% Adjusted Gamma UCL (Use when n < 40)	1.907

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.743
SD	3.256
SE of Mean	0.552
95% KM (t) UCL	2.662
95% KM (z) UCL	2.651
95% KM (jackknife) UCL	2.641
95% KM (bootstrap t) UCL	2.993
95% KM (BCA) UCL	3.003
95% KM (Percentile Bootstrap) UCL	2.904
95% KM (Chebyshev) UCL	4.151
97.5% KM (Chebyshev) UCL	5.193
99% KM (Chebyshev) UCL	7.24

Potential UCLs to Use

95% KM (t) UCL	2.662
95% KM (Percentile Bootstrap) UCL	2.904

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Trichloroethene OV

General Statistics

Number of Valid Data	70	Number of Detected Data	23
Number of Distinct Detected Data	23	Number of Non-Detect Data	47
		Percent Non-Detects	67.14%

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Raw Statistics	
Minimum Detected	0.0021
Maximum Detected	2400
Mean of Detected	134.3
SD of Detected	511
Minimum Non-Detect	0.0041
Maximum Non-Detect	6.6

Log-transformed Statistics	
Minimum Detected	-6.166
Maximum Detected	7.783
Mean of Detected	-1.325
SD of Detected	3.692
Minimum Non-Detect	-5.497
Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	66
Number treated as Detected	4
Single DL Non-Detect Percentage	94.29%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.294
5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.91
5% Shapiro Wilk Critical Value	0.914
Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	44.26
SD	295.4
95% DL/2 (t) UCL	103.1
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-2.852
SD	2.966
95% H-Stat (DL/2) UCL	16.47
Log ROS Method	
Mean in Log Scale	-4.806
SD in Log Scale	3.436
Mean in Original Scale	44.12
SD in Original Scale	295.4
95% t UCL	103
95% Percentile Bootstrap UCL	112.4
95% BCA Bootstrap UCL	180.8
95% H-UCL	16.93

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.139
Theta Star	966.2
nu star	6.393
A-D Test Statistic	3.436
5% A-D Critical Value	0.923
K-S Test Statistic	0.923

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	44.13

5% K-S Critical Value	0.204	SD	293.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	35.84
		95% KM (t) UCL	103.9
Assuming Gamma Distribution		95% KM (z) UCL	103.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	103
Minimum	0.000001	95% KM (bootstrap t) UCL	3209
Maximum	2400	95% KM (BCA) UCL	112
Mean	44.12	95% KM (Percentile Bootstrap) UCL	112
Median	0.000001	95% KM (Chebyshev) UCL	200.4
SD	295.4	97.5% KM (Chebyshev) UCL	268
k star	0.0702	99% KM (Chebyshev) UCL	400.8
Theta star	628.6		
Nu star	9.825	**Potential UCLs to Use**	
AppChi2	3.833	97.5% KM (Chebyshev) UCL	268
95% Gamma Approximate UCL (Use when n >= 40)	113.1		
95% Adjusted Gamma UCL (Use when n < 40)	115.5		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Vanadium M

General Statistics

Number of Valid Data	83	Number of Detected Data	82
Number of Distinct Detected Data	77	Number of Non-Detect Data	1
		Percent Non-Detects	1.20%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.6	Minimum Detected	1.526
Maximum Detected	210	Maximum Detected	5.347
Mean of Detected	25.95	Mean of Detected	2.963
SD of Detected	27.02	SD of Detected	0.72
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	2.5	Maximum Non-Detect	0.916

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.22	Lilliefors Test Statistic	0.111
5% Lilliefors Critical Value	0.0978	5% Lilliefors Critical Value	0.0978

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	25.65
SD	27
95% DL/2 (t) UCL	30.58
Maximum Likelihood Estimate(MLE) Method	
Mean	25.48
SD	27.06
95% MLE (t) UCL	30.42
95% MLE (Tiku) UCL	30.07

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.797
Theta Star	14.44
nu star	294.7
A-D Test Statistic	2.271
5% A-D Critical Value	0.766
K-S Test Statistic	0.766
5% K-S Critical Value	0.1

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	210
Mean	25.63
Median	16.5
SD	27.01
k star	1.14
Theta star	22.49
Nu star	189.2
AppChi2	158.4
95% Gamma Approximate UCL (Use when n >= 40)	30.62
95% Adjusted Gamma UCL (Use when n < 40)	30.72

Note: DL/2 is not a recommended method.

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	2.93
SD	0.776
95% H-Stat (DL/2) UCL	30.17
Log ROS Method	
Mean in Log Scale	2.94
SD in Log Scale	0.746
Mean in Original Scale	25.67
SD in Original Scale	26.98
95% t UCL	30.59
95% Percentile Bootstrap UCL	30.77
95% BCA Bootstrap UCL	33.02
95% H UCL	29.54

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	25.69
SD	26.8
SE of Mean	2.96
95% KM (t) UCL	30.61
95% KM (z) UCL	30.56
95% KM (jackknife) UCL	30.61
95% KM (bootstrap t) UCL	33.23
95% KM (BCA) UCL	31.07
95% KM (Percentile Bootstrap) UCL	30.82
95% KM (Chebyshev) UCL	38.59
97.5% KM (Chebyshev) UCL	44.17
99% KM (Chebyshev) UCL	55.14

Potential UCLs to Use

95% KM (BCA) UCL	31.07

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Vinyl Chloride OV

General Statistics

Number of Valid Data	69	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	65
		Percent Non-Detects	94.20%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.07	Minimum Detected	-2.659
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.704	Mean of Detected	-1.349
SD of Detected	1.073	SD of Detected	1.644
Minimum Non-Detect	0.0045	Minimum Non-Detect	-5.404
Maximum Non-Detect	270	Maximum Non-Detect	5.598

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	69
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.724	Shapiro Wilk Test Statistic	0.876
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.568	Mean	-2.929
SD	17.78	SD	2.626
95% DL/2 (t) UCL	7.136	95% H-Stat (DL/2) UCL	4.494

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	-8.345
SD in Log Scale	2.04
Mean in Original Scale	0.0411
SD in Original Scale	0.28
95% t UCL	0.0972
95% Percentile Bootstrap UCL	0.102
95% BCA Bootstrap UCL	0.151
95% H-UCL	0.00395

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.321
Theta Star	2.195
nu star	2.566
A-D Test Statistic	0.464
5% A-D Critical Value	0.676
K-S Test Statistic	0.676
5% K-S Critical Value	0.408

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2.3
Mean	0.0408
Median	0.000001
SD	0.28
k star	0.0899
Theta star	0.454
Nu star	12.4
AppChi2	5.493
95% Gamma Approximate UCL (Use when n >= 40)	0.0921
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.112
SD	0.283
SE of Mean	0.0416
95% KM (t) UCL	0.181
95% KM (z) UCL	0.18
95% KM (jackknife) UCL	0.168
95% KM (bootstrap t) UCL	0.371
95% KM (BCA) UCL	2.3
95% KM (Percentile Bootstrap) UCL	2.3
95% KM (Chebyshev) UCL	0.293
97.5% KM (Chebyshev) UCL	0.371
99% KM (Chebyshev) UCL	0.525

Potential UCLs to Use

95% KM (t) UCL	0.181

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Xylene, o OV

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

General Statistics

Number of Valid Data	46	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	31
		Percent Non-Detects	67.39%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.011	Minimum Detected	-4.51
Maximum Detected	110	Maximum Detected	4.7
Mean of Detected	16.83	Mean of Detected	-0.239
SD of Detected	34.45	SD of Detected	2.974
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	6.6	Maximum Non-Detect	1.887

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.48%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.566	Shapiro Wilk Test Statistic	0.937
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.57	Mean	-3.552
SD	20.79	SD	3.142
95% DL/2 (t) UCL	10.72	95% H-Stat (DL/2) UCL	46.37
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.041
		SD in Log Scale	4.488
		Mean in Original Scale	5.489
		SD in Original Scale	20.81
		95% t UCL	10.64
		95% Percentile Bootstrap UCL	10.78
		95% BCA Bootstrap UCL	13.43
		95% H-UCL	7296

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**
k star (bias corrected)	0.232	**Data appear Lognormal at 5% Significance Level**
Theta Star	72.57	

nu star	6.959
A-D Test Statistic	1.054
5% A-D Critical Value	0.863
K-S Test Statistic	0.863
5% K-S Critical Value	0.243

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	110
Mean	5.489
Median	0.000001
SD	20.81
k star	0.0852
Theta star	64.4
Nu star	7.842
AppChi2	2.644
95% Gamma Approximate UCL (Use when n >= 40)	16.28
95% Adjusted Gamma UCL (Use when n < 40)	16.9

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	5.505
SD	20.58
SE of Mean	3.14
95% KM (t) UCL	10.78
95% KM (z) UCL	10.67
95% KM (jackknife) UCL	10.66
95% KM (bootstrap t) UCL	18.04
95% KM (BCA) UCL	11.27
95% KM (Percentile Bootstrap) UCL	11.14
95% KM (Chebyshev) UCL	19.19
97.5% KM (Chebyshev) UCL	25.12
99% KM (Chebyshev) UCL	36.75

Potential UCLs to Use

99% KM (Chebyshev) UCL	36.75

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Xylenes, Total OV

General Statistics

Number of Valid Data	67	Number of Detected Data	25
Number of Distinct Detected Data	23	Number of Non-Detect Data	42
		Percent Non-Detects	62.69%

Raw Statistics

Minimum Detected	0.0045
Maximum Detected	380
Mean of Detected	41.29
SD of Detected	92.49
Minimum Non-Detect	0.0041
Maximum Non-Detect	0.5

Log-transformed Statistics

Minimum Detected	-5.404
Maximum Detected	5.94
Mean of Detected	0.0469
SD of Detected	3.701
Minimum Non-Detect	-5.497
Maximum Non-Detect	-0.693

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	52
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	77.61%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.523	Shapiro Wilk Test Statistic	0.934
5% Shapiro Wilk Critical Value	0.918	5% Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	15.45	Mean	-2.403
SD	59.28	SD	3.293
95% DL/2 (t) UCL	27.54	95% H-Stat (DL/2) UCL	111
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.767
		SD in Log Scale	4.54
		Mean in Original Scale	15.41
		SD in Original Scale	59.3
		95% t UCL	27.49
		95% Percentile Bootstrap UCL	27.87
		95% BCA Bootstrap UCL	34.2
		95% H-UCL	7118

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.203	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	203.5		
nu star	10.15		
A-D Test Statistic	0.884	**Nonparametric Statistics**	
5% A-D Critical Value	0.895	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.895	Mean	15.41
5% K-S Critical Value	0.193	SD	58.85
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	7.338
		95% KM (t) UCL	27.66
Assuming Gamma Distribution		95% KM (z) UCL	27.48
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	27.5
Minimum	0.000001	95% KM (bootstrap t) UCL	42.17
Maximum	380	95% KM (BCA) UCL	29.49
Mean	15.41	95% KM (Percentile Bootstrap) UCL	28.12
Median	0.000001	95% KM (Chebyshev) UCL	47.4

SD	59.3	97.5% KM (Chebyshev) UCL	61.24
k star	0.0806	99% KM (Chebyshev) UCL	88.43
Theta star	191.2		
Nu star	10.8	**Potential UCLs to Use**	
AppChi2	4.448	95% KM (t) UCL	27.66
95% Gamma Approximate UCL (Use when n >= 40)	37.41		
95% Adjusted Gamma UCL (Use when n < 40)	38.18		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Zinc M

General Statistics

Number of Valid Observations	83	Number of Distinct Observations	82

Raw Statistics		**Log-transformed Statistics**	
Minimum	20.1	Minimum of Log Data	3.001
Maximum	3330	Maximum of Log Data	8.111
Mean	403.6	Mean of log Data	5.021
Geometric Mean	151.5	SD of log Data	1.305
Median	128		
SD	745.8		
Std. Error of Mean	81.86		
Coefficient of Variation	1.848		
Skewness	2.93		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.304	Lilliefors Test Statistic	0.1
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	539.8	95% H-UCL	512.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	632.1
95% Adjusted-CLT UCL (Chen-1995)	566.4	97.5% Chebyshev (MVUE) UCL	754.8
95% Modified-t UCL (Johnson-1978)	544.2	99% Chebyshev (MVUE) UCL	995.7

Gamma Distribution Test	**Data Distribution**

Table B-3
ProUCL Output - Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

k star (bias corrected)	0.612
Theta Star	659.4
MLE of Mean	403.6
MLE of Standard Deviation	515.9
nu star	101.6
Approximate Chi Square Value (.05)	79.35
Adjusted Level of Significance	0.0471
Adjusted Chi Square Value	79.01
Anderson-Darling Test Statistic	4.793
Anderson-Darling 5% Critical Value	0.806
Kolmogorov-Smirnov Test Statistic	0.168
Kolmogorov-Smirnov 5% Critical Value	0.103

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	516.8
95% Adjusted Gamma UCL (Use when n < 40)	519.1

Potential UCL to Use

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	538.3
95% Jackknife UCL	539.8
95% Standard Bootstrap UCL	535.4
95% Bootstrap-t UCL	585.6
95% Hall's Bootstrap UCL	551.8
95% Percentile Bootstrap UCL	541.6
95% BCA Bootstrap UCL	573.2
95% Chebyshev(Mean, Sd) UCL	760.5
97.5% Chebyshev(Mean, Sd) UCL	914.9
99% Chebyshev(Mean, Sd) UCL	1218

Use 95% Chebyshev (Mean, Sd) UCL	760.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX C

Documentation of Exposure Modeling and Risk Evaluation for Lead in Soil

US EPA ARCHIVE DOCUMENT

Table C-1
Adult Lead Model - Source Area Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	266	266
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.4**	**1.9**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	3.3	5.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.020%**	**0.8%**

Notes:
ug - microgram
g - gram
ppm - parts per million
d/L - deciliter

Prepared By/Date: EYM 5/10/12
Checked By/Date: BJR 5/17/12

U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead
for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table C-2
Child Lead Model - Source Area Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

US EPA ARCHIVE DOCUMENT

Table C-2
Child Lead Model - Source Area Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 219.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	299.000	219.300
1-2	299.000	219.300
2-3	299.000	219.300
3-4	299.000	219.300
4-5	299.000	219.300
5-6	299.000	219.300
6-7	299.000	219.300

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.038	0.000	0.368
1-2	0.034	0.888	0.000	0.906
2-3	0.062	0.978	0.000	0.955
3-4	0.067	0.948	0.000	0.985
4-5	0.067	0.927	0.000	1.046
5-6	0.093	0.983	0.000	1.112
6-7	0.093	1.069	0.000	1.136

US EPA ARCHIVE DOCUMENT

Table C-2
Child Lead Model - Source Area Surface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	5.979	7.407	4.0
1-2	9.364	11.193	4.6
2-3	9.487	11.482	4.3
3-4	9.601	11.600	4.1
4-5	7.276	9.315	3.3
5-6	6.604	8.792	2.8
6-7	6.266	8.564	2.5

US EPA ARCHIVE DOCUMENT

Table C-3
Child Lead Model - Source Area Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

US EPA ARCHIVE DOCUMENT

Table C-3
Child Lead Model - Source Area Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 186.400 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	252.000	186.400
1-2	252.000	186.400
2-3	252.000	186.400
3-4	252.000	186.400
4-5	252.000	186.400
5-6	252.000	186.400
6-7	252.000	186.400

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

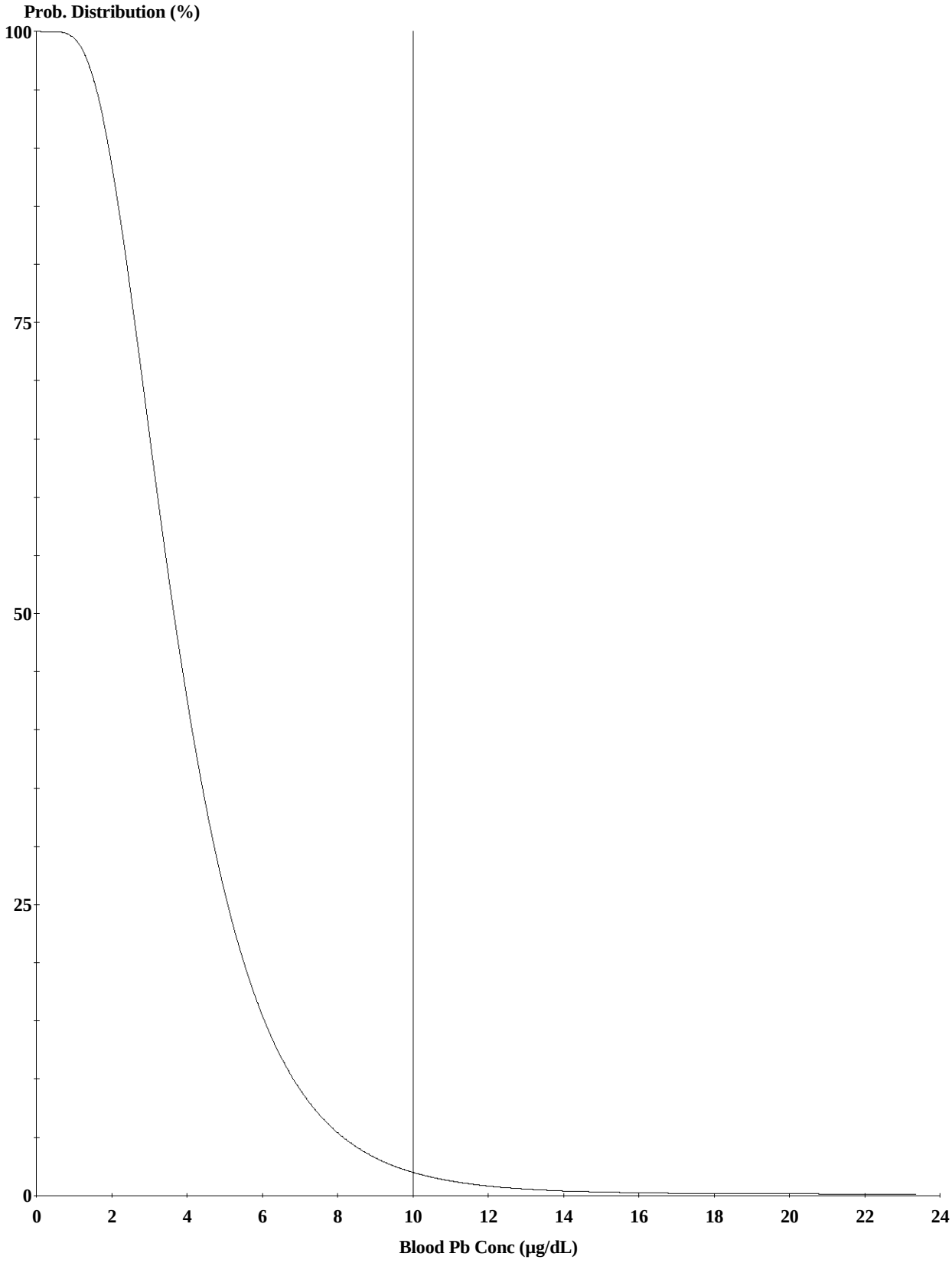
Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.049	0.000	0.371
1-2	0.034	0.899	0.000	0.917
2-3	0.062	0.988	0.000	0.965
3-4	0.067	0.956	0.000	0.994
4-5	0.067	0.932	0.000	1.052
5-6	0.093	0.987	0.000	1.117
6-7	0.093	1.073	0.000	1.141

US EPA ARCHIVE DOCUMENT

Table C-3
Child Lead Model - Source Area Subsurface Soil
Source Area Risk Assessment
Centredale Manor Restoration Project Superfund Site
North Providence, Rhodes Island

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	5.110	6.551	3.6
1-2	8.019	9.869	4.1
2-3	8.111	10.126	3.8
3-4	8.197	10.214	3.6
4-5	6.194	8.245	3.0
5-6	5.616	7.814	2.5
6-7	5.324	7.632	2.2

US EPA ARCHIVE DOCUMENT

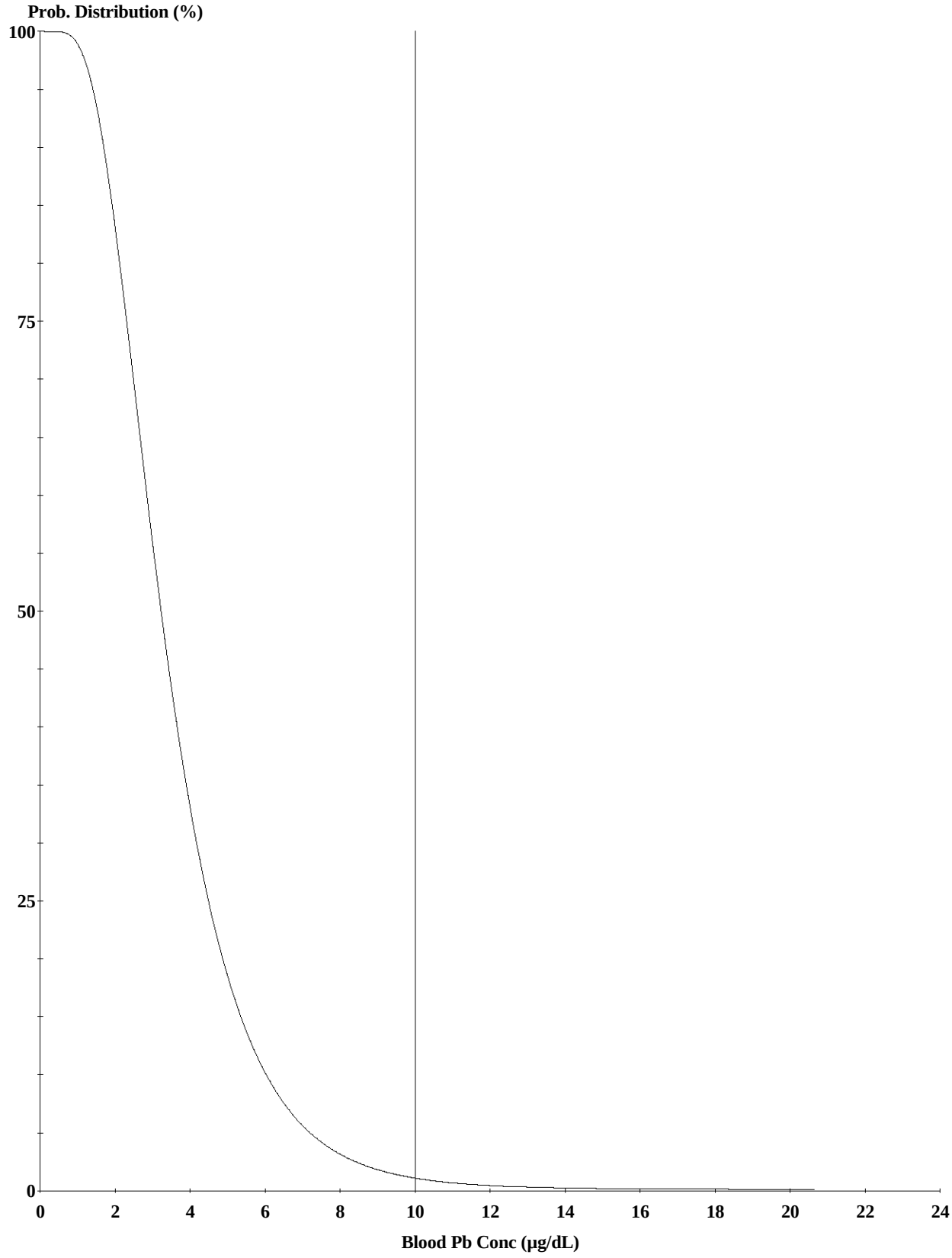


Cutoff = 10.000 µg/dl
Geo Mean = 3.820
GSD = 1.600
% Above = 2.032

Age Range = User Designated: Ages 12 - 72 months

Run Mode = Research

US EPA ARCHIVE DOCUMENT



Cutoff = 10.000 µg/dl
Geo Mean = 3.376
GSD = 1.600
% Above = 1.044

Age Range = User Designated: Ages 12 - 72 months

Run Mode = Research

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX D

Supporting Information for the Updates to the Human Health Risk-based PRGs

Appendix B – Equations Used to Derive Human Health PRGs
July 2005 Interim Final Preliminary Remediation Goals Report
Centredale Manor Restoration Superfund Site

US EPA ARCHIVE DOCUMENT

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

FISH TISSUE PRGs – BIOTA CONSUMPTION BY HUMANS

Receptor Cancer Risk = (child cancer risk + older child cancer risk + adult cancer risk)

$$CR_{receptor} = CR_{child} + CR_{olderchild} + CR_{adult}$$

$$CR_{child} = \frac{[C]_{fish} \times EF_{child} \times ED_{child} \times CF \times CSF_o \times IR_{child}}{BW_{child} \times AT}$$

where:

$[C]_{fish}$	=	Exposure point concentration of the COC in fish tissue (dimensions: mass/mass, typical units: mg/kg).
IR	=	Average daily fish consumption rate during the exposure period (dimensions: mass/time, typical units: grams/day)
EF	=	Number of days of exposure during the exposure period divided by the number of days in the exposure period (dimensions: events/time, typical units: days/year).
ED	=	Duration of the exposure period (dimensions: time, typical units: years).
C	=	Appropriate units conversion factor(s).
BW	=	Body weight of the receptor of concern during the averaging period (dimensions: mass, typical units: kg).
AT	=	Averaging Time (dimension: time, typical units: days).

$$CR_{olderchild} = \frac{[C]_{fish} \times EF_{olderchild} \times ED_{olderchild} \times CF \times CSF_o \times IR_{olderchild}}{BW_{olderchild} \times AT}$$

$$CR_{adult} = \frac{[C]_{fish} \times EF_{adult} \times ED_{adult} \times CF \times CSF_o \times IR_{adult}}{BW_{adult} \times AT}$$

$$CR_{receptor} = \frac{[C]_{fish} \times CF \times CSF_o}{AT}\left(\frac{EF_{child} \times ED_{child} \times IR_{child}}{BW_{child}} + \frac{EF_{olderchild} \times ED_{olderchild} \times IR_{olderchild}}{BW_{olderchild}} + \frac{EF_{adult} \times ED_{adult} \times IR_{adult}}{BW_{adult}}\right)$$

substituting $TR_{receptor}$(target risk) for $CR_{receptor}$ and PRG_{fish} (preliminary remediation goal for fish tissue) for $[C]_{fish}$,

$$TR_{receptor} = \frac{PRG_{fish} \times CF \times CSF_o}{AT}\left(\frac{EF_{child} \times ED_{child} \times IR_{child}}{BW_{child}} + \frac{EF_{olderchild} \times ED_{olderchild} \times IR_{olderchild}}{BW_{olderchild}} + \frac{EF_{adult} \times ED_{adult} \times IR_{adult}}{BW_{adult}}\right)$$

and then solving for PRG_{fish},

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

$$PRG_{fish} = \frac{TR_{receptor} \times AT}{CF \times CSF_o \left(\frac{EF_{child} \times ED_{child} \times IR_{child}}{BW_{child}} + \frac{EF_{olderchild} \times ED_{olderchild} \times IR_{olderchild}}{BW_{olderchild}} + \frac{EF_{adult} \times ED_{adult} \times IR_{adult}}{BW_{adult}} \right)}$$

The noncancer risk component of the PRG for fish tissue consumption is calculated for each age group of each receptor,

$$PRG_{fish,\ agegroup} = \frac{THI_{agegroup} \times RfD \times AT \ x \ BW_{agegroup}}{CF \times EF_{agegroup} \times ED_{agegroup} \times IR_{agegroup}}$$

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

SEDIMENT PRGs – INGESTION AND DERMAL CONTACT

Soil and Sediment Direct Contact Exposures

The ADD received by a receptor via direct contact with soil (ADD_{soil}) is the sum of the ADDs for exposure via the routes of dermal contact with the contaminated soil and ingestion of the contaminated soil. The same approach is used for evaluation of sediment contact. Possible inhalation exposures are evaluated as described below. Thus,

$$ADD_{soil} = ADD_{dermal} + ADD_{ingestion}$$

Dermal Contact. The ADD due to dermal contact with COC-contaminated soil and sediment ($ADD_{dermal\ absorption}$) may be calculated:

$$ADD_{dermal\ absorption} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT}$$

and:

$$DA_{event} = [COC]_{soil} \times AF \times ABS \times C$$

Where:

$ADD_{dermal\ absorption}$	=	Average daily dose of COC received through dermal contact with soil or sediment during the period of exposure (dimensions: mass/mass×time, typical units: mg/kg×day).
DA_{event}	=	Dose of COC absorbed during each exposure event (dimensions: mg/cm^2)
$[COC]_{soil}$	=	EPC of COC in the soil or sediment at the exposure point during the period of exposure (dimensions: mg/kg)
SA	=	Skin surface area in contact with the soil or sediment on days exposed (dimensions: cm^2/day)
AF	=	Mass of soil or sediment adhered to the unit surface area of skin exposed (dimensions: mg/cm^2)
ABS	=	Absorption Factor; represents the fraction of COC that may be absorbed through the skin from soil or sediment (unitless)
EF	=	Exposure Frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (dimensions: days/year)
ED	=	Exposure Duration: the period of time over which exposure may occur (dimension: years)
BW	=	Body Weight of the receptor of concern during the exposure duration dimension: kg)
AT	=	Averaging Time (dimension: days)
C	=	Appropriate units conversion factor(s)

Ingestion. The ADD due to the incidental ingestion of COC contaminated soil or sediment ($ADD_{ingestion}$) may be calculated:

$$ADD_{ingestion} = \frac{[COC]_{soil} \times IR \times EF \times ED \times C}{BW \times AT}$$

Where:

$ADD_{ingestion}$	=	Average daily dose of COC received through the ingestion of soil or sediment during the period of exposure (dimensions: mass/mass×time, typical units: mg/kg×day).
$[COC]_{soil}$	=	EPC of the COC in soil or sediment (dimensions: mass/mass, typical units: mg/kg).
IR	=	Daily soil ingestion rate on days exposed during the exposure period (dimensions: mass/time, typical units: mg/day)
EF	=	Number of exposure events during the exposure period divided by the number of days in the exposure period (dimensions: events/time, typical units: days/year).
ED	=	Duration of the exposure period (dimensions: time, typical units: years).
C	=	Appropriate units conversion factor(s)
BW	=	Body weight of the receptor of concern during the averaging period (dimensions: mass, typical units: kg).
AT	=	Averaging Time (dimension: time, typical units: days).

$$\textbf{Cancer risk}_{child,\ ing,\ derm} = \left[\frac{CSF_o \times [COC]_{sed} \times IR_{child} \times EF_{child} \times ED_{child}}{BW_{child} \times AT}\right] + \left[\frac{CSF_d \times DA_{event,\ child} \times EV_{child} \times ED_{child} \times EF_{child} \times SA_{child}}{BW_{child} \times AT}\right]$$

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

$$\textbf{Cancer risk}_{\text{olderchild, ing, derm}} = \left[\frac{CSF_o \times [COC]_{sed} \times IR_{olderchild} \times \text{EF}_{olderchild} \times \text{ED}_{olderchild}}{\text{BW}_{olderchild} \times AT}\right] + \left[\frac{CSF_d \times DA_{event,\,olderchild} \times EV_{olderchild} \times ED_{olderchild} \times EF_{olderchild} \times SA_{olderchild}}{BW_{olderchild} \times AT}\right]$$

$$\textbf{Cancer risk}_{\text{adult, ing, derm}} = \left[\frac{CSF_o \times [COC]_{sed} \times IR_{adult} \times \text{EF}_{adult} \times \text{ED}_{adult}}{\text{BW}_{adult} \times AT}\right] + \left[\frac{CSF_d \times DA_{event,\,adult} \times EV_{adult} \times ED_{adult} \times EF_{adult} \times SA_{adult}}{BW_{adult} \times AT}\right]$$

$$DA_{event} = [COC]_{sed} \times AF \times ABS \times CF$$

$$\begin{aligned}\textit{Cancer risk}_{receptor} = [\textbf{COC}]_{sed} \times \Bigg[& \left[\frac{CSF_o \times IR_{child} \times \text{EF}_{child} \times \text{ED}_{child}}{\text{BW}_{child} \times AT}\right] + \left[\frac{CSF_o \times IR_{olderchild} \times \text{EF}_{olderchild} \times \text{ED}_{olderchild}}{\text{BW}_{olderchild} \times AT}\right] + \\ & \left[\frac{CSF_o \times IR_{adult} \times \text{EF}_{adult} \times \text{ED}_{adult}}{\text{BW}_{adult} \times AT}\right] + \\ & \left[\frac{CSF_d \times AF \times ABS \times CF \times EV_{child} \times ED_{child} \times EF_{child} \times SA_{child}}{BW_{child} \times AT}\right] + \\ & \left[\frac{CSF_d \times AF \times ABS \times CF \times EV_{olderchild} \times ED_{olderchild} \times EF_{olderchild} \times SA_{olderchild}}{BW_{olderchild} \times AT}\right] + \\ & \left[\frac{CSF_d \times AF \times ABS \times CF \times EV_{adult} \times ED_{adult} \times EF_{adult} \times SA_{adult}}{BW_{adult} \times AT}\right] \Bigg]\end{aligned}$$

Rearranging, substituting PRG_{sed} for $[COC]_{sed}$ and Target Risk for Cancer $risk_{receptor}$, and solving for the cancer risk component of PRG_{sed},

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

$$PRG_{sed,c} = \frac{TR_{sed}}{\left[\left[\left(\frac{CSF_o \times IR_{child} \times \mathrm{EF}_{child} \times \mathrm{ED}_{child} \times CF}{\mathrm{BW}_{child} \times AT}\right)+\left(\frac{CSF_o \times IR_{olderchild} \times \mathrm{EF}_{olderchild} \times \mathrm{ED}_{olderchild} \times CF}{\mathrm{BW}_{olderchild} \times AT}\right)+\left(\frac{CSF_o \times IR_{adult} \times \mathrm{EF}_{adult} \times \mathrm{ED}_{adult} \times CF}{\mathrm{BW}_{adult} \times AT}\right)\right]+\left[\left(\frac{CSF_d \times AF \times ABS \times CF \times EV_{child} \times ED_{child} \times EF_{child} \times SA_{child}}{BW_{child} \times AT}\right)+\left(\frac{CSF_d \times AF \times ABS \times CF \times EV_{olderchild} \times ED_{olderchild} \times EF_{olderchild} \times SA_{olderchild}}{BW_{olderchild} \times AT}\right)+\left(\frac{CSF_d \times AF \times ABS \times CF \times EV_{adult} \times ED_{adult} \times EF_{adult} \times SA_{adult}}{BW_{adult} \times AT}\right)\right]\right]}$$

The noncancer (Hazard Index) component of the sediment PRGs are calculated as follows:

$$\textbf{Hazard Index}_{\textbf{agegroup, ing, derm}} = \left[\frac{[COC]_{sed} \times IR_{agegroup} \times \mathrm{EF}_{agegroup} \times \mathrm{ED}_{agegroup}}{RfD_o \times \mathrm{BW}_{agegroup} \times AT}\right] + \left[\frac{DA_{event,\,agegroup} \times EV_{agegroup} \times ED_{agegroup} \times EF_{agegroup} \times SA_{agegroup}}{RfD_o \times BW_{agegroup} \times AT}\right]$$

Rearranging and substituting $[COC]_{sed} \times AF \times ABS \times CF$ for $DA_{event,agegroup,}$

$$\textbf{Hazard Index}_{\textbf{agegroup, ing, derm}} = [COC]_{sed}\left[\frac{IR_{agegroup} \times \mathrm{EF}_{agegroup} \times \mathrm{ED}_{agegroup}}{RfD_o \times \mathrm{BW}_{agegroup} \times AT}\right] + \left[\frac{AF \times ABS \times CF \times EV_{agegroup} \times ED_{agegroup} \times EF_{agegroup} \times SA_{agegroup}}{RfD_o \times BW_{agegroup} \times AT}\right]$$

Substituting Target Hazard Index (**THI**) for $Hazard\ Index_{agegroup,ing,derm}$ and $\mathbf{PRG_{sed,nc}}$ for $[COC]_{sed}$, and solving for $PRG_{sed,nc}$,

$$PRG_{sed,nc} = \frac{THI}{\left[\left(\frac{CF \times IR_{agegroup} \times \mathrm{EF}_{agegroup} \times \mathrm{ED}_{agegroup}}{RfD_o \times \mathrm{BW}_{agegroup} \times AT}\right)+\left(\frac{AF \times ABS \times CF \times EV_{agegroup} \times ED_{agegroup} \times EF_{agegroup} \times SA_{agegroup}}{RfD_d \times BW_{agegroup} \times AT}\right)\right]}$$

US EPA ARCHIVE DOCUMENT

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

SEDIMENT PRGs – BASED ON FISH CONSUMPTION AND BIOTA/SEDIMENT ACCUMULATION FACTORS

The derivation of the sediment PRGs based on fish consumption and biota/sediment accumulation factors is a multi-step process. The steps are identified below.

Step 1) Lipid-normalized chemical fish tissue concentrations will be calculated for each species at each exposure point consistent with the equation shown below.

$$[C]_{fish,\,ln} = \frac{[C]_{fish}}{[Lipid]_{fish}} \times \frac{1}{CF1}$$

where:

$[C]_{fish,ln}$ = Lipid-normalized chemical concentration in fish tissue (mg chemical/kg lipid)
$[C]_{fish}$ = Chemical concentration in fish tissue (mg chemical/kg fish tissue as wet weight)
$[Lipid]_{fish}$ = Lipid concentration in fish tissue (mg lipid/kg fish tissue)
CF1 = Units conversion factor (0.000001 kg lipid/mg lipid)

Step 2) Mean lipid-normalized concentrations of each COC in each species at each exposure point will be calculated and compiled. Coefficient of variation will be identified for each COC, species, and exposure point combination.

Step 3) Organic carbon-normalized sediment concentrations will be calculated for sediment at each exposure point consistent with the equation shown below. These concentrations are essentially chemical concentrations in sediment organic carbon.

$$[C]_{sed,\,ocn} = \frac{[C]_{sed}}{[TOC]_{sed}} \times \frac{1}{CF2}$$

where:

$[C]_{sed,ocn}$ = Organic carbon-normalized chemical concentration in sediment (mg chemical/kg organic carbon in sediment
$[C]_{sed}$ = Chemical concentration in sediment (mg chemical/kg sediment as dry weight)
$[TOC]_{sed}$ = Total organic carbon concentration in sediment (mg total organic carbon/kg sediment as dry weight)
CF2 = Units conversion factor (0.000001 kg TOC/mg TOC)

Step 4) The mean organic carbon-normalized sediment concentrations for each COC at each exposure point will be calculated and compiled. The coefficient of variation will be identified for each COC and exposure point combination.

Step 5) Calculate BSAFs. The general equation for calculation of a BSAF is shown below

$$BSAF = \frac{[C]_{fish,\,ln}}{[C]_{sed,\,ocn}}$$

where:

BSAF = Biota-sediment accumulation factor (unitless)
$[C]_{fish,ln}$ = Lipid-normalized chemical concentration in fish tissue reported as wet weight (mg chemical/kg lipid in fish tissue)

$[C]_{sed,ocn}$ = Organic carbon-normalized chemical concentration in sediment reported as dry-weight (mg chemical/kg organic carbon in sediment)

Step 6) The **sediment** PRG will be calculated for each COC at each exposure point for each fish species per the equation shown below.

$$PRG_{sed} = \frac{PRG_{fish} \times [TOC]_{sed}}{BSAF \times [Lipid]_{fish}}$$

where:

PRG_{fish} = Risk-based target chemical concentration in fish tissue or preliminary remediation goal (mg/kg)
$[TOC]_{sed}$ = Mean total organic carbon concentration in sediment at exposure point reported as dry weight (mg total organic carbon/kg sediment)
BSAF = Species-specific biota-sediment accumulation factor for the exposure point (unitless)
$[Lipid]_{fish}$ = Mean lipid concentration in fish species at the exposure point (mg lipid/kg fish tissue)

Step 7) The **sediment** PRG will be calculated for each COC at each exposure point for the combined fish diet per the equation shown below. Assuming equal contribution of each species to the combined fish diet, the average of the species-specific sediment PRGs is the combined diet-based sediment PRG.

$$PRG_{sed,\,combined} = \frac{\sum_{1}^{n} PRG_{sed,\,species}}{n}$$

where:

$PRG_{sed,species}$ = Preliminary remediation goal (risk-based target chemical concentration in sediment) for an individual fish species (mg/kg)
n = Number of fish species at the exposure point for which a species-specific sediment PRG was developed.

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

APPENDIX B – EQUATIONS USED TO DERIVE HUMAN HEALTH PRGs

SURFACE SOIL AND BANK SOIL PRGs

The cancer risk-based component of the soil PRG for the Fogarty Center is calculated as follows. Each of the parameters in these equations have previously been identified in the section addressing sediment direct contact PRGs.

$$\textbf{Cancer risk}_{\text{adult, ing, derm}} = \left[\frac{\textit{CSF}_o \times [\textit{COC}]_{soil} \times \textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{CSF}_d \times [\textit{COC}]_{soil} \times \textit{DA}_{event,\,adult} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{BW}_{adult} \times \textit{AT}}\right]$$

Rearranging and substituting $[\textit{COC}]_{sed} \times \textit{AF} \times \textit{ABS} \times \textit{CF}$ for DA_{event}

$$\textbf{Cancer risk}_{\text{adult, ing, derm}} = [\textit{COC}]_{soil}\left[\frac{\textit{CSF}_o \times \textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{CSF}_d \times \textit{AF} \times \textit{ABS} \times \textit{CF} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{BW}_{adult} \times \textit{AT}}\right]$$

Substituting Target Risk (TR) for $\textbf{Cancer risk}_{\text{adult,ing,derm}}$, $\textbf{PRG}_{\text{soil,c}}$ for $[\textbf{COC}]_{\textbf{soil}}$, and solving for $\textbf{PRG}_{\text{soil,c}}$,

$$\textit{PRG}_{soil,\,c} = \frac{\textit{TR}}{\left[\frac{\textit{CSF}_o \times \textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{CSF}_d \times \textit{AF} \times \textit{ABS} \times \textit{CF} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{BW}_{adult} \times \textit{AT}}\right]}$$

The noncancer (Hazard Index) component of the soil PRG is calculated based on the following equations.

$$\textbf{Hazard Index}_{\text{agegroup, ing, derm}} = \left[\frac{[\textit{COC}]_{soil} \times \textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textit{RfD}_o \times \textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{DA}_{event,\,adult} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{RfD}_o \times \textit{BW}_{adult} \times \textit{AT}}\right]$$

Rearranging and substituting $[\textit{COC}]_{soil} \times \textit{AF} \times \textit{ABS} \times \textit{CF}$ for $\textit{DA}_{event,agegroup,}$

$$\textbf{Hazard Index}_{\text{agegroup, ing, derm}} = [\textit{COC}]_{soil}\left[\frac{\textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textit{RfD}_o \times \textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{AF} \times \textit{ABS} \times \textit{CF} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{BW}_{adult} \times \textit{AT}}\right]$$

Substituting Target Hazard Index (**THI**) for $\textit{Hazard Index}_{agegroup,ing,derm}$ and $\textbf{PRG}_{\text{soil,nc}}$ for $[\textit{COC}]_{soil}$, and solving for $\textit{PRG}_{soil,nc}$,

$$\textbf{PRG}_{\text{soil, nc}} = \frac{\textbf{THI}}{\left[\frac{\textit{IR}_{adult} \times \textbf{EF}_{adult} \times \textbf{ED}_{adult}}{\textit{RfD}_o \times \textbf{BW}_{adult} \times \textit{AT}}\right] + \left[\frac{\textit{AF} \times \textit{ABS} \times \textit{CF} \times \textit{EV}_{adult} \times \textit{ED}_{adult} \times \textit{EF}_{adult} \times \textit{SA}_{adult}}{\textit{RfD}_o \times \textit{BW}_{adult} \times \textit{AT}}\right]}$$

US EPA ARCHIVE DOCUMENT

APPENDIX E

Supporting Information for Evaluation of Impacts on Cleanup Goals

US EPA ARCHIVE DOCUMENT

Appendix E

Table E-1. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Sediments, Comparison of Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category[b]	Receptor/Scenario[c]	Risk-based Concentrations (PRGs, Risk Range[d])			Back-ground[e]	Proposed Cleanup Goal[f]	Basis[g]
			10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			
Inorganics (milligrams per kilogram [mg/kg])								
Aluminum	ECO_{fish}	Largemouth Bass CBR	***97.3***	***973***	9730	8210	8210	Bkgd
	ECO_{fish}	White Sucker CBR	***109***	***1085***	10850			
Arsenic	HH[h]	Resident Living along the River Direct Contact[j]	***2.62***	26.2	262	3.9	3.9	Bkgd
	HH	Resident Living along the River Direct Contact (Child)[k]	15	146	1457			
Barium	ECO_{fish}	White Sucker CBR[i]	***4.55***	***45.5***	455	134	134	Bkgd
Selenium	ECO_{fish}	White Sucker CBR	***0.0444***	***0.444***	4.44	1.1	1.1	Bkgd
Vanadium	ECO_{fish}	Largemouth Bass CBR	***2.22***	***22.2***	222	37.6	37.6	Bkgd
	ECO_{fish}	White Sucker CBR	***2.99***	***29.9***	299			
Zinc	ECO_{fish}	Largemouth Bass CBR	***3.62***	***36.2***	362	221	221	Bkgd
	ECO_{fish}	White Sucker CBR	***4.21***	***42.1***	421			
Semi-volatile Organic Compounds (mg/kg)								
Benzo(a)pyrene[h]	HH[h]	Resident Living along the River Direct Contact[j]	***0.40***	4.0	40	1.4	1.4	Bkgd
	HH[h]	Combined Fish Diet[j]	2.31	23.1	231			
	HH	Residential Living along the River Direct Contact (Child)[k]	1158	11579	115786			
	HH	Combined Diet (Child)[k]	15591	155912	1559123			
Dibenz(a,h)anthracene[h]	HH[h]	Resident Living along the River Direct Contact[j]	***0.40***	4.0	40	0.975	0.975	Bkgd
	HH	Resident Living along the River Direct Contact (Child)[k]	1158	11579	115786			
N-nitroso-di-n-propylamine	HH[h]	Resident Living along the River Direct Contact[j]	***0.456***	***4.56***	***45.6***	nd[l]	0.456	C
Pesticides/PCBs (mg/kg)								
4,4'-DDE	ECO_{bird}	Belted Kingfisher Diet	***0.00034***	***0.0034***	0.034	0.006	0.006	Bkgd
	ECO_{fish}	White Sucker CBR	***0.0014***	0.014	0.14			
	HH[h]	Combined Fish Diet[j]	0.0096	0.096	0.96			
	HH	Combined Diet (Child)[k]	***0.0501***	***0.501***	5.01			
4,4'-DDD	ECO_{bird}	Belted Kingfisher Diet	***0.00084***	0.0084	0.084	0.0049	0.0084	NC
	ECO_{fish}	White Sucker CBR	***0.0021***	0.021	0.21			
Dieldrin	HH[h]	Combined Fish Diet[j]	***0.0015***	0.015	0.15	0.0026	0.0026	Bkgd
	HH	Combined Diet (Child)[k]	0.0377	0.377	3.77			
Technical Chlordane	ECO_{fish}	White Sucker CBR	***0.00140***	***0.0140***	***0.140***	0.4	0.4	Bkgd
	ECO_{fish}	Largemouth Bass CBR	***0.003***	***0.03***	***0.3***			
	HH[h]	Combined Fish Diet[j]	***0.0501***	0.501	5.01			
	HH	Combined Diet (Child)[k]	***0.268***	2.68	26.8			
	ECO_{bird}	Belted Kingfisher Diet	***0.35***	3.5	35			
Aroclor-1254	HH[h]	Combined Fish Diet[j]	***0.00374***	***0.0374***	0.374	0.15	0.15	Bkgd
	HH	Combined Diet (Child)[k]	***0.00458***	***0.0458***	0.458			
	ECO_{fish}	White Sucker CBR	***0.0248***	0.248	2.48			
	ECO_{bird}	Belted Kingfisher Diet	***0.0362***	0.362	3.62			

US EPA ARCHIVE DOCUMENT

Appendix E

Table E-1. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Sediments, Comparison of Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category[b]	Receptor/Scenario[c]	Risk-based Concentrations (PRGs, Risk Range[d])			Back-ground[e]	Proposed Cleanup Goal[f]	Basis[g]
			10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			
Aroclor-1268	HH[h]	Combined Fish Diet[j]	***0.0137***	***0.137***	1.37	0.14	0.14	Bkgd
	HH	Combined Diet (Child)[k]	***0.0171***	0.171	1.71			
Aroclor-Total	ECO_{bird}	Belted Kingfisher Diet	***0.0124***	***0.124***	1.24	0.21	0.21	Bkgd
Dioxin/Furans and Dioxin-like PCBs (nanograms per kilogram [ng/kg])								
Coplanar PCBs (TEQ)	HH[h]	Combined Fish Diet[j]	***0.0058***	***0.058***	***0.58***	24.9	24.9	Bkgd
	HH[h]	Combined Diet (Child)[k]	***0.019***	***0.19***	***1.9***			
	ECO_{bird}	Tree Swallow CBR	***5.36***	53.6	536			
	ECO_{bird}	Belted Kingfisher Diet	***12.2***	122	1220			
	ECO_{fish}	White Sucker ELS	***51***	***510***	***5100***			
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	HH[h]	Combined Fish Diet[j]	***0.5***	***5***	50	14.7	14.7	Bkgd
	HH	Combined Diet (Child)[k]	***1.6***	***16***	160			
	HH[h]	Resident Living along the River Direct Contact[j]	***26.2***	262	2617			
	HH	Resident Living along the River Direct Contact (Child)[k]	34	340	3400			
Dioxin/Furans (TEQ)	ECO_{bird}	Tree Swallow CBR	***28.9***	289	2891	34	289	NC
	ECO_{bird}	Belted Kingfisher Diet	32.4	324	3240			
	ECO_{fish}	White Sucker CBR	45.0	450	4503			
	ECO_{bird}	Tree Swallow Egg Hatchability	90.3	903	9033			
	ECO_{fish}	Largemouth Bass CBR	120	1200	12000			
	ECO_{fish}	White Sucker ELS	139	1386	13856			
	ECO_{fish}	Largemouth Bass ELS	380	3800	38000			

(a) Cleanup goals were developed for risk-based contaminants for which Preliminary Remediation Goals (PRGs) were calculated (see Part I, Table 1-3 and Part II, Table 1-1 of the *Interim Final Preliminary Remediation Goal Report* (MACTEC, 2005)

(b) PRG basis (HH - human health and ECO - ecological); for ecological receptors the generic category is indicated: bird, fish, mammal.

(c) Specific receptors and exposure scenarios or pathways for which PRGs were developed include the following (tables where the PRGs are presented are also indicated).

Ranked from most to least stringent	Receptor/Scenario	Table # (MACTEC, 2005)
Human Health - Part I	Resident Living along the River Direct Contact	3-16
	Combined Fish Diet	5-2
	Resident Living along the River Direct Contact (Child)	3-16
	Combined Diet (Child)	3-12
Ecological - Part II	Tree Swallow CBR	2-20, 2-21, 2-22
	Belted Kingfisher Diet	2-20, 2-21, 2-22
	White Sucker CBR	2-20, 2-21, 2-22
	Tree Swallow Egg Hatchability	2-20, 2-21, 2-22
	Largemouth Bass CBR	2-20, 2-21, 2-22
	White Sucker ELS	2-20, 2-21, 2-22
	Largemouth Bass ELS	2-20, 2-21, 2-22

Receptor/Scenario	Table # this Report
Human Health	
Resident Living along the River Direct Contact (Child)	3-1
Combined Diet (Child)	3-1

US EPA ARCHIVE DOCUMENT

Appendix E

Table E-1. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Sediments, Comparison of Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category[b]	Receptor/Scenario[c]	Risk-based Concentrations (PRGs, Risk Range[d])			Back-ground[e]	Proposed Cleanup Goal[f]	Basis[g]
			10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			

(d) Except as noted, the lower, middle and upper range values are based on target hazards of 0.1, 1.0, and 10 (non-carcinogenic effects - humans and ecological receptors) and 10^{-6}, 10^{-5}, and 10^{-4} risk levels for (carcinogenic effects - humans only).
Bolding italics indicates values that are less than background.

(e) Background values as presented in the Interim Final PRG report (Part I: Table 5-2, Part II: Table 5-1, MACTEC, 2005); background values for TEQs calculated using mammal, bird, or fish TEFs as appropriate for the specific receptor at risk.

(f) Proposed Cleanup Goal is the lower risk range value (i.e. based on a total excess cancer risk of 10^{-6}) for carcinogenic effects and the middle risk range value (i.e., Superfund benchmark Hazard Index of 1.0) for non-carcinogenic effects (and all ecologically-protective PRGs), but defaults to background if either of these is less than site background.

(g) The basis of the Cleanup Goal is:

Bkgd Background
C Carcinogenic effects, lower risk range value for most sensitive human exposure
NC Non-carcinogenic effects, middle risk range value of the most sensitive human or ecological exposure pathway

(h) Based on carcinogenic effects.

(i) No MATC could be calculated for Barium because only a Lowest Observed Adverse Effect Level (LOAEL) derived PRG was available. Thus the LOAEL, rather than a MATC, is the basis for the PRG presented.

(j) Based on total excess cancer risk for all age groups combined.

(k) Based on non-carcinogenic Hazard Index for the most sensitive age group.

(l) nd - Analyte was not detected in Greystone Mill Pond surficial sediments.

Highlighted records represent revisions from the FS Addendum (Battelle, 2011)

US EPA ARCHIVE DOCUMENT

Table E-2. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soils, Comparison of ARARs and Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category [b]	Receptor/Scenario [c]	Potential ARARs [d]	Risk-based Concentrations (PRGs, Risk Range[e])			Background[f]	Proposed Cleanup Goal[g]	Basis[h]
				10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			
Inorganics (milligrams per kilogram [mg/kg])									
Antimony	ECO_{mam}	Short-tailed Shrew/Diet	10	***0.0440***	***0.440***	4.40	0.62	0.62	Bkgd
Arsenic	HH	Passive Recreational Visitor/Direct Contact [j]	***7***	***4.7***	46.7	467	7.7	7.7	Bkgd
	HH	Passive Recreational Visitor (Child)/Direct Contact [k]		29.1	291	2914			
	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]		***0.35***	***3.5***	35		7.7	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		***2.2***	21.6	216			
Beryllium[i]	Resident	Direct Exposure	***0.4***	N/A	N/A	N/A	3.1	N/A	N/A
Chromium[i]	Resident	Direct Exposure	390	N/A	N/A	N/A	231	N/A	N/A
Copper	ECO_{mam}	Short-tailed Shrew/Diet	3100	***1.9***	***19.2***	***192***	205	205	Bkgd
Lead[i]	Resident	Direct Exposure	***150***	N/A	N/A	N/A	450	N/A	N/A
Manganese[i]	Resident	Direct Exposure	***390***	N/A	N/A	N/A	1841	N/A	N/A
Pesticides (mg/kg)									
4,4'-DDE	ECO_{bird}	American Woodcock/CBR	N/A	***0.000459***	***0.00459***	0.0459	0.013	0.013	Bkgd
	ECO_{bird}	American Woodcock/Diet		***0.0066***	0.066	0.66			
4,4'-DDT	ECO_{bird}	American Woodcock/Diet	N/A	0.01	0.1	1	0.0085	0.1	NC
Technical Chlordane[i]	Resident	Direct Exposure	0.5	N/A	N/A	N/A	0.43	N/A	N/A
Semi-volatile organic compounds (mg/kg)									
Anthracene[i]	Resident	Direct Exposure	35	N/A	N/A	N/A	0.71	N/A	N/A
Benzo(a)anthracene[i]	Resident	Direct Exposure	***0.9***	N/A	N/A	N/A	3.1	N/A	N/A
Benzo(a)pyrene	HH	Passive Recreational Visitor/Direct Contact [j]	***0.4***	***0.21***	***2.1***	21	3.1	3.1	Bkgd
	HH	Passive Recreational Visitor (Child)/Direct Contact [k]		2316	23157	231573			
	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]		***0.016***	***0.16***	***1.6***		3.1	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		172	1720	17203			
Benzo(b)fluoranthene[i]	Resident	Direct Exposure	***0.9***	N/A	N/A	N/A	3.5	N/A	N/A
Benzo(g,h,i)perylene[i]	Resident	Direct Exposure	***0.8***	N/A	N/A	N/A	2.3	N/A	N/A
Benzo(k)fluoranthene[i]	Resident	Direct Exposure	***0.9***	N/A	N/A	N/A	3.2	N/A	N/A
Chrysene[i]	Resident	Direct Exposure	***0.4***	N/A	N/A	N/A	3.8	N/A	N/A
Dibenzo(a,h)anthracene	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]	***0.4***	***0.016***	***0.16***	1.6	0.61	0.61	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		172	1720	17203			
Fluoranthene[i]	Resident	Direct Exposure	20	N/A	N/A	N/A	7.0	N/A	N/A
Indeno(1,2,3-c,d)pyrene[i]	Resident	Direct Exposure	***0.9***	N/A	N/A	N/A	2.5	N/A	N/A
Phenanthrene[i]	Resident	Direct Exposure	40	N/A	N/A	N/A	4.0	N/A	N/A
Pyrene[i]	Resident	Direct Exposure	13	N/A	N/A	N/A	5.8	N/A	N/A

US EPA ARCHIVE DOCUMENT

Table E-2. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soils, Comparison of ARARs and Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category [b]	Receptor/Scenario [c]	Potential ARARs [d]	Risk-based Concentrations (PRGs, Risk Range[e])			Background[f]	Proposed Cleanup Goal[g]	Basis[h]
				10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			
Dioxin/Furans and Dioxin-like PCBs (nanograms per kilogram [ng/kg])									
Dioxin-like PCB Congener (TEQ)	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]	N/A	***3.5***	***35***	350	38	38	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		***5.0***	50	500			
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	ECO_{mam}	Short-tailed Shrew/Diet	N/A	***3.46***	34.6	346	17	35	NC
	ECO_{mam}	Short-tailed Shrew/CBR		***12.3***	123	1232			
	ECO_{bird}	American Woodcock/CBR		***17.3***	173	1731			
	ECO_{bird}	American Woodcock/Diet		47.1	471	4711			
2,3,7,8-Tetrachlorodibenzo-p-dioxin[i]	HH	Direct Contact (Recreational-use soil, western bank of Allendale Reach) [j]	N/A	***16***	160	1600	17	17	Bkgd
	HH	Direct Contact (Child) (Recreational-use soil, western bank of Allendale Reach) [k]		23	230	2300			
2,3,7,8-Tetrachlorodibenzo-p-dioxin[i]	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]	N/A	***3.5***	35	350	17	17	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		***5.0***	50	500			
Dioxin/Furans (TEQ)[i]	HH	Direct Contact (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [j]	N/A	***3.5***	***35***	350	50	50	Bkgd
	HH	Direct Contact (Child) (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) [k]		***5.0***	50	500			
Dioxin/Furans (TEQ)[i]	HH	Passive Recreational Visitor (Oxbow)/Direct Contact [j]	N/A	53	530	5300	50	53	C
Dioxin/Furans (TEQ)[i]	HH	Passive Recreational Visitor (Oxbow) (Child)/Direct Contact [k]	N/A	68	680	6800			

(a) Cleanup goals were developed for risk-based contaminants for which Preliminary Remediation Goals (PRGs) were calculated (MACTEC and Battelle, 2011) and contaminants detected at concentrations in excess of ARARs or To Be Considered (TBC) criteria (see Table F-2b of the FS Addendum [Battelle, 2011] for data comparisons to ARARs and TBC).

Cleanup goals were not developed for contaminants that were undetected (i.e., results are 'U' or 'UJ' qualified) or detected at concentrations below ARARs (see Table F-2b of the FS Addendum [Battelle, 2011] for data comparisons to ARARs). Nor were cleanup goals developed for undetected contaminants where the laboratory detection limits are in excess of ARARs (see Table F-2b of the FS Addendum [Battelle, 2011]); **additional sampling will be performed during design to verify undetected contaminants, and assess impacts, if any, to the proposed cleanup goals.**

In addition, all numeric criteria included in ARARs identified for the CMRP site are cleanup goals regardless of whether or not they are identified above in this Appendix F (except where background is an issue).

(b) PRG basis (HH - human health and ECO - ecological); for ecological receptors the generic category is indicated: bird, mammal.
(c) Specific receptors and exposure scenarios or pathways for which PRGs were developed include the following (tables where the PRGs are presented are also indicated). Ranked from most to least stringent. Ecological PRGs developed for the Oxbow pertain to Lyman Mill Reach (Oxbow and areas abutting Lyman Mill Pond); the only ecological contaminant for Allendale floodplain soil is dioxin (2,3,7,8-TCDD).

	Receptor/Scenario	Table # in MACTEC and Battelle (2011)
Human Health - Part I	Passive Recreational User Direct Contact	1
Ecological - Part II	Short-tailed Shrew CBR	10
	American Woodcock CBR	7
	Short-tailed Shrew Diet	12
	American Woodcock Diet	11

	Receptor/Scenario	Table # in this Report
Human Health	Passive Recreation User (Oxbow) Direct Contact	3-1
	Resident Living Along the River (who visits the western bank of Allendale; Recreational-use soil) Direct Contact	3-1
	Resident Living Along the River (Residential-use soil, eastern shore of Allendale and Lyman Mill Ponds) Direct Contact	3-2

US EPA ARCHIVE DOCUMENT

Table E-2. Proposed Cleanup Goals for Allendale and Lyman Mill Reach Floodplain Soils, Comparison of ARARs and Risk-based PRGs to Background

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Contaminant[a]	Receptor Category [b]	Receptor/Scenario [c]	Potential ARARs [d]	Risk-based Concentrations (PRGs, Risk Range[e])			Background[f]	Proposed Cleanup Goal[g]	Basis[h]
				10^{-6} (HQ of 0.1)	10^{-5} (HQ of 1)	10^{-4} (HQ of 10)			

(d) Potential ARARs include RIDEM residential direct exposure and GB leachability criteria (RIDEM, 2004).

(e) Except as noted, the lower, middle and upper range values are based on target hazards of 0.1, 1.0, and 10 (non-carcinogenic effects - humans and ecological receptors) and 10^{-6}, 10^{-5}, and 10^{-4} risk levels for (carcinogenic effects - humans only). **Bolding italics** indicates values that are less than background.

(f) Background values as presented in MACTEC and Battelle (2011); background values are based on the arithmetic mean of the four background floodplain soil samples (RWR-FP-5001-0000-01, RWR-FP-5002-0000-01, RWR-FP-5003-0000-01, and RWR-FP-5004-0000-01). **Additional sampling will be performed during design to verify background conditions.**

(g) Proposed Cleanup Goal is the lower risk range value (i.e. based on a total excess cancer risk of 10^{-6}) for carcinogenic effects and the middle risk range value (i.e., Superfund benchmark Hazard Index of 1.0) for non-carcinogenic effects (and all ecologically-protective PRGs), but defaults to background if either of these is less than site background.

(h) The basis of the Cleanup Goal is:

ARAR Applicable or Relevant and Appropriate Requirement
Bkgd Background
C Carcinogenic effects, lower risk range value for most sensitive human exposure
NA Not applicable because contaminant statistically determined to be consistent with, or less than background conditions (see note 'i').
NC Non-carcinogenic effects, middle risk range value of the most sensitive human or ecological exposure pathway

(i) Contaminants detected in floodplain soil at concentration in excess of potential ARARs/To Be Considered (TBC) criteria, but found to be consistent with, or less than background conditions (based on a statistical evaluation of the data) were not included in the cleanup goal determination unless a risk-based PRG was available for the contaminant. **Additional sampling will be performed during design to verify background conditions, and assess impacts, if any, to the proposed cleanup goals.**

(j) Based on total excess lifetime cancer risk (ELCR) for all age groups combined. The ELCR for the passive recreational visitor to the Oxbow area is $6x10^{-5}$ for the general area and $4x10^{-6}$ for the human health concern area (see Section 2.5.1 of the FS Addendum [Battelle, 2011]), which is within EPA's Superfund risk range indicating that remedial action is not warranted. However, the RAO for Allendale and Lyman Mill floodplain soil is to prevent human exposure to contamination that would result in an ELCR greater than 10^{-5} to 10^{-6} (see Section 3.1.1 of the FS [Battelle, 2010]). The lower risk level (10^{-5}) is based on the state regulations that the cumulative excess lifetime cancer risk posed by the contaminated-site does not exceed $1x10^{-5}$ (RIDEM, 2004). ELCR for the passive recreational visitor (child and adolescent) at the general area are above 10^{-5}. As a result, risk-based PRGs were developed for this receptor for exposure scenarios and contaminants that pose a greater than 10^{-6} risk (MACTEC and Battelle, 2011b, Part I).

(k) Based on non-carcinogenic Hazard Index for the most sensitive age group.

(l) Risk-based PRGs calculated for Dioxin/Furans (TEQ) also applicable to 2,3,7,8-Tetrachlorodibenzo-p-dioxin

Highlighted records represent revisions from the FS Addendum (Battelle, 2011)

US EPA ARCHIVE DOCUMENT

APPENDIX F

Supporting Information for Evaluation of Impacts on Cost Estimates for Remedial Alternatives

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Present Worth Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	A	B	C	D	E
1	**Source Area Soil Alternatives**				
2			ALT 1 No Action	ALT 3e Targeted Excavation, Upgrade and Maintain Existing Surfaces, Off-site Disposal	ALT 4 Targeted Excavation, Convert to RCRA Caps and Maintain, Off-site Disposal
3	**Remediation Area:**	**4.3**	**Acres Soil Caps**		
4		**2.1**	**Acres Parking Lots**		
5		**1.4**	**Acres Cap Extension**		
6		**0.3**	**Acres Additional Cleanup Area**		
7	New Utilities				$702,416
8	Cap Extension			$1,224,023	$1,354,539
9	Soil Cap Areas			$1,015,564	$3,094,691
10	Pavement Areas			$10,230	$1,660,407
11	Soil Excavation and Disposal			$16,182,638	$8,749,295
12	**Construction Cost**		**$0**	**$18,432,455**	**$15,561,347**
13	Design costs		$0	$545,062	$458,500
14	Oversight & QC costs		$0	$489,220	$917,540
15	Contingency	25%	$0	$4,866,684	$4,234,347
16	Post-construction Monitoring		$0		
17	**TOTAL CAPITAL COSTS**		**$0**	**$24,300,000**	**$21,200,000**
18					
19	Annual Monitoring & Maintenance		$13,772	$36,814	$37,697
20	**TOTAL PRESENT WORTH COSTS (a)**		**$170,000**	**$24,800,000**	**$21,700,000**
21					
22	Notes:				
23	Present worth factors for 7% discount factor				
24	~~Years 1 to 30~~	12.409			
25					
26	(a) The present worth costs for Alternatives 3 and 5 could increase by approximately $120,000 to $135,000 (or more) if a Stage IB cultural resource survey (archaeological survey testing and excavation) and additional mitigation measures are required to comply with the National Historic Preservation Act (USACE, 2011).				

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily output**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION COSTS**												
4													
5	**Alt 3e Upgrade and Maintain Existing Surfaces - Soil Excavation and Disposal**												
6	Excavate PTW, TSCA/GB, Dioxin, GA	14,730	cy	400	$7.36	$2.23	$1.38		$108,402	$32,774	$20,254	$0	$161,430
7	Backfill	23,863	tn	500	$11.71	$3.18	$33.06		$279,313	$75,883	$788,898	$0	$1,144,094
8	PTW off-site incineration	8,910	tn		$10.37	$1.54	$1.69	$880	$92,429	$13,708	$15,078	$7,840,800	$7,962,015
9	TSCA/GB & Dioxin incineration	697	tn		$10.37	$1.54	$1.69	$880	$7,226	$1,072	$1,179	$613,008	$622,485
10	TSCA/GB & Dioxin landfill	6,966	tn		$10.37	$1.54	$1.69	$410	$72,263	$10,717	$11,789	$2,856,234	$2,951,002
11	GA incineration	729	tn		$10.37	$1.54	$1.69	$880	$7,562	$1,122	$1,234	$641,520	$651,438
12	GA landfill	6,561	tn					$410	$0	$0	$0	$2,690,174	$2,690,174
13	Subtotal - Soil Excavation and Disposal								$567,196	$135,275	$838,431	$14,641,736	$16,182,638
14	**Alt 3 Upgrade and Maintain Existing Surfaces - Soil Cap Areas**												
15	Mobilization and Demobilize	10	days		$5,853	$1,590	$1,530		$58,525	$15,900	$15,300	$0	$89,725
16	Clear vegetation	186,000	sf	40,000	$0.13	$0.06	$0.00		$24,431	$10,742	$0	$0	$35,173
17	Area 1 fill	2,550	tons	500	$11.71	$3.18	$33.06		$29,848	$8,109	$84,303	$0	$122,260
18	Area 2 fill	1,440	tons	500	$11.71	$3.18	$33.06		$16,855	$4,579	$47,606	$0	$69,041
19	Area 3 fill	1,590	tons	500	$11.71	$3.18	$33.06		$18,611	$5,056	$52,565	$0	$76,233
20	Topsoil and planting	186,000	sf	7,400	$0.44	$0.13	$0.74	$0.04	$82,443	$25,009	$137,778	$7,027	$252,257
21	Superintendent & field engr	100	days		$1,920				$192,000	$0	$0	$0	$192,000
22	Project manager	100	days		$1,200				$120,000	$0	$0	$0	$120,000
23	Clerk	100	days		$360				$36,000	$0	$0	$0	$36,000
24	Field office, utilities, vehicles	5	mo			$4,575			$0	$22,875	$0	$0	$22,875
25	Subtotal Soil Cap Areas								$578,714	$92,270	$337,553	$7,027	$1,015,564
26													
27	**Alt 3 Upgrade and Maintain Existing Surfaces - Paved Areas**												
28	Seal asphalt	93,000	sf					$0.11	$0	$0	$0	$10,230	$10,230
29													
30	**Alt 3 Extend Cap Area**												
31	Excavation	1,120	cy		$10.69	$5.82	$0.00		$11,979	$6,517	$0	$0	$18,496
32	Soil disposal	1,793	tn		$10.37	$1.54	$1.69	$410	$18,596	$2,758	$3,034	$735,008	$759,395
33	Silt base layer	1,815	tons	500	$11.71	$3.18	$33.06		$21,245	$5,772	$60,004	$0	$87,020
34	Geotextile	60,500	sf					$0.26	$0	$0	$0	$15,999	$15,999
35	Earth fill	5,445	tons	500	$11.71	$3.18	$33.06		$63,734	$17,315	$180,012	$0	$261,061
36	Topsoil and planting	60,500	sf	7,400	$0.44	$0.13	$0.74	$0.04	$26,816	$8,135	$44,815	$2,286	$82,051

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily output**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
37	Subtotal Extend Cap Area								$142,370	$40,496	$287,864	$753,292	$1,224,023
38													
39	**ALT 3e UPGRADE AND MAINTAIN EXISTING SURFACES - TOTAL CONSTRUCTION**								**$1,288,280**	**$268,042**	**$1,463,848**	**$15,412,285**	**$18,432,455**
40													
41													
42	**ALT 4 UPGRADE TO RCRA CAPS**												
43	Mobilization and Demobilize	10	days		$5,853	$1,590	$1,530		$58,525	$15,900	$15,300	$0	$89,725
44	Clear vegetation	186,000	sf	40,000	$0.13	$0.06	$0.00		$24,431	$10,742	$0	$0	$35,173
45	Area 1 fill	12,750	tons	500	$11.71	$3.18	$33.06		$149,240	$40,545	$421,515	$0	$611,300
46	Area 2 fill	2,160	tons	500	$11.71	$3.18	$33.06		$25,283	$6,869	$71,410	$0	$103,561
47	Area 3 fill	0	tons	500	$11.71	$3.18	$33.06		$0	$0	$0	$0	$0
48	Topsoil and planting	186,000	sf	7,400	$0.44	$0.13	$0.74	$0.04	$82,443	$25,009	$137,778	$7,027	$252,257
49	Geomembrane	186,000	sf					$0.86	$0	$0	$0	$159,960	$159,960
50	Drain layer	12,090	tons	400	$14.63	$2.83	$37.50		$176,893	$34,154	$453,375	$0	$664,422
51	Geotextile	186,000	sf					$0.26	$0	$0	$0	$49,187	$49,187
52	Protective soil	12,090	tons	500	$11.71	$3.18	$33.06		$141,514	$38,446	$399,695	$0	$579,656
53	Superintendent & field engr	150	days		$1,920				$288,000	$0	$0	$0	$288,000
54	Project manager	150	days		$1,200				$180,000	$0	$0	$0	$180,000
55	Clerk	150	days		$360				$54,000	$0	$0	$0	$54,000
56	Field office, utilities, vehicles	6	mo			$4,575			$0	$27,450	$0	$0	$27,450
57													
58	**CONVERT TO RCRA CAPS AND MAINTAIN - SOIL CAP AREA**								$1,180,330	$199,115	$1,499,073	$216,173	$3,094,691
59													

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily output**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
60	**Alt 4 CONVERT TO RCRA CAPS AND MAINTAIN - PAVEMENT AREAS**												
61	Demolish asphalt	93,000	sf					$1.16	$0	$0	$0	$107,467	$107,467
62	Fill	6,045	tons	500	$11.71	$3.18	$33.06		$70,757	$19,223	$199,848	$0	$289,828
63	Geomembrane	93,000	sf					$0.86	$0	$0	$0	$79,980	$79,980
64	Drain layer	6,045	tons	400	$14.63	$2.83	$37.50		$88,446	$17,077	$226,688	$0	$332,211
65	Geotextile	93,000	sf					$0.26	$0	$0	$0	$24,593	$24,593
66	Gravel base	6,045	tons	500	$11.71	$3.18	$33.06		$70,757	$19,223	$199,848	$0	$289,828
67	New Asphalt	93,000	sf					$0.98	$0	$0	$0	$91,450	$91,450
68	Superintendent & field engr	120	days		$1,920				$230,400	$0	$0	$0	$230,400
69	Project manager	120	days		$1,200				$144,000	$0	$0	$0	$144,000
70	Clerk	120	days		$360				$43,200	$0	$0	$0	$43,200
71	Field office, utilities, vehicles	6	mo			$4,575			$0	$27,450	$0	$0	$27,450
72													
73	**CONVERT TO RCRA CAPS AND MAINTAIN PAVEMENT AREA**								$647,561	$82,973	$626,383	$303,490	$1,660,407
74													
75	**Remove and replace utilities**												
76	Sanitary sewer	280	lf	100	$45.35	$15.00	$122.40		$12,698	$4,200	$34,272	$0	$51,170
77	Water lines	820	lf	160	$28.34	$7.91	$37.94		$23,242	$6,483	$31,109	$0	$60,834
78	Gas lines	820	lf	160	$28.34	$7.91	$37.94		$23,242	$6,483	$31,109	$0	$60,834
79	Electric power lines	820	lf	150	$30.23	$8.43	$30.13		$24,791	$6,915	$24,709	$0	$56,416
80	Telephone lines	820	lf	150	$30.23	$8.43	$30.13		$24,791	$6,915	$24,709	$0	$56,416
81	Communication cables	820	lf	150	$30.23	$8.43	$30.13		$24,791	$6,915	$24,709	$0	$56,416
82	Storm drains	2,520	lf	160	$28.34	$7.91	$37.94		$71,427	$19,924	$95,603	$0	$186,953
83	Lighting conduits	2,520	lf	150	$30.23	$8.43	$30.13		$76,188	$21,252	$75,936	$0	$173,376
84													
85	**New utilities**								$281,172	$79,088	$342,156	$0	$702,416
86													

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily output**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
87	**Alt 4 Extend Cap Area**												
88	Excavation	1,120	cy		$10.69	$5.82	$0.00		$11,979	$6,517	$0	$0	$18,496
89	Soil disposal	1,793	tn		$10.37	$1.54	$1.69	$410	$18,596	$2,758	$3,034	$735,008	$759,395
90	Silt base layer	1,815	tons	500	$11.71	$3.18	$33.06		$21,245	$5,772	$60,004	$0	$87,020
91	Geotextile	60,500	sf					$0.26	$0	$0	$0	$15,999	$15,999
92	Geomembrane	60,500	sf					$0.86	$0	$0	$0	$52,030	$52,030
93	Drain layer	3,933	tons	400	$14.63	$2.83	$37.50		$57,538	$11,109	$147,469	$0	$216,116
94	Geotextile	60,500	sf					$0.26	$0	$0	$0	$15,999	$15,999
95	Protective soil	2,241	tons	500	$11.71	$3.18	$33.06		$26,228	$7,126	$74,079	$0	$107,432
96	Topsoil and planting	60,500	sf	7,400	$0.44	$0.13	$0.74	$0.04	$26,816	$8,135	$44,815	$2,286	$82,051
97													
98	Subtotal Extend Cap Area								$162,402	$41,416	$329,400	$821,321	$1,354,539
99													
100													
101	**Alt 4 Upgrade and Maintain Existing Surfaces - Soil Excavation and Disposal**												
102	**Excavate dioxin soil**	**430**	cy	400	$7.36	$2.23	$1.38		$3,164	$957	$591	$0	$4,712
103	Excavate PTW	5,500	cy	400	$7.36	$2.23	$1.38		$40,476	$12,238	$7,563	$0	$60,276
104	Backfill	8,910	tn	500	$11.71	$3.18	$33.06		$104,292	$28,334	$294,565	$0	$427,191
105	PTW off-site incineration	8,910	tn		$10.37	$1.54	$1.69	$880	$92,429	$13,708	$15,078	$7,840,800	$7,962,015
106	Dioxin soil off-site landfill	697	tn		$10.37	$1.54	$1.69	$410	$7,226	$1,072	$1,179	$285,623	$295,100
107													
108	Excavate and Disposal Sub-total								$247,588	$56,307	$318,976	$8,126,423	$8,749,295
109													
110	**CONVERT TO RCRA CAPS AND MAINTAIN TOTAL**								**$2,278,690**	**$403,664**	**$2,798,191**	**$1,626,608**	**$15,561,347**
111													
112													

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Design Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
3	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
4				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
5	**DESIGN COSTS**											
6												
7	**ALT 3 UPGRADE AND MAINTAIN EXISTING SURFACES**											
8	Physical survey	2	day	$4,720	$350	$800	$0	$9,440	$700	$1,600	$0	$11,740
9	Chemical sampling (32 borings)	16	day	$5,080	$1,550	$800	$0	$81,280	$24,800	$12,800	$0	$118,880
10	Chemical testing	32	ea				$1,806	$0	$0	$0	$57,802	$57,802
11	Dioxin testing	96	ea				$715	$0	$0	$0	$68,640	$68,640
12	Design report & calculations	800	hours	$90				$72,000	$0	$0	$0	$72,000
13	Drawings - 20 sheets	1,600	hours	$90				$144,000	$0	$0	$0	$144,000
14	Specifications	400	hours	$90				$36,000	$0	$0	$0	$36,000
15	Work plans	400	hours	$90				$36,000	$0	$0	$0	$36,000
16	**ALT 3 UPGRADE AND MAINTAIN EXISTING SURFACES DESIGN COST**							**$378,720**	**$25,500**	**$14,400**	**$126,442**	**$545,062**
17												
18												
19												
20	**ALT 4 CONVERT TO RCRA CAPS AND MAINTAIN**											
21	Physical survey	2	days	$4,720	$350	$800	$0	$9,440	$700	$1,600	$0	$11,740
22	Chemical sampling (8 borings)	5	day	$5,080	$1,550	$800	$0	$25,400	$7,750	$4,000	$0	$37,150
23	Chemical testing	8	ea				$1,806	$0	$0	$0	$14,450	$14,450
24	Dioxin testing	24	ea				$715	$0	$0	$0	$17,160	$17,160
25	Design report	1,600	hours	$90				$144,000	$0	$0	$0	$144,000
26	Drawings - 20 sheets	1,600	hours	$90				$144,000	$0	$0	$0	$144,000
27	Specifications	600	hours	$90				$54,000	$0	$0	$0	$54,000
28	Work plans	400	hours	$90				$36,000	$0	$0	$0	$36,000
29								**$412,840**	**$8,450**	**$5,600**	**$31,610**	**$458,500**
30	**ALT 4 CONVERT TO RCRA CAPS AND MAINTAIN DESIGN COST**											

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Construction Oversight Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
2				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION OVERSIGHT COSTS**											
4												
5												
6	**ALT 3 UPGRADE AND MAINTAIN EXISTING SURFACES**											
7	Project manager	150	days	$1,200				$180,000	$0	$0	$0	$180,000
8	Resident engineer	150	days	$960				$144,000	$0	$0	$0	$144,000
9	Survey crew	20	days	$1,200	$350	$680		$24,000	$7,000	$13,600	$0	$44,600
10	Admin support	150	days	$360				$54,000	$0	$0	$0	$54,000
11	Soil sample	2	days	$5,080	$1,550	$800		$10,160	$3,100	$1,600	$0	$14,860
12	Field office	6	months		$1,075			$0	$6,450	$0	$0	$6,450
13	Vehicles	6	months		$2,500			$0	$15,000	$0	$0	$15,000
14	Cell phones, radios	6	months		$750			$0	$4,500	$0	$0	$4,500
15	Utilities	6	months		$250			$0	$1,500	$0	$0	$1,500
16	Confirmation samples	10	ea				$715	$0	$0	$0	$7,150	$7,150
17	Designation samples	24	ea				$715	$0	$0	$0	$17,160	$17,160
18	**ALT 3 UPGRADE AND MAINTAIN EXISTING SURFACES C**							**$412,160**	**$37,550**	**$15,200**	**$24,310**	**$489,220**
19												
20	**ALT 4 CONVERT TO RCRA CAPS AND MAINTAIN**											
21	Project manager	300	days	$1,200				$360,000	$0	$0	$0	$360,000
22	Resident engineer	300	days	$960				$288,000	$0	$0	$0	$288,000
23	Survey crew	40	days	$1,200	$350	$680		$48,000	$14,000	$27,200	$0	$89,200
24	Admin support	300	days	$360				$108,000	$0	$0	$0	$108,000
25	Soil sample	1	days	$5,080	$1,550	$800		$5,080	$1,550	$800	$0	$7,430
26	Field office	12	months		$1,075			$0	$12,900	$0	$0	$12,900
27	Vehicles	12	months		$2,500			$0	$30,000	$0	$0	$30,000
28	Cell phones, radios	12	months		$750			$0	$9,000	$0	$0	$9,000
29	Utilities	12	months		$250			$0	$3,000	$0	$0	$3,000
30	Confirmation samples		ea				$715	$0	$0	$0	$0	$0
31	Designation samples	14	ea				$715	$0	$0	$0	$10,010	$10,010
32	**ALT 4 CONVERT TO RCRA CAPS AND MAINTAIN OVERSIGHT COST**							**$809,080**	**$70,450**	**$28,000**	**$10,010**	**$917,540**

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Long-term Monitoring Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1				Unit Costs				Costs				
2		Quantity	Units	Labor	Equipment	Materials	Subcontract	Labor	Equipment	Materials	Subcontract	TOTAL
3	**MONITORING COSTS**											
4												
5	**ALT 3 UPGRADE and MAINTAIN EXISTING CAPS**											
6	**A. Annual work years 1 to 30**											
7	Groundwater sampling		days	$5,080	$1,550	$800		$0	$0	$0	$0	$0
8	Physical survey	2	days	$4,720	$350	$800		$9,440	$700	$1,600	$0	$11,740
9	Ecology survey		days	$4,720	$300	$800		$0	$0	$0	$0	$0
10	Water chemistry						$715	$0	$0	$0	$0	$0
11	Fish tissue chemistry						$715	$0	$0	$0	$0	$0
12	Soil chemistry						$715	$0	$0	$0	$0	$0
13	Five year review	0.2	events	$10,160				$2,032	$0	$0	$0	$2,032
14	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 30**											**$13,772**
15												
16												
17	**B. Annual maintenance**											
18	Assume repair of 1/10 acres cap and seeding per year and sealing once every 5 years.											
19	Cap repair	283	tons				$47.95	$0	$0	$0	$13,575	$13,575
20	Seeding	4,356	sf				$0.038	$0	$0	$0	$165	$165
21	Pavement sealing	18,600	sf				$0.110	$0	$0	$0	$2,046	$2,046
22	Drain cleaning	1	ea				$2,400	$0	$0	$0	$2,400	$2,400
23	Mowing	186,000	sf				$0.003	$0	$0	$0	$586	$586
24	Invasive species control	4.3					$1,000.000				$4,270	$4,270
25	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$23,042**
26												
27												
28	**CONVERT TO RCRA CAPS**											
29	**A. Annual work years 1 to 30**											
30	Soil chemistry		days	$5,080	$1,550	$800		$0	$0	$0	$0	$0
31	Physical survey	2	days	$4,720	$350	$800		$9,440	$700	$1,600	$0	$11,740
32	Ecology survey		days	$4,720	$300	$800		$0	$0	$0	$0	$0
33	Five year review	0.2	events	$10,160				$2,032	$0	$0	$0	$2,032
34	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 30**											**$13,772**
35												
36												$0

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Long-term Monitoring Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
37	**B. Annual maintenance**											$0
38	Assume repair of 1/10 acres cap and seeding per year. Asphalt sealing not required for this alternative.											$0
39	Cap repair	283	tons				$47.95	$0	$0	$0	$13,575	$13,575
40	Seeding	4,356	sf				$0.038	$0	$0	$0	$165	$165
41	Drain cleaning	1	ea				$2,400	$0	$0	$0	$2,400	$2,400
42	Mowing	1,116,000	sf				$0.003	$0	$0	$0	$3,515	$3,515
43	Invasive species control	4.3					$1,000.000				$4,270	$4,270
44	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$23,925**
45												
46	**No Action**											
47	**A. Annual work years 1 to 30**											
48	Soil chemistry		days	$5,080	$1,550	$800		$0	$0	$0	$0	$0
49	Physical survey	2	days	$4,720	$350	$800		$9,440	$700	$1,600	$0	$11,740
50	Ecology survey		days	$4,720	$300	$800		$0	$0	$0	$0	$0
51	Five year review	0.2	events	$10,160				$2,032	$0	$0	$0	$2,032
52	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 30**											**$13,772**

Appendix F-1
Source Area Soil Remedial Cost Estimates - Unit Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H
1							
2	**Imported Fill - Site Grading and Protective Layer**						
3	**Estimated duration:**	500	Tons	divided by	500	tn/day production	
4		**1.0**	**days**				
5	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
6	Foreman	1.0	day	$771	$771	$96	per hour
7	Equip operator	1.0	day	$2,153	$2,153	$90	3 total
8	QC technician	1.0	day	$581	$581	$73	per hour
9	Laborer	1.0	day	$1,748	$1,748	$73	3 total
10	Safety officer	1.0	day	$600	$600	$75	per hour
11							
12	Subtotal Cost			$5,853	$5,853		
13	**Labor Unit Cost**				**$11.71**	**Per Ton**	
14							
15							
16	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
17	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
18	Grader	1.0	day	$430	$430		Road grader Means p 596
19	Dozer to spread	1.0	day	$860	$860		200 hp dozer Means p 21
20					$0		
21	Subtotal Cost			$1,590	$1,590		
22	**Equipment Unit Cost**				**$3.18**	**Per Ton**	
23							
24	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
25	Sand for cap	500	tons	$30	$15,000		Truck delivery to site at $24 per ton +25%
26	Health and safety equip	1.0	Days	$450	$450		9 crew x $50/day
27	Per diem	1.0	Days	$1,080	$1,080		9 crew x $120/day
28	Subtotal Cost				$16,530		
29	**Material Unit Cost**				**$33.06**	**Per Ton**	
30							
31	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
32					$0		
33					$0		
34	**Subtotal Cost**				$0		
35	**TOTAL UNIT COST**				**$47.95**	**Per Ton**	
36							
37	**Drain Layer over Membrane**						
38	**Estimated duration:**	400	tn	divided by	400	tn/day production	
39		**1.0**	**Days**				
40	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
41	Foreman	1.0	day	$771	$771	$96	per hour
42	Equip operator	1.0	day	$2,153	$2,153	$90	3 total
43	QC technician	1.0	day	$581	$581	$73	per hour
44	Safety officer	1.0	day	$600	$600	$75	per hour
45	Laborer	1.0	day	$1,748	$1,748	$73	3 total
46	Subtotal Cost				$5,853		
47	**Labor Unit Cost**				**$14.63**	**Per Ton**	
48							
49	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
50	Dozer	1.0	day	$480	$480		100 hp dozer
51	Grader	1.0	day	$350	$350		Small grader to spread
52	Loader to deliver material	1.0	day	$300	$300		3 cy wheel loader Means p 21
53	Subtotal Cost				$1,130		
54	**Equipment Unit Cost**				**$2.83**	**Per Ton**	
55							
56	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
57					$0		
58	Drain gravel	400	Tons	$38	$15,000		$30 per ton plus markup
59	Subtotal Cost				$15,000		
60	**Material Unit Cost**				**$37.50**	**Per Ton**	
61							
62	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
63							
64							
65	Subtotal Cost				$0		

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
66	**Subcontract Unit Cost**				**$0.00**	**Per Ton**	
67	**TOTAL UNIT COST**				**$54.96**	**Per Ton**	
68							
69	**Clear vegetation**						
70	**Estimated duration:**	40,000	sf	divided by	40,000	sf/day production	
71		**1.0**	**Days**				Means p 39 1.0 AC per day light trees
72	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
73	Equip operator	1.0	day	$2,153	$2,153	$90	3 total
74	Laborer	1.0	day	$2,330	$2,330	$73	4 total
75	Foreman	1.0	day	$771	$771	$96	
76							
77	Subtotal Cost			$5,254	$5,254		
78	**Labor Unit Cost**				**$0.13**	**Per sf**	
79							
80	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
81	Excavator	1.0	day	$890	$890		2.0 cy excavator Means p 20
82	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
83	Dozer	1.0	day	$860	$860		200 hp dozer Means p 21
84	Chipper	1.0	day	$165	$165		Means p 588
85	Stump grinder	1.0	day	$95	$95		Means p 588
86	Subtotal Cost			$2,310	$2,310		
87	**Equipment Unit Cost**				**$0.06**	**Per sf**	
88							
89	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
90					$0		
91					$0		
92	Subtotal Cost				$0		
93	**Material Unit Cost**				**$0.00**	**Per sf**	
94							
95	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
96							
97							
98	Subtotal Cost				$0		
99	**Subcontract Unit Cost**				$0		
100	**TOTAL UNIT COST**				**$0.19**	**Per sf**	
101							
102	**Clean Corridor - Sanitary Sewer**						
103	**Estimated duration:**	100	lf	divided by	100	lf/day production	
104		**1.0**	**Days**				
105	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
106	Foreman	1.0	day	$771	$771	$96	Trench excavation/ backfill Mean p. 51
107	Equip operator	1.0	day	$1,436	$1,436	$90	4' W x 10' D = 1.5 cy/lf
108	Laborer	1.0	day	$1,748	$1,748	$73	24" concrete pipe Mean p 61 100 lf/day
109	Truck driver	1.0	day	$581	$581	$73	
110			day		$0		
111	Subtotal Cost				$4,535		
112	**Labor Unit Cost**				**$45.35**	**Per lf**	
113							
114	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
115	Compactor	1.0	day	$105	$105		Compactor on loader Mean p 20
116	Excavator	1.0	day	$680	$680		1.5 cy excavator Means p 20
117	Loader	1.0	day	$235	$235		1.5 cy wheel loader Means p 21
118	Highway trucks (1)	1.0	day	$480	$480	$480	16 ton truck Means p 22
119							
120	Subtotal Cost				$1,500		
121	**Equipment Unit Cost**				**$15.00**	**Per lf**	
122							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
123	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
124	Health and safety equip	1.0	Days	$350	$350		7 crew x $50/day
125	Per diem	1.0	Days	$840	$840		7 crew x $120/day
126	24" pipe	100	lf	$13	$1,300		Mean p 51
127	Imported backfill	260	tons	$38	$9,750		$30 per ton plus markup
128					$0		
129					$0		
130	Subtotal Cost				$12,240		
131	**Material Unit Cost**				**$122.40**	**Per lf**	
132							
133	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
134					$0		Place excavated soil under landfill cover
135							
136	Subtotal Cost				$0		
137	**Subcontract Unit Cost**				**$0.00**	**Per lf**	
138	**TOTAL UNIT COST**				**$182.75**	**Per lf**	
139							
140	**Clean Corridor - Water or Gas Lines or Storm drains**						
141	**Estimated duration:**	160	lf	divided by	160	lf/day production	
142		**1.0**	**Days**				
143	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
144	Foreman	1.0	day	$771	$771	$96	Trench excavation/ backfill Mean p. 50
145	Equip operator	1.0	day	$1,436	$1,436	$90	2' W x 4' D = 0.3 cy/lf
146	Laborer	1.0	day	$1,748	$1,748	$73	6" DIP pipe Mean p 59 160 lf/day
147	Truck driver	1.0	day	$581	$581	$73	3" gas Means p 64 400 lf/dy
148			day		$0		
149	Subtotal Cost				$4,535		
150	**Labor Unit Cost**				**$28.34**	**Per lf**	
151							
152	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
153	Compactor	1.0	day	$105	$105		Compactor on loader Mean p 20
154	Excavator	1.0	day	$490	$490		1.0 cy excavator Means p 19
155	Loader	1.0	day	$190	$190		1.0 cy wheel loader Means p 21
156	Highway trucks (1)	1.0	day	$480	$480	$480	16 ton truck Means p 22
157							
158	Subtotal Cost				$1,265		
159	**Equipment Unit Cost**				**$7.91**	**Per lf**	
160							
161	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
162	Health and safety equip	1.0	Days	$350	$350		7 crew x $50/day
163	Per diem	1.0	Days	$840	$840		7 crew x $120/day
164	6" DIP or 3" gas pipe	160	lf	$11	$1,760		Mean p 59 or 64
165	Imported backfill	83	tons	$38	$3,120		$30 per ton plus markup
166					$0		
167					$0		
168	Subtotal Cost				$6,070		
169	**Material Unit Cost**				**$37.94**	**Per lf**	
170							
171	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
172					$0		Place excavated soil under landfill cover
173							
174	Subtotal Cost				$0		
175	**Subcontract Unit Cost**				**$0.00**	**Per lf**	
176	**TOTAL UNIT COST**				**$74.19**	**Per lf**	
177							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
178	**Clean Corridor - Electrical or communication utilities**						
179	**Estimated duration:**	150	lf	divided by	150	lf/day production	
180		**1.0**	**Days**				
181	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
182	Foreman	1.0	day	$771	$771	$96	Trench excavation/ backfill Mean p. 50
183	Equip operator	1.0	day	$1,436	$1,436	$90	2' W x 4' D = 0.3 cy/lf
184	Laborer	1.0	day	$1,748	$1,748	$73	2" conduit in trench Means p 469 150 lf/dy
185	Truck driver	1.0	day	$581	$581	$73	
186			day		$0		
187	Subtotal Cost				$4,535		
188	**Labor Unit Cost**				**$30.23**	**Per lf**	
189							
190	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
191	Compactor	1.0	day	$105	$105		Compactor on loader Mean p 20
192	Excavator	1.0	day	$490	$490		1.0 cy excavator Means p 19
193	Loader	1.0	day	$190	$190		1.0 cy wheel loader Means p 21
194	Highway trucks (1)	1.0	day	$480	$480	$480	16 ton truck Means p 22
195							
196	Subtotal Cost				$1,265		
197	**Equipment Unit Cost**				**$8.43**	**Per lf**	
198							
199	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
200	Health and safety equip	1.0	Days	$350	$350		7 crew x $50/day
201	Per diem	1.0	Days	$840	$840		7 crew x $120/day
202	Conduit	150	lf	$5.00	$750		Mean p 59 or 64
203	wires	150	lf	$4.20	$630		(3) 4/0 Means p 467
204	Imported backfill	52	tons	$38	$1,950		$30 per ton plus markup
205					$0		
206					$0		
207	Subtotal Cost				$4,520		
208	**Material Unit Cost**				**$30.13**	**Per lf**	
209							
210	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
211					$0		Place excavated soil under landfill cover
212							
213	Subtotal Cost				$0		
214	**Subcontract Unit Cost**				**$0.00**	**Per lf**	
215	**TOTAL UNIT COST**				**$68.80**	**Per lf**	
216							
217	**Excavate, Haul, Stockpile Existing Soil**						
218	**Estimated duration:**	600	cy	divided by	600	cy/day production	
219		**1.0**	**Days**				
220	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
221	Foreman	1.0	day	$771	$771	$96	per hour
222	Equip operator	1.0	day	$2,153	$2,153	$90	3 total
223	Laborer	1.0	day	$1,748	$1,748	$73	3 total
224	Truck driver	1.0	day	$1,744	$1,744	$73	3 total
225					$0		
226	Subtotal Cost				$6,415		
227	**Labor Unit Cost**				**$10.69**	**Per CY**	
228							
229	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
230	Dozer	1.0	day	$860	$860		200 hp dozer Means p 21
231	Excavator	1.0	day	$890	$890		2.0 cy excavator Means p 20
232	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
233	Highway trucks (3)	1.0	day	$1,440	$1,440	$480	16 ton truck Means p 22
234							
235	Subtotal Cost				$3,490		
236	**Equipment Unit Cost**				**$5.82**	**Per CY**	
237							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
238	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
239					$0		PPE not needed for work on clean soil.
240			Tons	$30	$0		
241					$0		
242					$0		
243	Subtotal Cost				$0		
244	**Material Unit Cost**				**$0.00**	**Per CY**	
245							
246	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
247							
248							
249	Subtotal Cost				$0		
250	**Subcontract Unit Cost**				**$0.00**	**Per Cy**	
251	**TOTAL UNIT COST**				**$16.51**	**Per cy**	
252							
253	**Topsoil and Plantings**						
254	**Estimated duration:**	7,400	sf	divided by	7400	sf/day production	
255		137	cy		137	cy/day	
256		1.0	days				Topsoil Means p 85 7,400 sf/day
257	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
258	Foreman	1.0	day	$640	$640	$96	
259		1.0					
260	Equip operator	1.0	day	$1,560	$1,560	$90	3 total
261	Laborer	1.0	day	$1,080	$1,080	$73	3 total
262	Subtotal Cost				$3,280		
263	**Labor Unit cost**				**$0.44**	**Per sf**	
264					**$23.94**	**Per Cy**	
265							
266	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
267	Loader	1.0	day	$165	$165		1.5 cy wheel loader Means p 590
268	Dozer	1.0	day	$480	$480		100 hp dozer
269	Grader	1.0	day	$350	$350		Small grader to spread
270			day		$0		
271			day		$0		
272	Subtotal Cost				$995		
273	**Labor unit cost**				**$0.13**	**Per sf**	
274					**$7.26**	**Per Cy**	
275							
276	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
277					$0		
278	Top Soil	137	cy	$40	$5,481		$32 per cy plus markup
279					$0		
280							
281	Subtotal Cost				$5,481		
282	**Material Unit cost**				**$0.74**	**Per sf**	
283					**$40**	**Per cy**	
284							
285	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
286	Hydroseed	7,400	sf	$0.038	$280		Mean p 85 $0.34 per sy
287							
288	Subtotal Cost				$280		
289	**Subcontract Unit Cost**				**$0.04**	**Per sf**	
290	**TOTAL UNIT COST**				**$1.36**	**Per sf**	
291							
292							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
293	**SUBCONTRACT CONSTRUCTION COSTS**						
294							
295	60 mil geomembrane	1	SF				
296	Labor	1	SF				Layfield Plastics 2000 0.38/sf installed
297	Equipment	1	SF				
298	Material	1	SF				Means Environmental Costs p 9-85 $1.34/sf
299	Unit Cost				**$0.86**	**sf**	
300							
301	Geotextile - 16 oz						Means Environmental p 9-84
302	Labor	1	sy	0.71			
303	Equipment	1	sy	0.03			
304	Material	1	sy	1.64			
305					**$0.26**	**sf**	
306							
307	Asphalt Pavement				$6.50	sy	Means p 69 2 in. binder course
308					$2.35	sy	1 in wearing course
309					**$0.98**	**sf**	
310	Asphalt seal coat				$0.86	sy	Means p 73 petroleum resistant
311	Prepare surface				$0.13	sy	
312	**Total**				**$0.11**	**sf**	
313	Remove pavement				$3.90	sy	Means p 37 3 in. thick
314	Off-site disposal/recycling				$6.50	sy	145 pcf x 2.25 cf/sy x $ 40 per ton
315	**Total**				**$1.16**	**sf**	
316							
317	Mowing grass				$0.0032	sf	Means p 249 $3.15 per 1,000 sf
318							
319	Drain cleaning				$2,400	ea	Means Vac-truck crew A-13 $1,173 per day
320							assume 2 days per event
321							
322							
323							
324	**Oversight**						
325	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
326	Project manager	1.0	day	$1,200	$1,200	$150	per hr
327	Resident engineer	1.0	day	$960	$960	$120	per hr
328	Superintendent	1.0	day	$823	$823	$103	per hr
329	Sample crew	1.0	day	$1,440	$1,440	$90	2 staff
330	Survey crew	1.0	day	$1,200	$1,200	$75	2 staff
331	Admin support	1.0	day	$360	$360	$45	
332	**Labor Daily Costs**				**$5,983**	**Per day**	
333							
334	**Monthly Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
335	Field office	1.0	mo	$1,075	$1,075		trailer, copier, fax, water, chemical toilets
336	Vehicles	1.0	mo	$2,500	$2,500		2 trucks and fuel
337	Cell phones, radios	1.0	mo	$750	$750		4 phones, 3 radios
338	Utilities	1.0	mo	$250	$250		
339	**Equipment Monthly Cost**			4,575	**$4,575**	**Per Month**	
340							
341	**Daily Equipment**						
342	Vehicles	1	day	150	$150		
343	Cell phones, radios	1.0	day	$50	$50		
344	dGPS	1.0	day	$100	$100		
345	Computer and survey software	1.0	day	$50	$50		
346							
347	**Daily Equipment Cost**				**$350**	**Per Day**	
348							
349	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
350	Per diem	1.0	day	$480.00	$480		4 field crew x $120/day
351	PPE, office supplies	1.0	day	$200	$200		4 field crew x $50/day
352	**Subtotal Cost**			**680**	**$680**	**Per day**	
353							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
354	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
355	Sediment - dioxins (8290)	1.0	ea	$715	$715		Columbia 11/8/06 estimate +10% markup
356	Sediment grain size, TOC, solids	1.0	ea	$175	$175		
357	Sediment - 2,3,7,8 TCDD (8290)	1.0	ea	$358	$358		Columbia + 10%
358	TCLP (131)	1.0	ea	$94	$94		
359	Metals (6020)	1.0	ea	$185	$185		
360	Pesticides (8081A)	1.0	ea	$176	$176		
361	Volatiles (8260B)	1.0	ea	$138	$138		
362	Semivolatiles (8270C)	1.0	ea	$325	$325		
363	**Subtotal - dioxins and all TCLP**	**1.0**	**ea**		**$1,806**		**All above except 2,3,7,8 TCDD**
364	Animal - freeze dry, homogenize, lipids	3.0	ea	$39	$116		Cost for each procedure
365	Animal tissue dioxins	1.0	ea	$715	$715		
366	**Subtotal animal tissue**				**$831**		**dioxins and 3 processing steps**
367	Water - dioxins	1.0	ea	$715	$715		
368	**Subtotal Cost**						
369							
370	**Soil chemistry monitoring event**						
371	**Estimated duration:**					2	days to mobilize and sample
372			**days**				
373	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
374	Project manager	1.0	day	$1,200	$1,200	$150	per hr
375	Senior scientist	1.0	day	$960	$960	$120	per hr
376	Sample crew	2.0	day	$2,160	$4,320	$90	2 staff x 12 hr/day
377	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
378	GIS, production	2.0	day	$560	$1,120	$70	per hour
379	**Subtotal Costs**				**$10,160**	**Per event**	
380	**Labor Daily Cost**				$5,080	Per day	
381							
382	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
383	Vehicles	2.0	day	$150	$300		van and fuel
384	Cell phones, radios	2.0	day	$50	$100		
385	dGPS	2.0	day	$100	$200		
386	Computer and survey software	2.0	day	$50	$100		
387	Soil boring equipment	2.0	day	$1,200	$2,400		
388							
389	**Subtotal Cost**				**$3,100**	**Per event**	
390	**Equipment Daily Cost**				$1,550	Per day	
391							
392	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
393	Per diem	4.0	day	$100.00	$400		
394	PPE, office supplies	4.0	day	$50	$200		
395	Shipping equipment, sample	1.0	ea	$1,000	$1,000		
396	**Subtotal Cost**				**$1,600**	**Per event**	
397	**Materials Daily Cost**				$800	Per day	
398							
399	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
400							
401	**Subtotal Cost**				**$0**		
402							
403	**TOTAL COST**				**$14,860.00**	**Per Event**	
404	**TOTAL DAILY COST**				**$7,430.00**	**Per Day**	

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
405	**Physical survey monitoring event**						
406	**Estimated duration:**					2	days field time
407	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
408	Project manager	1.0	day	$1,200	$1,200	$150	per hr
409	Senior scientist	1.0	day	$960	$960	$120	per hr
410	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
411	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
412	GIS, production	2.0	day	$560	$1,120	$70	per hour
413	**Subtotal Costs**				**$9,440**	**Per event**	
414	**Labor Daily Cost**				$4,720	Per day	
415							
416	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
417	Vehicles	2.0	day	$150	$300		van and fuel
418	Cell phones, radios	2.0	day	$50	$100		
419	dGPS	2.0	day	$100	$200		
420	Computer and survey software	2.0	day	$50	$100		
421							
422	**Subtotal Cost**				$700	Per event	
423	**Equipment Daily Cost**				**$350**	**Per day**	
424							
425	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
426	Per diem	4.0	day	$100.00	$400		
427	PPE, office supplies	4.0	day	$50	$200		
428	Shipping equipment, supplies	1.0	ea	$1,000	$1,000		
429	**Subtotal Cost**				$1,600	Per event	
430	**Materials Daily Cost**				**$800**	**Per day**	
431							
432	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
433							
434							
435	Subtotal Cost				**$0**		
436							
437	TOTAL COST				**$11,740**	Per Event	
438	TOTAL DAILY COST				**$5,870**	Per Day	
439	**Ecologic survey monitoring event**						
440	**Estimated duration:**		stations			2	days field time concurrent with sediment
441			**days**				
442	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
443	Project manager	1.0	day	$1,200	$1,200	$150	per hr
444	Senior scientist	1.0	day	$960	$960	$120	per hr
445	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
446	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
447	GIS, production	2.0	day	$560	$1,120	$70	per hour
448							
449	**Subtotal Costs**				**$9,440**	**Per event**	
450	**Labor Daily Cost**				$4,720	Per day	
451							
452	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
453	Vehicles	2.0	day	$150	$300		van and fuel
454	Cell phones, radios	2.0	day	$50	$100		
455	dGPS	2.0	day	$100	$200		
456							
457	**Subtotal Cost**				**$600**	**Per event**	
458	**Equipment Daily Cost**				$300	Per day	
459							
460							
461							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
462	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
463	Per diem	4.0	day	$100.00	$400		
464	PPE, office supplies	4.0	day	$50	$200		
465	Shipping equipment, samples	1.0	ea	$1,000	$1,000		
466	**Subtotal Cost**				**$1,600**	**Per event**	
467	**Materials Daily Cost**				$800	Per day	
468							
469	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
470							
471	Subtotal Cost				**$0**		
472							
473	**TOTAL COST**				**$11,640**	**Per Event**	
474	**TOTAL DAILY COST**				**$5,820**	**Per Day**	
475							
476	**DESIGN COSTS**						
477							
478	Project manager			$1,200		$150	per hour
479	Senior engineer			$960		$120	per hour
480	Staff engineers			$1,800		$75	per hour
481	CAD			$600		$75	per hour
482	Tech support			$480		$60	per hour
483	Labor total			$5,040			
484	**Labor unit cost per hour**				**$90.00**		7 person office staff working 56 labor hours per day.
485							
486	**Load and Off-site Disposal**						
487	**Estimated duration:**	260	Tons	divided by	260	tn/day production	
488		**1.0**	**days**				
489	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
490	Equip operator	1.0	day	$794	$794	$99	1 total
491	Laborer	1.0	day	$1,303	$1,303	$81	2 total
492	QC officer	1.0	day	$600	$600	$75	
493							
494	Subtotal Costs				$2,697		
495	**Labor Unit Costs**				**$10.37**	**Per Ton**	
496							
497	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
498	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
499	Decontamination system	1.0	day	$100	$100		
500							
501	Subtotal Cost				$400		
502	**Equipment Unit Costs**				**$1.54**	**Per Ton**	
503							
504	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
505	Health and safety equip	1.0	Days	$200	$200		4 crew x $50/day
506	Per diem	1.0	Days	$240	$240		2 crew x $120/day
507	Subtotal Cost				$440		
508	**Material Unit Cost**				**$1.69**		**Per Ton**
509							
510	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
511	Hazardous waste landfill	260	tons	$391	$101,530		Clean Harbors $355 per ton plus 10% markup
512	Debris	13	tons	$391	$5,077		for dioxins less than 10 time UTS
513	Subtotal Cost				$106,607		
514	**Subcontract Unit Costs**				**$410**	**Per Ton**	
515							
516	**TOTAL UNIT COST - HAZARDOUS WASTE LANDFILL**				**$424**	**Per Ton**	
517	Incineration	260	tons	$880	$228,800		Clean Harbors $800 per ton plus 10%
518	**Subcontract Unit Cost**				**$880**	**Per Ton**	
519	**TOTAL UNIT COST - OFF-SITE INCINERATION**				**$894**	**Per Ton**	

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
520							
521	**On-site Incineration**						
522	**Estimated duration:**	260	Tons	divided by	260	tn/day production	
523		**1.0**	**days**				
524	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
525	Equip operator	1.0	day	$794	$794	$99	1 total
526	Laborer	1.0	day	$1,303	$1,303	$81	2 total
527	QC officer	1.0	day	$600	$600	$75	
528							
529	Subtotal Costs				$2,697		
530	**Labor Unit Costs**				**$10.37**	**Per Ton**	
531							
532	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
533	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
534	Decontamination system	1.0	day	$100	$100		
535							
536	Subtotal Cost				$400		
537	**Equipment Unit Costs**				**$1.54**	**Per Ton**	
538							
539	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
540	Health and safety equip	1.0	Days	$500	$500		10 crew x $50/day
541	Per diem	1.0	Days	$480	$480		4 crew x $120/day
542	Subtotal Cost				$980		
543	**Material Unit Cost**				**$3.77**	**Per Ton**	
544							
545	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
546	Incinerate dredged material	260	tons	600.00	$156,000		Ref: Incineration cost summary table.
547	**Solid waste landfill of ash**	1	tons	50.00	$50		Range $264 to $1,087 per ton for soil
548							Use $600 per ton
549	Subtotal Cost				$156,050		
550	**Subcontract Unit Costs**				**$600**	**Per Ton**	
551							
552	**TOTAL UNIT COST**				**$616**	**Per Ton**	
553							
554	**Excavate Soil**						
555	**Estimated duration:**	400	cy	divided by	400	icy/day production with 1 excavators	
556		**1.0**	**days**			icy =	in-situ cubic yards
557	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
558	Foreman	1.0	day	$847	$847	$106	per hour
559	Equip operator	1.0	day	$794	$794	$99	1 total on excavators
560							
561	Laborer	1.0	day	$1,303	$1,303	$81	2 total
562							
563							
564	Subtotal Cost			$2,944	$2,944		Rates confirmed with Means Building Costs
565	**Labor Unit Cost**				**7.36**	**Per Cy**	
566							
567	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
568	Low-ground pressure excavator	1.0	day	$890	$890	$890	2.0 cy excavator Means p 20 & www.machinerytrader Cat 345BL $3,000 per week
569							
570							
571					$0		
572	Subtotal Cost			$890	$890		

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
573	**Equipment Unit Cost**				**$2.23**	**Per Cy**	
574							
575	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
576	Health and safety equip	1.0	Days	$450	$450		3 crew x $50/day
577							
578	Small Tools	1.0	day	$100	$100		
579					$0		
580	Subtotal Cost				$550		
581	**Material Unit Cost**				**$1.38**	**Per Cy**	
582							
583	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
584							
585	Subtotal Cost				**$0**	**Per cy**	
586							
587	**TOTAL UNIT COST**				**$10.96**	**Per Cy**	
588							
589	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
590	Sediment - dioxins (8290)	1.0	ea	$715	$715		Columbia 11/8/06 estimate +10% markup
591	Sediment grain size, TOC, solids	1.0	ea	$175	$175		
592	Sediment - 2,3,7,8 TCDD (8290)	1.0	ea	$358	$358		Columbia + 10%
593	TCLP (131)	1.0	ea	$94	$94		
594	Metals (6020)	1.0	ea	$185	$185		
595	Pesticides (8081A)	1.0	ea	$176	$176		
596	Volatiles (8260B)	1.0	ea	$138	$138		
597	Semivolatiles (8270C)	1.0	ea	$325	$325		
598	**Subtotal - dioxins and TCLP**	**1.0**	**ea**		**$1,806**		**All above except 2,3,7,8 TCDD**

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Volume Estimates

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
3								
4								
5	**CAP EXTENSION**							
6	Excavation	1.0	60,500	1.0	2.5	151,250	5,602	cy
7	Silt base layer	1.0	60,500	1.0	0.5	30,250	1,815	tons
8	Geotextile	1.0	60,500	1.0	1	60,500	60,500	sf
9	Earth fill	1.0	60,500	1.0	1.5	90,750	5,445	tons
10	Topsoil and planting	1.0	60,500	1.0	1	60,500	60,500	sf
11								
12								
13								
14	**ALT 3 UPGRADE AND MAINTAIN EXISTING SURFACES**						**6.4**	**Acres**
15								
16	Cap Area 1		85,000					
17	Cap Area 2		48,000					
18	Cap Area 3		53,000					
19	Parking - Southwest Centredale Manor		34,000					
20	Parking - North Centredale Manor		27,000					
21	Parking - South Brook Village		32,000					
22	Total Cap Areas		186,000			186,000	4.3	Acres
23	Total Parking Lot Areas		93,000			93,000	2.1	Acres
24	Cap Extension Area		60,500			60,500	1.4	Acres
25								
26	Clear existing vegetation							
27	Cap areas	1.0	186,000	1	1	186,000		sf
28								
29	Area 1 - fill 0.5 ft	1.0	85,000	1	0.5	42,500	2,550	tons
30	Area 2 - fill 0.5 ft	1.0	48,000	1	0.5	24,000	1,440	tons
31	Area 3 - fill average of 0.5 ft	1	53,000	1	0.5	26,500	1,590	tons
32	Total grading fill						5,580	tons
33								
34								
35	Topsoil and plantings						**186,000**	**sf**
36								
37	Seal asphalt						**93,000**	**sf**
38	**CAP EXTENTION**							
39								
40	Excavation	1.0	60,500	1.0	0.5	30,250	1,120	cy
41	Silt base layer	1.0	60,500	1.0	0.5	30,250	1,815	tons
42	Geotextile	1.0	60,500	1.0	1	60,500	60,500	sf
43	Earth fill	1.0	60,500	1.0	1.5	90,750	5,445	tons
44	Topsoil and planting	1.0	60,500	1.0	1	60,500	60,500	sf
45								
46	Principal Threat Waste						**5,500**	**cy**
47	Dioxin Soil Excavation						**430**	
48	TSCA/GB Soil Excavation						**4,300**	**cy**
49	GA Soil Excavation	Volume from 7/18/11 spreadsheet by D. Dahlen					**4,500**	**cy**
50	Soil disposal	In-place density			120	pcf		**tons**
51	PTW						**8,910**	**tons**
52	Dioxin Soil						**697**	**tons**
53	TSCA/GB Soil						**6,966**	**tons**
54	GA Soil Excavation						**7,290**	**tons**

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
55		Assume 100% of the PTW soils require incineration						
56		Assume 10% of the TSCA/GB requires incineration.						
57		Asssume 10% of GA soils require incineration						
58	TSCA/GB & Dioxin Incineration	10%					**697**	**tons**
59	TSCA/GB & Dioxin landfill	90%					**6,966**	**tons**
60	GA Incineration	10%					**729**	**tons**
61	GA landfill	90%					**6,561**	**tons**
62								
63	Backfill						**23,863**	**tons**
64								
65	**ALT 4 CONVERT TO RCRA CAPS AND MAINTAIN**						**6.4**	**Acres**
66	Cap Area 1		85,000					
67	Cap Area 2		48,000					
68	Cap Area 3		53,000					
69	Parking - Southwest Centredale Manor		34,000					
70	Parking - North Centredale Manor		27,000					
71	Parking - South Brook Village		32,000					
72	Total Cap Areas		186,000			186,000	4.3	Acres
73	Total Parking Lot Areas		93,000			93,000	2.1	Acres
74								
75	Use unit weight of 130 pcf for cap soils				1.76	tons per cy		
76	**1. CAP AREAS**							
77	Clear existing vegetation							
78	Cap areas	1.0	186,000	1	1	186,000		sf
79	Fill to create 3% slope							
80	Area 1 - fill 5 ft at center	1.0	85,000	1	2.5	212,500	12,750	tons
81	Area 2 - fill 1.5 ft at center	1.0	48,000	1	0.8	36,000	2,160	tons
82	Area 3 - no fill needed							
83	Total grading fill					248,500	14,910	tons
84								
85								
86	Geomembrane						**186,000**	**sf**
87	Drain layer	1.0	186,000	1	1.0	186,000	6,889	cy
88							**12,090**	**tons**
89	Geotextile						**186,000**	**sf**
90	Protective soil layer	1.0	186,000	1	1.0	186,000	6,889	cy
91							**12,090**	**tons**
92	Topsoil (price with vegetation)							
93								
94	**2. PAVEMENT AREAS**							
95	Demolish asphalt						**93,000**	**sf**
96	Fill for 3% slope - assume 1.0 ft	1.0	93,000	1	1.0	93,000	3,444	cy
97							**6,045**	**tons**
98	Geomembrane						**93,000**	**sf**
99	Drain layer	1.0	93,000	1	1.0	93,000	3,444	cy
100							**6,045**	**tons**
101	Geotextile						**93,000**	**sf**
102	Gravel base	1.0	93,000	1	1.0	93,000	3,444	cy
103							**6,045**	**tons**
104	Asphalt pavement						**93,000**	**sf**
105								

US EPA ARCHIVE DOCUMENT

Appendix F-1
Source Area Soil Remedial Cost Estimates - Volume Estimates

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
106	**Utility clean corridors**							
107	Smith to Centredale Manor						720	lf
108	Smith to Brook Village						180	lf
109	Centredale to Steere Ave						100	lf
110	Total						1000	lf
111	Sewer lines						**280**	**lf**
112	Water lines						**820**	**lf**
113	Gas lines						**820**	**lf**
114	Power lines						**820**	**lf**
115	Telephone lines						**820**	**lf**
116	Communication cable						820	**lf**
117	Storm drains in parking lots	1	1200	1	1	1,200		
118		4	120	1	1	480		
119		2	180	1	1	360		
120		2	240	1	1	480		
121	Storm drains					**2,520**		**lf**
122	parking lot lighting - use same as storm drain							
123	Lighting conduits					**2,520**		**lf**
124								
125	**CAP EXTENTION**							
126								
127	Excavation	1.0	60,500	1.0	0.5	30,250	**1,120**	**cy**
128	Silt base layer	1.0	60,500	1.0	0.5	30,250	**1,815**	**tons**
129	Geotextile	1.0	60,500	1.0	1	60,500	**60,500**	**sf**
130	Geomembrane	1	60,500	1.0	1	60,500	**60,500**	**sf**
131	Drain layer	1.0	60,500	1.0	1.0	60,500	2,241	cy
132							**3,933**	**tons**
133	Geotextile						**60,500**	**sf**
134	Protective soil layer	1.0	60,500	1.0	1.0	60,500	2,241	cy
135								
136								
137	Topsoil and planting	1.0	60,500	1.0	1	60,500	**60,500**	**sf**

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Present Worth Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	A	B	C	D	E	F
1	**Allendale Reach Floodplain Soil Alternatives**					
2			ALT 1 No Action[1]	ALT 5a and ALT 5b[2] Excavation, On-site CDF	ALT 5d Excavation, On-site Incinerate	ALT 5e Excavation, Off-site Disposal
3	**Remediation Area:**	**3.1**	**Acres**			
4	**Remediation Volume**	**6,624**	**Cubic Yards**			
5	**Construction Cost (Excludes Disposal)**		$0	$1,190,848	$1,190,848	$1,190,848
6	Disposal			$138,408	$5,569,653	$3,468,977
7	Design costs		$0	$160,733	$160,733	$160,733
8	Oversight & QC costs		$0	$86,038	$93,188	$93,188
9	**Contingencies**					
10	Excavation (25%)	25%	$0	$359,405	$361,192	$361,192
11	Disposal (25% for a; 10% for d,e)			$34,602	$556,965	$346,898
12	**Capital Costs**					
13	Base Alternative			$1,800,000	$1,800,000	$1,800,000
14	**TOTAL CAPITAL COSTS**		**$0**	**$2,000,000**	**$7,900,000**	**$5,600,000**
15	Annual Monitoring & Maintenance		$0	$3,143	$3,143	$3,143
16	Monitoring (vegetation)			$5,970	$5,970	$5,970
17						
18	**TOTAL PRESENT WORTH COSTS**		**$0**	**$2,100,000**	**$8,000,000**	**$5,700,000**
19	Notes:					
20	Present worth factors for 7% discount factor					
21	~~Years 1 to 30~~	12.409				
22						
23	[1] Costs for periodic monitoring and 5-yr reviews are covered under Allendale Sediment No Action alternative.					
24	[2] Costs for Alternative 5b are the same as Alternative 5a. Costs for disposal monitoring are covered under Allendale Sediment on-site CDF alternatives.					

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily output**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION COSTS**												
4													
5													
6	**EXCAVATION (without disposal)**												
7	Mobilization and Demobilize	10	days		$7,525	$3,410	$1,800		$75,248	$34,100	$18,000	$0	$127,348
8	Temp road gravel	1,067	cy	400	$9.34	$2.08	$52.50		$9,967	$2,213	$56,000	$0	$68,180
9	Geomembrane for temp roads	28,800	sf					$0.86	$0	$0	$0	$24,768	$24,768
10	Work area gravel	741	cy	400	$9.34	$2.08	$52.50		$6,921	$1,537	$38,889	$0	$47,347
11	Work area asphalt	40,000	sf					$1.00	$0	$0	$0	$40,000	$40,000
12	Excavate soil	6,624	cy	400	$15.81	$8.53	$4.50		$104,739	$56,470	$29,808	$0	$191,017
13	Backfill	8,216	tons	500	$12.58	$2.32	$30.94		$103,368	$19,060	$254,189	$0	$376,618
14	Remove haul roads	1,807	tons		$9.34	$2.08			$16,888	$3,750	$0	$0	$20,638
15	Wetland enhancement	3.1	ac					$42,551	$0	$0	$0	$133,756	$133,756
16	Superintendent & field engr	45	days		$1,920				$86,400	$0	$0	$0	$86,400
17	Project manager	45	days		$1,200				$54,000	$0	$0	$0	$54,000
18	Clerk	45	days		$360				$16,200	$0	$0	$0	$16,200
19	Field office, utilities, vehicles	1	mo			$4,575			$0	$4,575	$0	$0	$4,575
20													
21	**EXAVATION (without disposal) CONSTRUCTION COST**								**$473,732**	**$121,705**	**$396,886**	**$198,524**	**$1,190,848**
22													
23													
24													
25	**Excavation OPTION A Upland CDF**												
26	Upland CDF cell	8,216	tons					$0.00	$0	$0	$0	$0	$0
27	Load and place in CDF	8,216	tons	640	$9.80	$4.66	$2.39		$80,513	$38,254	$19,640	$0	$138,408
28									**$80,513**	**$38,254**	**$19,640**	**$0**	**$138,408**
29													
30													
31	**Excavation Option D On-Site Incineration**												
32	On-site incineration	8,216	tons		$10.37	$1.54	$1.96	$600	$85,225	$12,639	$16,115	$4,930,916	$5,044,896
33	Solid waste landfill	8,216	tons		$10.37	$1.54	$1.96	$50	$85,225	$12,639	$16,115	$410,778	$524,758
34									**$170,450**	**$25,279**	**$32,230**	**$5,341,694**	**$5,569,653**
35													
36	**Excavation Option E Off-site Disposal**												
37	Off-site Incineration	0	tons		$8.07	$1.54	$2.62	$880	$0	$0	$0	$0	$0
38	Hazardous Waste Landfill	8,216	tons		$8.07	$1.54	$2.62	$410	$66,266	$12,639	$21,487	$3,368,585	$3,468,977
39													
40									**$66,266**	**$12,639**	**$21,487**	**$3,368,585**	**$3,468,977**

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Design Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
3	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
4				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
5	**DESIGN COSTS**											
6												
7												
8												
9	**EXCAVATE & ALL DISPOSAL OPTIONS**											
10	Physical survey	2	days	$4,720	$350	$750	$0	$9,440	$700	$1,500	$0	$11,640
11	Soil chemistry	2	days	$5,080	$500	$750	$0	$10,160	$1,000	$1,500	$0	$12,660
12	Ecologic survey	1	days	$4,720	$500	$750	$0	$4,720	$500	$750	$0	$5,970
13	Soil samples dioxins	20	each				$715				$14,300	$14,300
14	Soil samples all COCs	10	each				$1,806				$18,063	$18,063
15	Animal tissue samples	0	each				$1,507				$0	$0
16											$0	$0
17	Design report	150	hours	$90				$13,500	$0	$0	$0	$13,500
18	Drawings - 8 sheets	640	hours	$90				$57,600	$0	$0	$0	$57,600
19	Specifications	150	hours	$90				$13,500	$0	$0	$0	$13,500
20	Work plans	150	hours	$90				$13,500	$0	$0	$0	$13,500
21	**EXCAVATE DESIGN COST**							**$122,420**	**$2,200**	**$3,750**	**$32,363**	**$160,733**
22												

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Construction Oversight Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
2				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION OVERSIGHT COSTS**											
4												
5	**EXCAVATE - ALL DISPOSAL OPTIONS**											
6	Project manager	20	days	$1,200				$24,000	$0	$0	$0	$24,000
7	Resident engineer	20	days	$960				$19,200	$0	$0	$0	$19,200
8	Water quality crew	0	days	$2,160	$350	$750		$0	$0	$0	$0	$0
9	Survey crew	2	days	$1,200	$350	$680		$2,400	$700	$1,360	$0	$4,460
10	Soil sample crew	2	days	$1,440	$350	$680		$2,880	$700	$1,360	$0	$4,940
11	Admin support	30	days	$360				$10,800	$0	$0	$0	$10,800
12	Field office	1	months		$1,075			$0	$1,075	$0	$0	$1,075
13	Vehicles	1	months		$2,500			$0	$2,500	$0	$0	$2,500
14	Cell phones, radios	1	months		$750			$0	$750	$0	$0	$750
15	Utilities	1	months		$250			$0	$250	$0	$0	$250
16	Confirmation soil samples	10	each				$1,806	$0	$0	$0	$18,063	$18,063
17	Designation soil samples	10	each				$715	$0	$0	$0	$7,150	$7,150
18	Animal tissue samples	0	each				$1,507	$0	$0	$0	$0	$0
19												
20	**EXCAVATE OVERSIGHT COST Alt 5d, 5e**							**$59,280**	**$5,975**	**$2,720**	**$25,213**	**$93,188**
21	**OVERSIGHT Alt 5a, 5b** (delete Designation samples)											**$86,038**

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Long-term Monitoring Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1				Unit Costs				Costs				
2		Quantity	Units	Labor	Equipment	Materials	Subcontract	Labor	Equipment	Materials	Subcontract	TOTAL
3	**MONITORING COSTS**											
4												
5												
6												
7	**ON-SITE CDF MONITORING**			**(Assume no cost since this alternative would only be done if CDF used for pond sediments)**								
8	**A. Annual work years 1 to 30**											
9	Soil chemistry							$0	$0	$0	$0	$0
10	Physical survey	0	each	$9,440	$0	$1,500		$0	$0	$0	$0	$0
11	Ecology survey							$0	$0	$0	$0	$0
12	Groundwater chemistry	0	each				$715	$0	$0	$0	$0	$0
13	Animal tissue chemistry							$0	$0	$0	$0	$0
14	Soil chemistry							$0	$0	$0	$0	$0
15	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 30**											**$0**
16												
17												
18												
19												$0
20	**C. Annual maintenance**											$0
21												$0
22												
23	Plantings	0.00	sf				$1.00	$0	$0	$0	$0	$0
24	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$0**
25												
26	**EXCAVATION ALTERNATIVE -FLOODPLAIN MONITORING**											
27	**A. Annual work years 1 to 30**											
28	Soil chemistry		day	$5,080	$500	$750		$0	$0	$0	$0	$0
29	Physical survey		day	$4,720	$350	$750		$0	$0	$0	$0	$0
30	Ecology survey	1	day	$4,720	$500	$750		$4,720	$500	$750	$0	$5,970
31	Water chemistry						$715	$0	$0	$0	$0	$0
32	Animal tissue chemistry						$1,507	$0	$0	$0	$0	$0
33	Soil chemistry						$890	$0	$0	$0	$0	$0
34	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 30**											**$5,970**
35												
36												$0
37	**B. Annual maintenance**											$0
38	Invasive species control	3.1	ac				$1,000.00	$0	$0	$0	$3,143	$3,143
39	Cap repair		tons				$45.84	$0	$0	$0	$0	$0
40	Plantings		sf				$1.00	$0	$0	$0	$0	$0
41	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$3,143**

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Unit Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H
1	**Excavate Soil with Low-ground Pressure Long-reach Excavators**						
2	**Estimated duration:**	400	cy	divided by	400	icy/day	production
3		**1.0**	**days**			icy =	in-situ cubic yards
4	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
5	Foreman	1.0	day	$847	$847	$106	per hour
6	Equip operator	1.0	day	$1,588	$1,588	$99	2 total on excavators
7	Truck driver	1.0	day	$1,284	$1,284	$80	2 total
8	Laborer	1.0	day	$2,607	$2,607	$81	4 total
9	Safety officer		day	$600	$0	$75	per hour
10	QC officer		day	$600	$0	$75	per hour
11	Subtotal Cost			$7,525	$6,325		Rates confirmed with Means Building Costs
12	**Labor Unit Cost**				**15.81**	**Per Cy**	
13							
14	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
15	Low-ground pressure excavator	1.0	day	$890	$890	$890	www.machinerytrader Cat 345BL $3,000 per
16	Rehandling excavators	1.0	day	$680	$680	$680	1.5 cy Means p 20
17	Trucks to process area (2)	1.0	day	$1,840	$1,840	$920	(2) off-road trucks 25 ton Means p 22
18					$0		
19	Subtotal Cost			$3,410	$3,410		
20	**Equipment Unit Cost**				**$8.53**	**Per Cy**	
21							
22	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
23	Health and safety equip	1.0	Days	$500	$500		10 crew x $50/day
24	Per diem	1.0	Days	$1,200	$1,200		10 crew x $120/day
25	Small Tools	1.0	day	$100	$100		
26					$0		
27	Subtotal Cost			$1,800	$1,800		
28	**Material Unit Cost**				**$4.50**	**Per Cy**	
29							
30	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
31							
32	Subtotal Cost				**$0**	**Per cy**	
33							
34	**TOTAL UNIT COST**				**$28.84**	**Per Cy**	
35							
36							
37	**Load and Place Soil in CDF**						
38	**Estimated duration:**	640	Tons	divided by	640	tn/day	production
39		**1.0**	**days**				400 icy x 0.65 dewatered tons/cyu
40	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
41							
42	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
43	Truck driver	1.0	day	$1,284	$1,284	$80	2 total
44	Laborer	1.0	day	$2,607	$2,607	$81	4 total
45	QC officer		day	$600	$0	$75	
46	Subtotal Costs				$6,272		
47	**Labor Unit Costs**				**$9.80**	**Per Ton**	
48							
49	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
50	Loader	1.0	day	$300	$300	$300	3 cy wheel loader Means p 21
51	Decontamination system	1.0	day	$100	$100	$100	
52	Highway trucks (2)	1.0	day	$960	$960	$480	16 ton truck Means p 22
53	Dozer	1.0	day	$860	$860	$860	200 HP crawler Mean p 21
54	Compactor	1.0	day	$760	$760	$760	Mean p 20
55							
56	Subtotal Cost				$2,980		
57	**Equipment Unit Costs**				**$4.66**	**Per Ton**	

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Unit Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H
58							
59	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
60	Health and safety equip	1.0	Days	$450	$450		9 crew x $50/day
61	Per diem	1.0	Days	$1,080	$1,080		9 crew x $120/day
62	Subtotal Cost				$1,530		
63	**Material Unit Cost**				**$2.39**	**Per Ton**	
64							
65	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
66			tons		$0		
67			tons		$0		
68							
69	Subtotal Cost				$0		
70	**Subcontract Unit Costs**				**$0.00**	**Per Ton**	
71							
72	**TOTAL UNIT COST**				**$16.85**	**Per Ton**	
73							
74	**Load and Off-site Disposal**						
75	**Estimated duration:**	260	Tons	divided by	260	tn/day production	
76		**1.0**	**days**				
77	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
78	Equip operator	1.0	day	$794	$794	$99	1 total
79	Laborer	1.0	day	$1,303	$1,303	$81	2 total
80	QC officer		day	$600	$0	$75	
81							
82	Subtotal Costs				$2,097		
83	**Labor Unit Costs**				**$8.07**	**Per Ton**	
84							
85	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
86	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
87	Decontamination system	1.0	day	$100	$100		
88							
89	Subtotal Cost				$400		
90	**Equipment Unit Costs**				**$1.54**	**Per Ton**	
91							
92	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
93	Health and safety equip	1.0	Days	$200	$200		4 crew x $50/day
94	Per diem	1.0	Days	$480	$480		4 crew x $120/day
95	Subtotal Cost				$680		
96	**Material Unit Cost**				**$2.62**		**Per Ton**
97							
98	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
99	Hazardous waste landfill	260	tons	$391	$101,530		Clean Harbors $355 per ton plus 10% markup
100	Debris	13	tons	$391	$5,077		for dioxins less than 10 time UTS
101	Subtotal Cost				$106,607		
102	**Subcontract Unit Costs**				**$410**	**Per Ton**	
103							
104	**TOTAL UNIT COST - HAZARDOUS WASTE LANDFILL**				**$422**	**Per Ton**	
105	Incineration	260	tons	$880	$228,800		Clean Harbors $800 per ton plus 10%
106	**Subcontract Unit Cost**				**$880**	**Per Ton**	
107	**TOTAL UNIT COST - OFF-SITE INCINERATION**				**$892**	**Per Ton**	
108							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
109	**On-site Incineration**						
110	**Estimated duration:**	260	Tons	divided by	260	tn/day production	
111		**1.0**	**days**				
112	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
113	Equip operator	1.0	day	$794	$794	$99	1 total
114	Laborer	1.0	day	$1,303	$1,303	$81	2 total
115	QC officer	1.0	day	$600	$600	$75	
116							
117	Subtotal Costs				$2,697		
118	**Labor Unit Costs**				**$10.37**	**Per Ton**	
119							
120	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
121	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
122	Decontamination system	1.0	day	$100	$100		
123							
124	Subtotal Cost				$400		
125	**Equipment Unit Costs**				**$1.54**	**Per Ton**	
126							
127	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
128	Health and safety equip	1.0	Days	$150	$150		3 crew x $50/day
129	Per diem	1.0	Days	$360	$360		3 crew x $120/day
130	Subtotal Cost				$510		
131	**Material Unit Cost**				**$1.96**	**Per Ton**	
132							
133	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
134	Incinerate dredged material	260	tons	600.00	$156,000		Ref: Incineration cost summary table.
135	**Solid waste landfill of ash**	1	tons	50.00	$50		Range $264 to $1,087 per ton for soil
136							Use $600 per ton
137	Subtotal Cost				$156,050		
138	**Subcontract Unit Costs**				**$600**	**Per Ton**	
139							
140	**TOTAL UNIT COST**				**$614**	**Per Ton**	
141							
142	**Backfill**						
143	**Estimated duration:**	500	Tons	divided by	500	tn/day production	
144		**1.0**	**days**				
145	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
146	Foreman	1.0	day	$847	$847	$106	per hour
147	Equip operator	1.0	day	$1,588	$1,588	$99	2 total
148	QC technician	1.0	day	$650	$650	$81	per hour
149	Laborer	1.0	day	$2,607	$2,607	$81	4 total
150	Safety officer	1.0	day	$600	$600	$75	per hour
151							
152	Subtotal Cost			$6,291	$6,291		
153	**Labor Unit Cost**				**$12.58**	**Per Ton**	
154							
155							
156	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
157	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
158	Dozer to spread	1.0	day	$860	$860		200 hp dozer Means p 21
159					$0		
160	Subtotal Cost			$1,160	$1,160		
161	**Equipment Unit Cost**				**$2.32**	**Per Ton**	
162							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
163	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
164	Sand/load backfill	500	tons	$30	$15,000		Truck delivery to site at $24 per ton +25%
165	Health and safety equip	1.0	Days	$350	$350		7 crew x $50/day
166	Per diem	1.0	Days	$120	$120		1 crew x $120/day
167	Subtotal Cost				$15,470		
168	**Material Unit Cost**				**$30.94**	**Per Ton**	
169							
170	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
171					$0		
172					$0		
173	**Subtotal Cost**				$0		
174	**TOTAL UNIT COST**				**$45.84**	**Per Ton**	
175							
176	**Gravel for Work Areas**						
177	**Estimated duration:**	400	cy	divided by	400	cy/day production	
178		**1.0**	**Days**				
179	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
180	Foreman	1.0	day	$847	$847	$106	per hour
181	Equip operator	1.0	day	$1,588	$1,588	$99	2 total
182	Laborer	1.0	day	$1,303	$1,303	$81	2 total
183	Subtotal Cost				$3,738		
184	**Labor Unit Cost**				**$9.34**	**Per CY**	
185							
186	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
187	Dozer	1.0	day	$480	$480		100 hp dozer
188	Grader	1.0	day	$350	$350		Small grader to spread
189	Subtotal Cost				$830		
190	**Equipment Unit Cost**				**$2.08**	**Per CY**	
191							
192	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
193					$0		
194	Bank run cover soil	700	Tons	$30	$21,000		$24 per ton plus markup
195	Subtotal Cost				$21,000		
196	**Material Unit Cost**				**$52.50**	**Per CY**	
197							
198	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
199							
200							
201	Subtotal Cost				$0		
202	**Subcontract Unit Cost**				**$0.00**	**Per Cy**	
203	**TOTAL UNIT COST**				**$63.92**	**Per Cy**	
204							
205							
206	**Topsoil and Plantings**						
207	**Estimated duration:**	7,400	sf	divided by	7400	sf/day production	
208		137	cy		137	cy/day	
209		1.0	days				Topsoil Means p 85 7,400 sf/day
210	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
211	Foreman	1.0	day	$847	$847	$106	
212	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
213	Laborer	1.0	day	$1,955	$1,955	$81	3 total
214	Subtotal Cost				$5,183		
215	**Labor Unit cost**				**$0.70**	**Per sf**	
216					**$37.82**	**Per Cy**	
217							

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Unit Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H
218	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
219	Loader	1.0	day	$165	$165		1.5 cy wheel loader Means p 590
220	Dozer	1.0	day	$480	$480		100 hp dozer
221	Grader	1.0	day	$350	$350		Small grader to spread
222			day		$0		
223			day		$0		
224	Subtotal Cost				$995		
225	**Labor unit cost**				**$0.13**	**Per sf**	
226					**$7.26**	**Per Cy**	
227							
228	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
229					$0		
230	Top Soil	137	cy	$40	$5,481		$32 per cy plus markup
231					$0		
232	Floodplain plantings		ea		$0		
233	Subtotal Cost				$5,481		
234	**Material Unit cost**				**$0.74**	**Per sf**	
235					**$40**	**Per cy**	
236							
237	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
238	Plantings	7,400	sf	$1.00	$7,400		From New Bedford estimate $40,000 per acre
239							
240	Subtotal Cost				$7,400		
241	**Subcontract Unit Cost**				**$1.00**	**Per sf**	
242	**TOTAL UNIT COST**				**$2.58**	**Per sf**	
243							
244							
245							
246	**SUBCONTRACT CONSTRUCTION COSTS**						
247							
248	**Liner System**						
249	**Estimated duration:**	1	SF				
250	Geocomposite	1	SF				Means Environmental Costs
251	Labor	1	SF	0.18			
252	Equipment	1	SF	0.10			
253	Material	1	SF	0.58			
254	Unit Cost				**$0.86**	**SF**	
255							
256							
257							
258							
259							
260							
261							
262							
263							
264	**Asphalt Pavement**				**$1.00**	**sf**	
265							
266							
267							
268							
269							
270							
271							
272							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
273	**Oversight**						
274	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
275	Project manager	1.0	day	$1,200	$1,200	$150	per hr
276	Resident engineer	1.0	day	$960	$960	$120	per hr
277	Superintendent	1.0	day	$899	$899	$112	per hr
278	Sample crew	1.0	day	$1,440	$1,440	$90	2 staff
279	Survey crew	1.0	day	$1,200	$1,200	$75	2 staff
280	Admin support	1.0	day	$360	$360	$45	
281	**Labor Daily Costs**				**$6,059**	**Per day**	
282							
283	**Monthly Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
284					$0		
285	Field office	1.0	mo	$1,075	$1,075		trailer, copier, fax, water, chemical toilets
286	Vehicles	1.0	mo	$2,500	$2,500		2 trucks and fuel
287	Cell phones, radios	1.0	mo	$750	$750		4 phones, 3 radios
288	Utilities	1.0	mo	$250	$250		
289	**Equipment Monthly Cost**			4,575	**$4,575**	**Per Month**	
290							
291	**Daily Equipment**						
292	Vehicles	1	day	150	$150		
293	Cell phones, radios	1.0	day	$50	$50		
294	dGPS	1.0	day	$100	$100		
295	Computer and survey software	1.0	day	$50	$50		
296							
297	**Daily Equipment Cost**				**$350**	**Per Day**	
298							
299	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
300	Per diem	1.0	day	$480.00	$480		4 field crew x $120/day
301	PPE, office supplies	1.0	day	$200	$200		4 field crew x $50/day
302	**Subtotal Cost**			**680**	**$680**	**Per day**	
303							
304	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
305	Sediment - dioxins (8290)	1.0	ea	$715	$715		Columbia 11/8/06 estimate +10% markup
306	Sediment grain size, TOC, solids	1.0	ea	$175	$175		
307	Sediment - 2,3,7,8 TCDD (8290)	1.0	ea	$358	$358		Columbia + 10%
308	TCLP (131)	1.0	ea	$94	$94		
309	Metals (6020)	1.0	ea	$185	$185		
310	Pesticides (8081A)	1.0	ea	$176	$176		
311	Volatiles (8260B)	1.0	ea	$138	$138		
312	Semivolatiles (8270C)	1.0	ea	$325	$325		
313	**Subtotal - dioxins and all TCLP**	**1.0**	**ea**		**$1,806**		**All above except 2,3,7,8 TCDD**
314					$0		
315	lipids	3.0	ea	$39	$116		Cost for each procedure
316	Animal tissue dioxins	1.0	ea	$715	$715		
317	**Subtotal animal tissue**				**$1,507**		**dioxins, PAHs, PCBs, pesticiess and 3 processing steps**
318	Water - dioxins	1.0	ea	$715	$715		
319	**Subtotal Cost**						
320							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
321	**Soil chemistry monitoring event**						
322	**Estimated duration:**					2	days to mobilize and sample
323			**days**				
324	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
325	Project manager	1.0	day	$1,200	$1,200	$150	per hr
326	Senior scientist	1.0	day	$960	$960	$120	per hr
327	Sample crew	2.0	day	$2,160	$4,320	$90	2 staff x 12 hr/day
328	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
329	GIS, production	2.0	day	$560	$1,120	$70	per hour
330	**Subtotal Costs**				**$10,160**	**Per event**	
331	**Labor Daily Cost**				$5,080	Per day	
332							
333	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
334	Vehicles	2.0	day	$150	$300		van and fuel
335	Cell phones, radios	2.0	day	$50	$100		
336	dGPS	2.0	day	$100	$200		
337	Computer and survey software	2.0	day	$50	$100		
338	Core equipment	2.0	day	$150	$300		
339	**Subtotal Cost**				**$1,000**	**Per event**	
340	**Equipment Daily Cost**				$500	Per day	
341							
342							
343							
344	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
345	Per diem	4.0	day	$100.00	$400		
346	PPE, office supplies	2.0	day	$50	$100		
347	Shipping equipment, sample	1.0	ea	$1,000	$1,000		
348	**Subtotal Cost**				**$1,500**	**Per event**	
349	**Materials Daily Cost**				$750	Per day	
350							
351	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
352							
353	**Subtotal Cost**				**$0**		
354							
355	**TOTAL COST**				**$12,660.00**	**Per Event**	
356	**TOTAL DAILY COST**				**$6,330.00**	**Per Day**	
357	**Physical survey monitoring event**						
358	**Estimated duration:**					2	days field time
359	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
360	Project manager	1.0	day	$1,200	$1,200	$150	per hr
361	Senior scientist	1.0	day	$960	$960	$120	per hr
362	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
363	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
364	GIS, production	2.0	day	$560	$1,120	$70	per hour
365	**Subtotal Costs**				**$9,440**	**Per event**	
366	**Labor Daily Cost**				**$4,720**	**Per day**	
367							
368	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
369	Vehicles	2.0	day	$150	$300		van and fuel
370	Cell phones, radios	2.0	day	$50	$100		
371	dGPS	2.0	day	$100	$200		
372	Computer and survey software	2.0	day	$50	$100		
373	**Subtotal Cost**				**$700**	**Per event**	
374	**Equipment Daily Cost**				**$350**	**Per day**	
375							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
376							
377							
378	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
379	Per diem	4.0	day	$100.00	$400		
380	PPE, office supplies	2.0	day	$50	$100		
381	Shipping equipment, supplies	1.0	ea	$1,000	$1,000		
382	**Subtotal Cost**				**$1,500**	**Per event**	
383	**Materials Daily Cost**				**$750**	**Per day**	
384							
385	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
386							
387							
388	Subtotal Cost				**$0**		
389							
390	TOTAL COST				**$11,640**	Per Event	
391	TOTAL DAILY COST				**$5,820**	Per Day	
392	**Ecologic survey monitoring event**						
393	**Estimated duration:**		stations			2	days field time concurrent with sediment
394			**days**				
395	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
396	Project manager	1.0	day	$1,200	$1,200	$150	per hr
397	Senior scientist	1.0	day	$960	$960	$120	per hr
398	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
399	Data analysis and report	2.0	day	$1,280	$2,560	$80	2 staff
400	GIS, production	2.0	day	$560	$1,120	$70	per hour
401							
402	**Subtotal Costs**				**$9,440**	**Per event**	
403	**Labor Daily Cost**				$4,720	Per event	
404							
405	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
406	Vehicles	2.0	day	$150	$300		van and fuel
407	Cell phones, radios	2.0	day	$50	$100		
408	dGPS	2.0	day	$100	$200		
409	Computer and survey software	2.0	day	$50	$100		
410	Core equipment	2.0	day	$150	$300		
411	**Subtotal Cost**				**$1,000**	**Per event**	
412	**Equipment Daily Cost**				$500	Per day	
413							
414							
415							
416	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
417	Per diem	4.0	day	$100.00	$400		
418	PPE, office supplies	2.0	day	$50	$100		
419	Shipping equipment, samples	1.0	ea	$1,000	$1,000		
420	**Subtotal Cost**				**$1,500**	**Per event**	
421	**Materials Daily Cost**				$750	Per event	
422							
423	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
424							
425	Subtotal Cost				**$0**		
426							
427	**TOTAL COST**				**$11,940**	**Per Event**	
428	**TOTAL DAILY COST**				**$5,970**	**Per Day**	
429							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
430							
431	Project manager			$1,200		$150	per hour
432	Senior engineer			$960		$120	per hour
433	Staff engineers			$1,800		$75	per hour
434	CAD			$600		$75	per hour
435	Tech support			$480		$60	per hour
436	Labor total			$5,040			
437	**Labor unit cost per hour**				**$90.00**		per day.
438	Containerized shrub						
439	plant material	4840	ea	$10	$48,400		Plant $8 to $14 Table L-3
440	Install	161	hr	$73	$11,777		Plant rate 20 to 40 per hour per USACE
441					**$60,177**	**Ac**	
442	Containerized tree						
443	plant material	435	ea	$50	$21,750		Tree $20 Table L-3, Means $50 to $200
444	Install	43.5	hr	$73	$3,176		Plant rate 10 per hour
445					**$24,926**	**Ac**	
446					**$42,551**	**Ac**	50:50 mix of shrubs/trees
447							

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Appendix F-2
Allendale Floodplain Soil Remedial Cost Estimates - Volume Estimates

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
3								
4								
5	**EXCAVATION & OFF-SITE DISPOSAL**							**CY**
6	Removal volume	Floodplain Soils (per Watermark calculations)				136,926	**6,624**	**cy**
7	Area				1.0		136,926	sf
8	Area in acres						**3.1**	**ac**
9								
10	Sediment Weight	Use 120 pounds per cubic foot in-situ					**8,216**	**tons**
11								
12								
13	Hazardous waste landfill disposal	Assume all soil below 10x UTS						**tons**
14	Off-site Incineration							**tons**
15								
16	Clear work areas	Assume 200 by 200 ft upland processing						
17	Allendale	1.0	200	200	1.0	40,000	40,000	sf
18	Gravel for pond sites	40,000	1.0	1.0	0.5	20,000	**741**	**cy**
19	Asphalt for process area	40,000	1.0	1.0	1.0	40,000	**40,000**	**sf**
20								
21								
22								
23								
24	Gravel haul roads							
25	Gravel	1.0	1,200	24	1.0	28,800	1,067	cy
26	Geotextile for roads	1.0	1,200	24	1	28,800	28,800	sf

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Present Worth Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	A	B	C	D	E	F	G	H	I	J	K
1	**Lyman Mill Stream Sediment and Floodplain Soil (including Oxbow) Alternatives**										
2			ALT 1 No Action	ALT 3a Targeted Excavation, ENR, Upland CDF	ALT 3b Targeted Excavation, ENR, Nearshore CDF	ALT3d Targeted Excavation, ENR, On-site Incinerate	ALT 3e Targeted Excavation, ENR, Off-site Disposal	ALT 5a Partial Excavation, ENR, Upland CDF	ALT 5b Partial Excavation, ENR, Nearshore CDF	ALT 5d Partial Excavation, ENR, On-site Incinerate	ALT 5e Partial Excavation, ENR, Off-site Disposal
3	**Remediation Area:**	**32.2**	**Acres**								
4											
5	**Construction Cost (Excludes Disposal)**		$0	$6,239,893	$6,239,893	$6,239,893	$6,239,893	$10,186,323	$10,186,323	$10,186,323	$10,186,323
6	Disposal			$5,960,108	$3,371,043	$26,847,979	$18,441,530	$13,509,543	$7,298,847	$58,130,164	$39,928,858
7	Design costs		$0	$503,239	$503,239	$503,239	$503,239	$552,954	$552,954	$552,954	$552,954
8	Oversight & QC costs		$0	$475,240	$475,240	$509,560	$509,560	$915,885	$915,885	$1,013,125	$1,013,125
9	**Contingencies**										
10	Excavation (25%)	25%	$0	$1,804,593	$1,804,593	$1,813,173	$1,813,173	$2,913,791	$2,913,791	$2,938,101	$2,938,101
11	Disposal (25% for a,b; 10% for d,e)			$1,490,027	$842,761	$2,684,798	$1,844,153	$3,377,386	$1,824,712	$5,813,016	$3,992,886
12			$0								
13	**Capital Costs**										
14	Base Alternative			$9,000,000	$9,000,000	$9,100,000	$9,100,000	$14,600,000	$14,600,000	$14,700,000	$14,700,000
15	**TOTAL CAPITAL COSTS**		**$0**	**$16,500,000**	**$13,200,000**	**$38,600,000**	**$29,400,000**	**$31,500,000**	**$23,700,000**	**$78,600,000**	**$58,600,000**
16	Annual Monitoring & Maintenance Years		$20,436	$206,679	$206,679	$206,679	$206,679	$206,679	$206,679	$206,679	$206,679
17	Disposal Monitoring			$24,930	$24,930	$0	$0	$24,930	$24,930	$0	$0
18											
19	**TOTAL PRESENT WORTH (a)**		**$253,590**	**$19,400,000**	**$16,100,000**	**$41,200,000**	**$32,000,000**	**$34,400,000**	**$26,600,000**	**$81,200,000**	**$61,200,000**
20	Notes:										
21	Present worth factors for 7% discount factor										
22	Years 1 to 30	12.409									
23											
24	(a) The present worth costs for Alternatives 3 and 5 could increase by approximately $290,000 to $350,000 (or more) if a Stage IB cultural resource survey (archaeological survey testing and excavation) and additional mitigation measures are required to comply with the National Historic Preservation Act (USACE, 2011).										

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION COSTS**												
4													
5													
6	**TARGETED EXCAVATION (without disposal)**												
7	Mobilization and Demobilize	10	days		$6,873	$3,410	$1,630	$0	$68,732	$34,100	$16,300	$0	$119,132
8	Mobilize and demob excavators	5	days		$6,873	$3,410	$1,630	$0	$34,366	$17,050	$8,150	$0	$59,566
9	Clear vegetation	431,726	sf		$0.49	$0.19	$0.00	$0	$209,914	$83,107	$0	$0	$293,022
10	Excavate sediment/soil	26,102	cy	200	$34.37	$17.05	$8.15	$0	$897,018	$445,039	$212,731	$0	$1,554,788
11	Backfill excavated area	23,985	tons	500	$15.76	$4.54	$33.40	$0	$377,934	$108,891	$801,092	$0	$1,287,916
12	Slurry placement thin cap	13,468	tons	70	$74.02	$16.07	$36.43	$0	$996,948	$216,457	$490,636	$0	$1,704,042
13	Flow control structure	1	ls					$6,360	$0	$0	$0	$6,360	$6,360
14	Narrow Streambank restoration	1,613	lf					$10	$0	$0	$0	$16,130	$16,130
15	Shrub/tree plantings	1.0	ac					$42,551	$0	$0	$0	$42,551	$42,551
16	Tree plantings	4.46	ac					$24,926	$0	$0	$0	$111,056	$111,056
17	Shrub plantings	4.46	ac					$60,177	$0	$0	$0	$268,122	$268,122
18	Seeding in thin cap	22.3	ac					$2,004	$0	$0	$0	$44,607	$44,607
19	Superintendent & field engr	200	days		$1,920				$384,000	$0	$0	$0	$384,000
20	Project manager	200	days		$1,200				$240,000	$0	$0	$0	$240,000
21	Clerk	200	days		$360				$72,000	$0	$0	$0	$72,000
22	Field office, utilities, vehicles	8	mo			$4,575			$0	$36,600	$0	$0	$36,600
23									$0	$0	$0	$0	$0
24	**TARGET EXCAVATION (without disposal) CONSTRUCTION COST**								**$3,280,912**	**$941,244**	**$1,528,909**	**$488,827**	**$6,239,893**
25													
26	**Target Excavation OPTION A Upland CDF**												
27													
28	Construct and Fill CDF	35,238	tons					$71.36	$0	$0	$0	$2,514,644	$2,514,644
29	Off-site Incineration	3,915	tons					$880	$0	$0	$0	$3,445,464	$3,445,464
30									**$0**	**$0**	**$0**	**$5,960,108**	**$5,960,108**
31													
32	**Target Excavation Option B Nearshore CDF**												
33									$0	$0	$0	$0	$0
34	Construct and Fill CDF	39,153	tons					$86.10	$0	$0	$0	$3,371,043	$3,371,043
35									**$0**	**$0**	**$0**	**$3,371,043**	**$3,371,043**
36													
37	**Target Excavation Option D On-Site Incineration**												
38	On-site incineration	39,153	tons		$9.99	$1.48	$6.30	$600	$391,116	$58,004	$246,519	$23,499,051	$24,194,690
39	Solid waste landfill	39,153	tons		$9.99	$1.48	$6.30	$50	$391,116	$58,004	$246,519	$1,957,650	$2,653,289
40									**$782,232**	**$116,009**	**$493,038**	**$25,456,701**	**$26,847,979**
41													

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION COSTS**												
4													
42	**Target Excavation Option E Off-site Disposal**												
43													
44	Off-site Incineration	3,915	tons		$9.99	$1.48	$2.52	$880	$39,112	$5,800	$9,861	$3,445,464	$3,500,237
45	Hazardous Waste Landfill	35,238	tons		$9.99	$1.48	$2.52	$410	$352,004	$52,204	$88,747	$14,448,338	$14,941,293
46									**$391,116**	**$58,004**	**$98,608**	**$17,893,802**	**$18,441,530**
47													
48	**PARTIAL EXCAVATION (without disposal)**												
49	Mobilization and Demobilize	10	days		$6,873	$3,410	$1,630	$0	$68,732	$34,100	$16,300	$0	$119,132
50	Mobilize and demob excavators	5	days		$6,873	$3,410	$1,630	$0	$34,366	$17,050	$8,150	$0	$59,566
51	Clear vegetation	1,001,510	sf		$0.49	$0.19	$0.00	$0	$486,956	$192,791	$0	$0	$679,746
52	Excavate sediment/soil	56,515	cy	200	$34.37	$17.05	$8.15	$0	$1,942,187	$963,581	$460,597	$0	$3,366,365
53	Backfill excavated area	55,639	tons	500	$15.76	$4.54	$33.40	$0	$876,724	$252,603	$1,858,357	$0	$2,987,684
54	Slurry placement thin cap	5,555	tons	70	$74.02	$16.07	$36.43	$0	$411,170	$89,273	$202,353	$0	$702,796
55	Flow control structure	1	ls					$6,360	$0	$0	$0	$6,360	$6,360
56	Narrow Streambank restoration	1,613	lf					$10	$0	$0	$0	$16,130	$16,130
57	Shrub/tree plantings	1.0	ac					$42,551	$0	$0	$0	$42,551	$42,551
58	Tree plantings	11.0	ac					$24,926	$0	$0	$0	$274,075	$274,075
59	Shrub plantings	11.0	ac					$60,177	$0	$0	$0	$661,695	$661,695
60	Seeding in thin cap	9.2	ac					$2,004	$0	$0	$0	$18,397	$18,397
61	Superintendent & field engr	340	days		$1,920				$652,800	$0	$0	$0	$652,800
62	Project manager	340	days		$1,200				$408,000	$0	$0	$0	$408,000
63	Clerk	340	days		$360				$122,400	$0	$0	$0	$122,400
64	Field office, utilities, vehicles	15	mo			$4,575			$0	$68,625	$0	$0	$68,625
65	**PARTIAL EXCAVATION (without disposal) CONSTRUCTION COST**								**$5,003,335**	**$1,618,023**	**$2,545,757**	**$1,019,209**	**$10,186,323**
66													
67	**Partial Excavation OPTION A Upland CDF**												
68	Excavate existing soil	0	cy	600	$11.85	$5.82	$0	$0	$0	$0	$0	$0	$0
69	Clear trees and vegetation	91,124	sf	12,000	$0.49	$0.19	$0.00	$0.00	$44,306	$17,541	$0	$0	$61,848
70	Sand liner base	3,375	cy	400	$9.34	$2.08	$52.50	$0.00	$31,535	$7,003	$177,186	$0	$215,724
71	Install base liner	91,124	sf					$0.77	$0	$0	$0	$69,710	$69,710
72	Sand drain layer	3,375	cy	400	$9.34	$2.08	$52.50	$0.00	$31,535	$7,003	$177,186	$0	$215,724
73	Perimeter berms	16,207	cy	600	$8.64	$3.65	$52.50	$0.00	$140,005	$59,157	$850,889	$0	$1,050,051
74	Soil over sediment	5,800	cy	400	$9.34	$2.08	$52.50	$0.00	$54,194	$12,035	$304,500	$0	$370,729
75	Cover membrane	156,600	sf					$0.77	$0	$0	$0	$119,799	$119,799
76	Drain gravel over membrane	5,800	cy	400	$9.34	$2.08	$52.50	$0.00	$54,194	$12,035	$304,500	$0	$370,729
77	Protective soil	5,800	cy	400	$9.34	$2.08	$52.50	$0.00	$54,194	$12,035	$304,500	$0	$370,729
78	Topsoil and plantings	156,600	sf	7,400	$0.31	$0.13	$0.74	$1.00	$48,505	$21,056	$116,000	$156,600	$342,161
79	Load and place in CDF	84,773	tons		$20.10	$9.26	$4.41	$0.00	$1,703,804	$784,931	$373,627	$0	$2,862,361
80	Off-site incineration	8,477	tons					$880	$0	$0	$0	$7,459,980	$7,459,980
81													
82									**$2,162,271**	**$932,796**	**$2,608,387**	**$7,806,089**	**$13,509,543**

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Construction Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Description**	**Quantity**	**Units**	**Daily**	**Unit Costs**				**Costs**				
2					**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION COSTS**												
4													
83													
84	**Partial Excavation Option B Nearshore CDF**												
85									$0	$0	$0	$0	$0
86	Construct and Fill CDF	84,773	tons					$86.10	$0	$0	$0	$7,298,847	$7,298,847
87									**$0**	**$0**	**$0**	**$7,298,847**	**$7,298,847**
88													
89													
90	**Partial Excavation Option D On-Site Incineration**												
91	On-site incineration	84,773	tons		$9.99	$1.48	$6.30	$600	$846,828	$125,589	$533,753	$50,879,199	$52,385,369
92	Solid waste landfill	84,773	tons		$9.99	$1.48	$6.30	$50	$846,828	$125,589	$533,753	$4,238,625	$5,744,795
93									**$1,693,657**	**$251,178**	**$1,067,506**	**$55,117,824**	**$58,130,164**
94													
95	**Partial Excavation Option E Off-site Disposal**												
96													
97	Off-site Incineration	8,477	tons		$9.99	$1.48	$2.52	$880	$84,683	$12,559	$21,350	$7,459,980	$7,578,572
98	Hazardous Waste Landfill	76,295	tons		$9.99	$1.48	$2.52	$410	$762,145	$113,030	$192,151	$31,282,960	$32,350,286
99									**$846,828**	**$125,589**	**$213,501**	**$38,742,940**	**$39,928,858**

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Design Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1	**DESIGN COSTS**											
2	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
3				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
4												
5												
6	**TARGETED EXCAVATION - ALL DISPOSAL OPTIONS**											
7	Physical survey	2	days	$6,640	$1,500	$750	$0	$13,280	$3,000	$1,500	$0	$17,780
8	Sediment/soil chemistry	5	days	$5,608	$1,925	$550	$0	$28,040	$9,625	$2,750	$0	$40,415
9	Ecologic survey	2	days	$6,640	$1,850	$750	$0	$13,280	$3,700	$1,500	$0	$18,480
10	Water samples	10	each				$715				$7,150	$7,150
11	Sediment/soil samples	80	each				$1,806				$144,504	$144,504
12	Background samples	20	each				$1,806				$36,126	$36,126
13	Animal tissue samples	10	each				$1,507				$15,070	$15,070
14											$0	$0
15	Design report	400	hours	$124				$49,714	$0	$0	$0	$49,714
16	Drawings - 10 sheets	800	hours	$124				$99,429	$0	$0	$0	$99,429
17	Specifications	400	hours	$124				$49,714	$0	$0	$0	$49,714
18	Work plans	200	hours	$124				$24,857	$0	$0	$0	$24,857
19	**TARGETED EXCAVATION DESIGN COST**							**$278,314**	**$16,325**	**$5,750**	**$202,850**	**$503,239**
20												
21	**OPTIONS**											
22	Physical survey	2	days	$6,640	$1,500	$750	$0	$13,280	$3,000	$1,500	$0	$17,780
23	Sediment/soil chemistry	5	days	$5,608	$1,925	$550	$0	$28,040	$9,625	$2,750	$0	$40,415
24	Ecologic survey	2	days	$6,640	$1,850	$750	$0	$13,280	$3,700	$1,500	$0	$18,480
25	Water samples	10	each				$715				$7,150	$7,150
26	Sediment/soil samples	80	each				$1,806				$144,504	$144,504
27	Background samples	20	each				$1,806				$36,126	$36,126
28	Animal tissue samples	10	each				$1,507				$15,070	$15,070
29											$0	$0
30	Design report	400	hours	$124				$49,714	$0	$0	$0	$49,714
31	Drawings - 15 sheets	1,200	hours	$124				$149,143	$0	$0	$0	$149,143
32	Specifications	400	hours	$124				$49,714	$0	$0	$0	$49,714
33	Work plans	200	hours	$124				$24,857	$0	$0	$0	$24,857
34	**PARTIAL EXCAVATION DESIGN COST**							**$328,029**	**$16,325**	**$5,750**	**$202,850**	**$552,954**

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Construction Oversight Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1	**Description**	**Quantity**	**Units**	**Unit Costs**				**Costs**				
2				**Labor**	**Equipment**	**Materials**	**Subcontract**	**Labor**	**Equipment**	**Materials**	**Subcontract**	**TOTAL**
3	**CONSTRUCTION OVERSIGHT COSTS**											
6	**TARGETED EXCAVATION - ALT 3d, 3e**											
7	Project manager	160	days	$1,200				$192,000	$0	$0	$0	$192,000
8	Resident engineer	160	days	$960				$153,600	$0	$0	$0	$153,600
9	Water quality crew	0	days	$3,240	$1,500	$750		$0	$0	$0	$0	$0
10	Survey crew	4	days	$1,440	$350	$680		$5,760	$1,400	$2,720	$0	$9,880
11	Sediment/soil sample crew	10	days	$1,440	$350	$680		$14,400	$3,500	$6,800	$0	$24,700
12	Admin support	160	days	$360				$57,600	$0	$0	$0	$57,600
13	Field office	6	months		$1,075			$0	$6,450	$0	$0	$6,450
14	Vehicles	6	months		$2,500			$0	$15,000	$0	$0	$15,000
15	Cell phones, radios	6	months		$750			$0	$4,500	$0	$0	$4,500
16	Utilities	6	months		$250			$0	$1,500	$0	$0	$1,500
17	Water samples	0	each				$715	$0	$0	$0	$0	$0
18	Confirmation Sediment/soil samples	28	each				$358	$0	$0	$0	$10,010	$10,010
19	Designation sediment/soil samples	48	each				$715	$0	$0	$0	$34,320	$34,320
20	Animal tissue samples	0	each				$1,507	$0	$0	$0	$0	$0
22	**TARGETED EXCAVATION OVERSIGHT COST Alt 3d, 3e**							**$423,360**	**$32,350**	**$9,520**	**$44,330**	**$509,560**
24	**Targeted Excavation Oversight Alt 3a, 3b**											**$475,240**
26	**PARTIAL EXCAVATION - Alt 5d, 5e**											
27	Project manager	300	days	$1,200				$360,000	$0	$0	$0	$360,000
28	Resident engineer	300	days	$960				$288,000	$0	$0	$0	$288,000
29	Water quality crew	0	days	$3,240	$1,500	$750		$0	$0	$0	$0	$0
30	Survey crew	10	days	$1,440	$350	$680		$14,400	$3,500	$6,800	$0	$24,700
31	Sediment/soil sample crew	20	days	$1,440	$350	$680		$28,800	$7,000	$13,600	$0	$49,400
32	Admin support	300	days	$360				$108,000	$0	$0	$0	$108,000
33	Field office	15	months		$1,075			$0	$16,125	$0	$0	$16,125
34	Vehicles	15	months		$2,500			$0	$37,500	$0	$0	$37,500
35	Cell phones, radios	15	months		$750			$0	$11,250	$0	$0	$11,250
36	Utilities	15	months		$250			$0	$3,750	$0	$0	$3,750
37	Water samples	0	each				$715	$0	$0	$0	$0	$0
38	Confirmation Sediment/soil samples	48	each				$358	$0	$0	$0	$17,160	$17,160
39	Designation sediment/soil samples	136	each				$715	$0	$0	$0	$97,240	$97,240
40	Animal tissue samples	0	each				$1,507	$0	$0	$0	$0	$0
42	**PARTIAL EXCAVATION OVERSIGHT COST Alt 5d,**							**$799,200**	**$79,125**	**$20,400**	**$114,400**	**$1,013,125**
44	Partial Excavation Oversight Alt 5a, 5b											$915,885

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Long-term Monitoring Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
1				Unit Costs				Costs				
2		Quantity	Units	Labor	Equipment	Materials	Subcontract	Labor	Equipment	Materials	Subcontract	TOTAL
3	**MONITORING COSTS**											
4												
5												
6	**TARGETED EXCAVATION, PARTIAL EXCAVATION MONITORIN**											
7	**A. Annual work years 1**											
8	Sediment/soil chemistry	5	days	$5,608	$1,925	$550		$28,040	$9,625	$2,750	$0	$40,415
9	Physical survey	2	days	$6,640	$1,500	$750		$13,280	$3,000	$1,500	$0	$17,780
10	Ecology survey	2	days	$6,640	$1,850	$750		$13,280	$3,700	$1,500	$0	$18,480
11	Water chemistry	10					$715	$0	$0	$0	$7,150	$7,150
12	Animal tissue chemistry	10					$831	$0	$0	$0	$8,305	$8,305
13	Sediment/soil chemistry	20					$890	$0	$0	$0	$17,800	$17,800
14	Five-year review	0.2	events	$13,280				$2,656	$0	$0	$0	$2,656
15	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 3(**											**$112,586**
16												
17												$0
18	**B. Annual maintenance**											$0
19	Assume repair of 1/4 acres cap and plantings per year =											$0
20	Cap repair	403	tons				$126.52	$0	$0	$0	$51,030	$51,030
21	Plantings	10,890	sf				$1.00	$0	$0	$0	$10,890	$10,890
22	Invasive species control	32.2	ac				$1,000	$0	$0	$0	$32,173	$32,173
23	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$94,093**
24												
25	**UPLAND OR NEARSHORE CDF MONITORING**											
26	**A. Annual work years 1**											
27	Sediment/soil chemistry							$0	$0	$0	$0	$0
28	Physical survey	2	days	$6,640	$1,500	$750		$13,280	$3,000	$1,500	$0	$17,780
29	Ecology survey							$0	$0	$0	$0	$0
30	Groundwater chemistry	10	each				$715	$0	$0	$0	$7,150	$7,150
31	Animal tissue chemistry							$0	$0	$0	$0	$0
32	Sediment/soil chemistry							$0	$0	$0	$0	$0
33	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 3(**											**$24,930**
34												
35												
36												
37												$0
38	**C. Annual maintenance**											$0
39												$0
40								$0	$0	$0	$0	$0
41	Plantings		sf				$1.00	$0	$0	$0	$0	$0
42	**ANNUAL MAINTENANCE**							$0	$0	$0	$0	**$0**
43												

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Long-term Monitoring Costs

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I	J	K	L	M
44												
45	**NO ACTION**											
46	**A. Annual work years 1**											
47	Sediment/soil chemistry		each	$5,608	$1,925	$550		$0	$0	$0	$0	$0
48	Physical survey	2	each	$6,640	$1,500	$750		$13,280	$3,000	$1,500	$0	$17,780
49	Ecology survey		each	$6,640	$1,850	$750		$0	$0	$0	$0	$0
50	Water chemistry						$715	$0	$0	$0	$0	$0
51	Animal tissue chemistry						$831	$0	$0	$0	$0	$0
52	Sediment/soil chemistry						$890	$0	$0	$0	$0	$0
53	Five-year review	0.2	events	$13,280				$2,656	$0	$0	$0	$2,656
54	**TOTAL ANNUAL MONITORING IN YEARS 1 TO 3(**											**$20,436**

	B	C	D	E	F	G	H
1	**Excavate Sediment with Low-ground Pressure Long-reach Excavators**						
2	**Estimated duration:**	200	cy	divided by	200	icy/day production with 1 excavator	
3		**1.0**	**days**			icy =	in-situ cubic yards
4	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
5	Foreman	1.0	day	$847	$847	$106	per hour
6	Equip operator	1.0	day	$1,588	$1,588	$99	2 total on excavators
7	Truck driver	1.0	day	$1,284	$1,284	$80	2 total
8	Laborer	1.0	day	$1,955	$1,955	$81	3 total
9	Safety officer	1.0	day	$600	$600	$75	per hour
10	QC officer	1.0	day	$600	$600	$75	per hour
11	Subtotal Cost			$6,873	$6,873		Rates confirmed with Means Building Costs
12	**Labor Unit Cost**				**34.37**	**Per Cy**	
13							
14	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
15	Low-ground pressure excavator	1.0	day	$890	$890	$890	www.machinerytrader Cat 345BL $3,000 per
16	Rehandling excavator	1.0	day	$680	$680	$680	1.5 cy Means p 20
17	Trucks to process area (2)	1.0	day	$1,840	$1,840	$920	(2) off-road trucks 25 ton Means p 22
18					$0		
19	Subtotal Cost			$3,410	$3,410		
20	**Equipment Unit Cost**				**$17.05**	**Per Cy**	
21							
22	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
23	Health and safety equip	1.0	Days	$450	$450		9 crew x $50/day
24	Per diem	1.0	Days	$1,080	$1,080		9 crew x $120/day
25	Small Tools	1.0	day	$100	$100		
26					$0		
27	Subtotal Cost				$1,630		
28	**Material Unit Cost**				**$8.15**	**Per Cy**	
29							
30	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
31							
32	Subtotal Cost				**$0**	**Per cy**	
33							
34	**TOTAL UNIT COST**				**$59.57**	**Per Cy**	
35							
36	**Load and Place Sediment in CDF**						
37	**Estimated duration:**	270	Tons	divided by	270	tn/day production	
38		**1.0**	**days**				200 icy x 1.35 tons/cy
39	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
40							
41	Equip operator	1.0	day	$1,588	$1,588	$99	2 total
42	Truck driver	1.0	day	$1,284	$1,284	$80	2 total
43	Laborer	1.0	day	$1,955	$1,955	$81	3 total
44	QC officer	1.0	day	$600	$600	$75	
45	Subtotal Costs				$5,427		
46	**Labor Unit Costs**				**$20.10**	**Per Ton**	
47							
48	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
49	Loader	1.0	day	$300	$300	$300	3 cy wheel loader Means p 21
50	Decontamination system	1.0	day	$100	$100	$100	
51	Highway truck	1.0	day	$480	$480	$480	16 ton truck Means p 22
52	Dozer	1.0	day	$860	$860	$860	200 HP crawler Mean p 21
53	Compactor	1.0	day	$760	$760	$760	Mean p 20
54							
55	Subtotal Cost				$2,500		
56	**Equipment Unit Costs**				**$9.26**	**Per Ton**	
57							
58	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
59	Health and safety equip	1.0	Days	$350	$350		7 crew x $50/day
60	Per diem	1.0	Days	$840	$840		7 crew x $120/day
61	Subtotal Cost				$1,190		
62	**Material Unit Cost**				**$4.41**	**Per Ton**	
63							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
64	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
65			tons		$0		
66			tons		$0		
67							
68	Subtotal Cost				$0		
69	**Subcontract Unit Costs**				**$0.00**	**Per Ton**	
70							
71	**TOTAL UNIT COST**				**$33.77**	**Per Ton**	
72							
73	**Load and Off-site Disposal**						
74	**Estimated duration:**	270	Tons	divided by	270	tn/day production	
75		**1.0**	**days**				
76	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
77	Equip operator	1.0	day	$794	$794	$99	1 total
78	Laborer	1.0	day	$1,303	$1,303	$81	2 total
79	QC officer	1.0	day	$600	$600	$75	
80							
81	Subtotal Costs				$2,697		
82	**Labor Unit Costs**				**$9.99**	**Per Ton**	
83							
84	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
85	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
86	Decontamination system	1.0	day	$100	$100		
87							
88	Subtotal Cost				$400		
89	**Equipment Unit Costs**				**$1.48**	**Per Ton**	
90							
91	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
92	Health and safety equip	1.0	Days	$200	$200		4 crew x $50/day
93	Per diem	1.0	Days	$480	$480		4 crew x $120/day
94	Subtotal Cost				$680		
95	**Material Unit Cost**				**$2.52**		**Per Ton**
96							
97	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
98	Hazardous waste landfill	270	tons	$391	$105,435		Clean Harbors $355 per ton plus 10% markup
99	Debris	14	tons	$391	$5,272		for dioxins less than 10 time UTS
100	Subtotal Cost				$110,707		
101	**Subcontract Unit Costs**				**$410**	**Per Ton**	
102							
103	**TOTAL UNIT COST - HAZARDOUS WASTE LANDFILL**				**$424**	**Per Ton**	
104	Incineration	270	tons	$880	$237,600		Clean Harbors $800 per ton plus 10%
105	**Subcontract Unit Cost**				**$880**	**Per Ton**	
106	**TOTAL UNIT COST - OFF-SITE INCINERATION**				**$894**	**Per Ton**	
107							
108	**On-site Incineration**						
109	**Estimated duration:**	270	Tons	divided by	270	tn/day production	
110		**1.0**	**days**				
111	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
112	Equip operator	1.0	day	$794	$794	$99	1 total
113	Laborer	1.0	day	$1,303	$1,303	$81	2 total
114	QC officer	1.0	day	$600	$600	$75	
115							
116	Subtotal Costs				$2,697		
117	**Labor Unit Costs**				**$9.99**	**Per Ton**	
118							
119	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
120	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
121	Decontamination system	1.0	day	$100	$100		
122							
123	Subtotal Cost				$400		
124	**Equipment Unit Costs**				**$1.48**	**Per Ton**	
125							
126	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
127	Health and safety equip	1.0	Days	$500	$500		10 crew x $50/day
128	Per diem	1.0	Days	$1,200	$1,200		10 crew x $120/day

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
129	Subtotal Cost				$1,700		
130	**Material Unit Cost**				**$6.30**	**Per Ton**	
131							
132	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
133	Incinerate dredged material	270	tons	600.00	$162,000		Ref: Incineration cost summary table.
134	**Solid waste landfill of ash**	1	tons	50.00	$50		Range $264 to $1,087 per ton for soil
135							Use $600 per ton
136	Subtotal Cost				$162,050		
137	**Subcontract Unit Costs**				**$600**	**Per Ton**	
138							
139	**TOTAL UNIT COST**				**$618**	**Per Ton**	
140							
141	**Backfill**						
142	**Estimated duration:**	500	Tons	divided by	500	tn/day production	
143		**1.0**	**days**				
144	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
145	Foreman	1.0	day	$847	$847	$106	per hour
146	Equip operator	1.0	day	$3,175	$3,175	$99	4 total
147	QC technician	1.0	day	$650	$650	$81	per hour
148	Laborer	1.0	day	$2,607	$2,607	$81	4 total
149	Safety officer	1.0	day	$600	$600	$75	per hour
150							
151	Subtotal Cost			$7,879	$7,879		
152	**Labor Unit Cost**				**$15.76**	**Per Ton**	
153							
154							
155	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
156	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
157	Grader	1.0	day	$430	$430		Road grader Means p 596
158	Excavator	1.0	day	$680	$680		1.5 cy excavator Means p 20
159	Dozer to spread	1.0	day	$860	$860		200 hp dozer Means p 21
160					$0		
161	Subtotal Cost			$2,270	$2,270		
162	**Equipment Unit Cost**				**$4.54**	**Per Ton**	
163							
164	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
165	Loam	500	tons	$30	$15,000		Truck delivery to site at $24 per ton +25%
166	Health and safety equip	1.0	Days	$500	$500		10 crew x $50/day
167	Per diem	1.0	Days	$1,200	$1,200		10 crew x $120/day
168	Subtotal Cost				$16,700		
169	**Material Unit Cost**				**$33.40**	**Per Ton**	
170							
171	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
172					$0		
173					$0		
174	**Subtotal Cost**				$0		
175	**TOTAL UNIT COST**				**$53.70**	**Per Ton**	
176							
177	**Enhanced Natural Recovery cap (Land-spray application)**						
178	**Estimated duration:**	70	Tons	divided by	70	tn/day production	
179		**1.0**	**days**				
180	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
181	Foreman	1.0	day	$847	$847	$106	per hour
182	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
183	QC technician	1.0	day	$650	$650	$81	per hour
184	Laborer	1.0	day	$1,303	$1,303	$81	2 total
185							
186							
187	Subtotal Cost			$5,181	$5,181		
188	**Labor Unit Cost**				**$74.02**	**Per Ton**	
189							
190							
191	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
192	Loader	1.0	day	$240	$240		1.5 cy wheel loader Means p 21
193	Slurry pump on truck	1.0	day	$455	$455		Truck and hydromulch Means p 600

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
194	Dozer for truck access	1.0	day	$430	$430		100 hp dozer Means p 21
195					$0		
196	Subtotal Cost			$1,125	$1,125		
197	**Equipment Unit Cost**				**$16.07**	**Per Ton**	
198							
199	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
200	Loam	70	tons	$30	$2,100		Truck delivery to site at $24 per ton +25%
201	Health and safety equip	1.0	Days	$450	$450		9 crew x $50/day
202	Per diem		Days		$0		Use local crew
203	Subtotal Cost				$2,550		
204	**Material Unit Cost**				**$36.43**	**Per Ton**	
205							
206	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
207							Use 4-inch dia. hose 752 cy slurry per day
208							Pumps 70 tn per day.
209							See mass balance calculations worksheet
210					$0		
211					$0		
212	**Subtotal Cost**				$0		
213	**TOTAL UNIT COST**				**$126.52**	**Per Ton**	
214							
215	**Clear Trees, Chip Vegetation, Grind Stumps**						
216	**Estimated duration:**	12,000	sf	divided by	12,000	sf/day production	
217		**1.0**	**Days**				Means p 39 0.3 AC per day heavy trees
218	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
219	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
220	Laborer	1.0	day	$2,607	$2,607	$81	4 total
221	Foreman	1.0	day	$847	$847	$106	
222							
223	Subtotal Cost			$5,835	$5,835		
224	**Labor Unit Cost**				**$0.49**	**Per sf**	
225							
226	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
227	Excavator	1.0	day	$890	$890		2.0 cy excavator Means p 20
228	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
229	Dozer	1.0	day	$860	$860		200 hp dozer Means p 21
230	Chipper	1.0	day	$165	$165		Means p 588
231	Stump girder	1.0	day	$95	$95		Means p 588
232	Subtotal Cost			$2,310	$2,310		
233	**Equipment Unit Cost**				**$0.19**	**Per sf**	
234							
235	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
236					$0		
237					$0		
238	Subtotal Cost				$0		
239	**Material Unit Cost**				**$0.00**	**Per sf**	
240							
241	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
242							
243							
244	Subtotal Cost				$0		
245	**Subcontract Unit Cost**				$0		
246	**TOTAL UNIT COST**				**$0.68**	**Per sf**	
247							
248	**Soil over sediment or membrane (also for drainage sand)**						
249	**Estimated duration:**	400	cy	divided by	400	cy/day production	
250		**1.0**	**Days**				
251	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
252	Foreman	1.0	day	$847	$847	$106	per hour
253	Equip operator	1.0	day	$1,588	$1,588	$99	2 total
254	Laborer	1.0	day	$1,303	$1,303	$81	2 total
255	Subtotal Cost				$3,738		
256	**Labor Unit Cost**				**$9.34**	**Per CY**	
257							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
258	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
259	Dozer	1.0	day	$480	$480		100 hp dozer
260	Grader	1.0	day	$350	$350		Small grader to spread
261	Subtotal Cost				$830		
262	**Equipment Unit Cost**				**$2.08**	**Per CY**	
263							
264	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
265					$0		
266	Processed gravel	700	Tons	$30	$21,000		$24 per ton plus markup
267	Subtotal Cost				$21,000		
268	**Material Unit Cost**				**$52.50**	**Per CY**	
269							
270	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
271							
272							
273	Subtotal Cost				$0		
274	**Subcontract Unit Cost**				**$0.00**	**Per Cy**	
275	**TOTAL UNIT COST**				**$63.92**	**Per Cy**	
276							
277	**Construct Perimeter Berms**						
278	**Estimated duration:**	600	cy	divided by	600	cy/day production	
279		**1.0**	**Days**				
280	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
281	Foreman	1.0	day	$847	$847	$106	per hour
282	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
283	Laborer	1.0	day	$1,955	$1,955	$81	3 total
284			day				
285			day		$0		
286	Subtotal Cost				$5,183		
287	**Labor Unit Cost**				**$8.64**	**Per CY**	
288							
289	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
290	Dozer	1.0	day	$860	$860		200 hp dozer Means p 21
291	Excavator	1.0	day	$890	$890		2.0 cy excavator Means p 20
292	Compactor	1.0	day	$440	$440		Means p 21
293							
294							(Means crew B-32)
295	Subtotal Cost				$2,190		
296	**Equipment Unit Cost**				**$3.65**	**Per CY**	
297							
298	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
299					$0		Use 1.75 tons per cy
300	Bank run gravel	1,050	Tons	$30	$31,500		$24 per ton plus markup
301							
302							
303	Subtotal Cost				$31,500		
304	**Material Unit Cost**				**$52.50**	**Per CY**	
305							
306	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
307							
308							
309	Subtotal Cost				$0		
310	**Subcontract Unit Cost**				**$0.00**	**Per Cy**	
311	**TOTAL UNIT COST**				**$64.79**	**Per cy**	
312							
313	**Excavate, Haul, Stockpile Existing Soil**						
314	**Estimated duration:**	600	cy	divided by	600	cy/day production	
315		**1.0**	**Days**				

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
316	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
317	Foreman	1.0	day	$847	$847	$106	per hour
318	Equip operator	1.0	day	$2,381	$2,381	$99	3 total
319	Laborer	1.0	day	$1,955	$1,955	$81	3 total
320	Truck driver	1.0	day	$1,926	$1,926	$80	3 total
321			day		$0		
322	Subtotal Cost				$7,109		
323	**Labor Unit Cost**				**$11.85**	**Per CY**	
324							
325	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
326	Dozer	1.0	day	$860	$860		200 hp dozer Means p 21
327	Excavator	1.0	day	$890	$890		2.0 cy excavator Means p 20
328	Loader	1.0	day	$300	$300		3 cy wheel loader Means p 21
329	Highway trucks (3)	1.0	day	$1,440	$1,440	$480	16 ton truck Means p 22
330							
331	Subtotal Cost				$3,490		
332	**Equipment Unit Cost**				**$5.82**	**Per CY**	
333							
334	Materials	**Units**		**Unit Rate**	**Total Cost**		**Comments**
335					$0		PPE not needed for work on clean soil.
336			Tons	$30	$0		
337							
338							
339	Subtotal Cost				$0		
340	**Material Unit Cost**				**$0.00**	**Per CY**	
341							
342	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
343							
344							
345	Subtotal Cost				$0		
346	**Subcontract Unit Cost**				**$0.00**	**Per Cy**	
347	**TOTAL UNIT COST**				**$17.66**	**Per cy**	
348							
349	**Topsoil and Plantings**						
350	**Estimated duration:**	7,400	sf	divided by	7400	sf/day production	
351		137	cy		137	cy/day	
352		1.0	days				Topsoil Means p 85 7,400 sf/day
353	Craft Labor	**Units**		**Unit Rate**	**Total Cost**		**Comments**
354	Foreman	1.0	day	$847	$847	$106	
355	Equip operator	1.0	day	$794	$794	$99	3 total
356	Laborer	1.0	day	$652	$652	$81	3 total
357	Subtotal Cost				$2,292		
358	**Labor Unit cost**				**$0.31**	**Per sf**	
359					**$16.73**	**Per Cy**	
360							
361	Equipment	**Units**		**Unit Rate**	**Total Cost**		**Comments**
362	Loader	1.0	day	$165	$165		1.5 cy wheel loader Means p 590
363	Dozer	1.0	day	$480	$480		100 hp dozer
364	Grader	1.0	day	$350	$350		Small grader to spread
365			day		$0		
366			day		$0		
367	Subtotal Cost				$995		
368	**Labor unit cost**				**$0.13**	**Per sf**	
369					**$7.26**	**Per Cy**	
370							
371	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
372					$0		
373	Screened loam	137	cy	$40	$5,481		$32 per cy plus markup
374					$0		
375	Wetland plantings		ea		$0		
376	Subtotal Cost				$5,481		
377	**Material Unit cost**				**$0.74**	**Per sf**	
378					**$40**	**Per cy**	
379							

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
380	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
381	Plantings	7,400	sf	$1.00	$7,400		From New Bedford estimate $40,000 per acre
382							
383	Subtotal Cost				$7,400		
384	**Subcontract Unit Cost**				**$1.00**	**Per sf**	
385	**TOTAL UNIT COST**				**$2.18**	**Per sf**	
386							
387							
388	**SUBCONTRACT CONSTRUCTION COSTS**						
389							
390	**Liner System**						
391	**Estimated duration:**		SF				
392	Geocomposite	1	SF				Means Environmental Costs
393	Labor	1	SF	0.18			
394	Equipment	1	SF	0.10			
395	Material	1	SF	0.58			
396	Unit Cost				**$0.86**	**SF**	
397							
398	**60 Mil Geomembrane**				**$0.77**	**SF**	$0.51 plus 25% sub markup + 25 % prime
399							
400							
401							
402							
403							
404							
405							
406	**Asphalt Pavement**				**$1.00**	**sf**	
407							
408	On-site CDF	$6,049,563		84,773	**$71.36**	**Per Ton**	
409	Nearshore CDF	$3,443,969		40,000	**$86.10**	**Per Ton**	Based on costs for Pond Sediment
410							Partial Excavation Alternative
411							without dewatering.
412							
413							
414							
415	**Oversight**						
416	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
417	Project manager	1.0	day	$1,200	$1,200	$150	per hr
418	Resident engineer	1.0	day	$960	$960	$120	per hr
419	Superintendent	1.0	day	$899	$899	$112	per hr
420	Sample crew	1.0	day	$1,440	$1,440	$90	2 staff
421	Survey crew	1.0	day	$1,200	$1,200	$75	2 staff
422	Admin support	1.0	day	$360	$360	$45	
423	**Labor Daily Costs**				**$6,059**	**Per day**	
424							
425	**Monthly Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
426					$0		
427	Field office	1.0	mo	$1,075	$1,075		trailer, copier, fax, water, chemical toilets
428	Vehicles	1.0	mo	$2,500	$2,500		2 trucks and fuel
429	Cell phones, radios	1.0	mo	$750	$750		4 phones, 3 radios
430	Utilities	1.0	mo	$250	$250		
431	**Equipment Monthly Cost**			4,575	**$4,575**	**Per Month**	
432							
433	**Daily Equipment**						
434	Vehicles	1	day	150	$150		
435	Cell phones, radios	1.0	day	$50	$50		
436	dGPS	1.0	day	$100	$100		
437	Computer and survey software	1.0	day	$50	$50		
438							
439	**Daily Equipment Cost**				**$350**	**Per Day**	
440							
441	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
442	Per diem	1.0	day	$480.00	$480		4 field crew x $120/day
443	PPE, office supplies	1.0	day	$200	$200		4 field crew x $50/day
444	**Subtotal Cost**			**680**	**$680**	**Per day**	

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
445							
446	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
447	Sediment - dioxins (8290)	1.0	ea	$715	$715		Columbia 11/8/06 estimate +10% markup
448	Sediment grain size, TOC, solids	1.0	ea	$175	$175		
449	Sediment - 2,3,7,8 TCDD (8290)	1.0	ea	$358	$358		Columbia + 10%
450	TCLP (131)	1.0	ea	$94	$94		
451	Metals (6020)	1.0	ea	$185	$185		
452	Pesticides (8081A)	1.0	ea	$176	$176		
453	Volatiles (8260B)	1.0	ea	$138	$138		
454	Semivolatiles (8270C)	1.0	ea	$325	$325		
455	**Subtotal - dioxins and all TCLP**	**1.0**	**ea**		**$1,806**		**All above except 2,3,7,8 TCDD**
456					$0		
457	Animal - freeze dry, homogenize, lipids	3.0	ea	$39	$116		Cost for each procedure
458	Animal tissue dioxins	1.0	ea	$715	$715		
459	**Subtotal animal tissue**				**$1,507**		**dioxins, PAHs, PCBs, pesticiess and 3 processing steps**
460	Water - dioxins	1.0	ea	$715	$715		
461	**Subtotal Cost**						
462							
463	**Sediment chemistry monitoring event**						
464	**Estimated duration:**					5	days to mobilize and sample
465			**days**				
466	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
467	Project manager	2.0	day	$1,200	$2,400	$150	per hr
468	Senior scientist	2.0	day	$960	$1,920	$120	per hr
469	Sample crew	5.0	day	$3,240	$16,200	$90	3 staff x 12 hr/day
470	Data analysis and report	5.0	day	$1,280	$6,400	$80	2 staff
471	GIS, production	2.0	day	$560	$1,120	$70	per hour
472	**Subtotal Costs**				**$28,040**	**Per event**	
473	**Labor Daily Cost**				$5,608	Per day	
474							
475	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
476	Vehicles	5.0	day	$150	$750		van and fuel
477	Cell phones, radios	5.0	day	$50	$250		
478	dGPS	5.0	day	$100	$500		
479	Sample vessel	5.0	day	$1,000	$5,000		
480	Computer and survey software	5.0	day	$50	$250		
481	Fathometer	5.0	day	$100	$500		
482	Tide gauge	5.0	day	$50	$250		
483	Turbidity, DO, pH meter	5.0	day	$75	$375		
484	Sediment profile camera	5.0	day	$200	$1,000		
485	Core equipment	5.0	day	$150	$750		
486	**Subtotal Cost**				**$9,625**	**Per event**	
487	**Equipment Daily Cost**				$1,925	Per day	
488	**Equipment costs ON LAND**				**$2,250**	**Per Event**	
489							
490							
491	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
492	Per diem	15.0	day	$100.00	$1,500		
493	PPE, office supplies	5.0	day	$50	$250		
494	Shipping equipment, sample	1.0	ea	$1,000	$1,000		
495	**Subtotal Cost**				**$2,750**	**Per event**	
496	**Materials Daily Cost**				$550	Per day	
497							
498	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
499							
500	**Subtotal Cost**				**$0**		
501							
502	**TOTAL COST**				**$40,415.00**	**Per Event**	
503	**TOTAL DAILY COST**				**$8,083.00**	**Per Day**	
504	**Physical survey monitoring event**						
505	**Estimated duration:**					2	days field time
506	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
507	Project manager	1.0	day	$1,200	$1,200	$150	per hr

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
508	Senior scientist	1.0	day	$960	$960	$120	per hr
509	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
510	Data analysis and report	5.0	day	$1,280	$6,400	$80	2 staff
511	GIS, production	2.0	day	$560	$1,120	$70	per hour
512	**Subtotal Costs**				**$13,280**	**Per event**	
513	**Labor Daily Cost**				$6,640	Per day	
514							
515	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
516	Vehicles	2.0	day	$150	$300		van and fuel
517	Cell phones, radios	2.0	day	$50	$100		
518	dGPS	2.0	day	$100	$200		
519	Computer and survey software	2.0	day	$50	$100		
520	Sample vessel	2.0	day	$1,000	$2,000		
521	Fathometer	2.0	day	$100	$200		
522	Tide gauge	2.0	day	$50	$100		
523	**Subtotal Cost**				$3,000	Per event	
524	**Equipment Daily Cost**				**$1,500**	**Per day**	
525	**Equipment cost ON LAND**				**$700**	**Per Event**	
526							
527							
528	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
529	Per diem	4.0	day	$100.00	$400		
530	PPE, office supplies	2.0	day	$50	$100		
531	Shipping equipment, supplies	1.0	ea	$1,000	$1,000		
532	**Subtotal Cost**				$1,500	Per event	
533	**Materials Daily Cost**				**$750**	**Per day**	
534							
535	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
536							
537							
538	Subtotal Cost				**$0**		
539							
540	TOTAL COST				**$17,780**	Per Event	
541	TOTAL DAILY COST				**$8,890**	Per Day	
542	**Ecologic survey monitoring event**						
543	**Estimated duration:**		stations			2	days field time concurrent with sediment
544			**days**				
545	**Craft Labor**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
546	Project manager	1.0	day	$1,200	$1,200	$150	per hr
547	Senior scientist	1.0	day	$960	$960	$120	per hr
548	Survey crew	2.0	day	$1,800	$3,600	$75	2 staff x 12 hr/day
549	Data analysis and report	5.0	day	$1,280	$6,400	$80	2 staff
550	GIS, production	2.0	day	$560	$1,120	$70	per hour
551							
552	**Subtotal Costs**				**$13,280**	**Per event**	
553	**Labor Daily Cost**				$6,640	Per day	
554							
555	**Equipment**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
556	Vehicles	2.0	day	$150	$300		van and fuel
557	Cell phones, radios	2.0	day	$50	$100		
558	dGPS	2.0	day	$100	$200		
559	Computer and survey software	2.0	day	$50	$100		
560	Sample vessel	2.0	day	$1,000	$2,000		
561	Fathometer	2.0	day	$100	$200		
562	Tide gauge	2.0	day	$50	$100		
563	Sediment profile camera	2.0	day	$200	$400		
564	Core equipment	2.0	day	$150	$300		
565	**Subtotal Cost**				**$3,700**	**Per event**	
566	**Equipment Daily Cost**				$1,850	Per day	
567	**Equipment cost ON LAND**				**$700**	**Per Event**	
568							
569							
570	**Materials**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
571	Per diem	4.0	day	$100.00	$400		
572	PPE, office supplies	2.0	day	$50	$100		

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H
573	Shipping equipment, samples	1.0	ea	$1,000	$1,000		
574	**Subtotal Cost**				**$1,500**	**Per event**	
575	**Materials Daily Cost**				$750	Per day	
576							
577	**Subcontract**	**Units**		**Unit Rate**	**Total Cost**		**Comments**
578							
579	Subtotal Cost				**$0**		
580							
581	**TOTAL COST**				**$18,480**	**Per Event**	
582	**TOTAL DAILY COST**				**$9,240**	**Per Day**	
583							
584							
585	Project manager			$1,200		$150	per hour
586	Senior engineer			$960		$120	per hour
587	Staff engineers			$2,880		$120	per hour
588	CAD			$960		$120	per hour
589	Tech support			$960		$120	per hour
590	Labor total			$6,960			
591	**Labor unit cost per hour**				**$124.29**		per day.
592							
593	**Restoration and Mitigation Unit Costs**						Estimating guidance
594							USACE Technical Report EL-97-8
595		**Units**		**Unit Rate**	**Total Cost**		
596	Aquatic restoration in ponds	10	ea	$400	$4,000	Ac	Large wood $200 to $300 per Table L-1
597							Assume 10 per acre
598	Containerized shrub						
599	plant material	4840	ea	$10	$48,400		Plant $8 to $14 Table L-3
600	Install	161	hr	$73	$11,777		Plant rate 20 to 40 per hour per USACE
601					**$60,177**	**Ac**	
602	Containerized tree						
603	plant material	435	ea	$50	$21,750		Tree $20 Table L-3, Means $50 to $200
604	Install	43.5	hr	$73	$3,176		Plant rate 10 per hour
605					**$24,926**	**Ac**	
606							
607	Mix shrubs/trees				**$42,551**	**Ac**	
608							
609	Re-stock fish				**$25,000**	**ls**	Allowance
610							
611	Hydroseeding	43560	sf	$0.046	$2,004	Ac	Means $46/1,000 sf
612							
613							
614							
615							
616							
617							
618	Stream Bank						
619							USACE $15 to $104 per linear foot.
620	Log toes						$20 to $60/lf Table L-4
621	Coir logs						$8 to $30/lf
622	Fascines						$8 to $120/lf
623	Wide bank (25 ft)				$30	lf	
624	Narrow bank (5 ft)				$10	lf	
625							
626	Flow control structure	120	tn	53		6360	Assume gravel water control/diversion
627							50 ' x 3' high by 12' wide

US EPA ARCHIVE DOCUMENT

Appendix F-3
Lyman Mill Reach Stream Sediment and Floodplain Soil Remedial Cost Estimates - Volume Estimates

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
3								
4								
5		Lyman Mill stream sediment and floodplain soil				1,401,454	**32.2**	**Acres**
6								
7	Clear work areas	None - assume work done concurrently with Lyman Mill pond remediation						
8								
9								
10	**TARGET EXCAVATION & DISPOSAL**					431,726	**9.9**	**Acres**
11		Areas and volume from 7/18/11 spreadsheet by D.Dahlen						
12	Removal volume						26,102	cy
13								
14								
15	Sediment Volume (no dewatering)						26,102	cy
16	Sediment Weight (no dewatering)					1.5 tn/cy	**39,153**	**tons**
17								
18								
19								
20								
21	For upland CDF, assume 10% of total requires off-site incineration							
22	Incineration					0.10	3,915	tons
23	CDF						35,238	tons
24								
25		Cap over excavated Areas						
26		431,726.00	1.0	1.0	1.0	431,726	15,990	CY
27		Use unit weight of 1.5 tons per cy						
28							**23,985**	**tons**
29		Assume average of 3 inches of thin cap over unexcavated area						
30		969,728.00	1.0	1.0	0.25	242,432	8,979	cy
31		Use unit weight of 1.5 tons per cy					**13,468**	**tons**
32								
33	**PARTIAL EXCAVATION & DISPOSAL**					1,001,510	**23.0**	**Acres**
34		Areas and volume from 7/18/11 spreadsheet by D.Dahlen						
35	Removal volume						56,515	cy
36								
37								
38	Sediment Volume (no dewatering)						56,515	cy
39	Sediment Weight (no dewatering)					1.5 tn/cy	**84,773**	**tons**
40								
41								
42								
43								
44	For upland CDF, assume 10% of total requires off-site incineration							
45	Incineration					0.10	8,477	tons
46	CDF						76,295	tons
47								
48		Cap over excavated Areas						
49		1,001,510	1.0	1.0	1.0	1,001,510	37,093	CY
50		Use unit weight of 1.5 tons per cy						
51							**55,639**	**tons**
52		Assume average of 3 inches of thin cap over unexcavated area						
53		399,944	1.0	1.0	0.25	99,986	3,703	cy
54		Use unit weight of 1.5 tons per cy					**5,555**	**tons**
55								
56								

US EPA ARCHIVE DOCUMENT

	B	C	D	E	F	G	H	I
1	**Description**	**No.**	**Length**	**Width**	**Thickness**	**Quantity calc.**	**Quantity**	**Units**
2			**Ft.**	**Ft.**	**Ft.**	**(LF/SF/CF)**		
57	**CAPACITY AND MATERIAL VOLUMES FOR TYPICAL UPLAND CDF**							
58	Capacity =	Volume inside a prismatoid space						
59		Volume =	$1/6h(B_1+4M+B_2)$					
60		B1 = area of lower base: B2 = area of upper base: M = area of midsection: and h = height						
61	Northwest lower portion	Height			10.0			
62		Bottom inside	500	250		125,000	sf	
63		Midsection	520	270		140,400	sf	
64		Top inside	540	290		156,600	sf	
65		Capacity				1,405,333	**52,049**	**cy**
66	Slope ratio (inside - outside)		2	2				
67	Clear trees & vegetation	1.0	418	218	1.0	91,124	91,124	sf
68	Sand base for liner	1.0	418	218	1.0	91,124	3,375	cy
69	Install base liner	1.0	418	218	1.0	91,124	91,124	sf
70	Sand drain layer	1.0	418	218	1.0	91,124	3,375	cy
71								
72	East berm core	1.0	458	10.0	10.0	45,800		
73	inside slope	0.5	455	20.0	10.0	45,467		
74	outside slope	0.5	481	20.0	10.0	48,133		
75	South berm core	1.0	258	10.0	10.0	25,800		
76	inside slope	0.5	255	20.0	10.0	25,467		
77	outside sloe	0.5	281	20.0	10.0	28,133		
78	North berm core	1.0	458	10.0	10.0	45,800		
79	inside slope	0.5	455	20.0	10.0	45,467		
80	outside slope	0.5	481	20.0	10.0	48,133		
81	West berm core	1.0	258	10.0	10.0	25,800		
82	inside slope	0.5	255	20.0	10.0	25,467		
83	outside sloe	0.5	281	20.0	10.0	28,133		
84	**Total berms**					**437,600**	**16,207**	**cy**
85								
86	CDF size at top	1	540	290	1	156,600		sf
87	Soil over sediment	1.0	156,600	1.0	1.0	156,600	**5,800**	**cy**
88	Install cover membrane	1.0	156,600	1.0	1.0	156,600	**156,600**	**sf**
89	Drain gravel over membrane	1.0	156,600	1.0	1.0	156,600	**5,800**	**cy**
90	Protective soil and topsoil	1.0	156,600	1.0	1.0	156,600	**5,800**	**cy**
91	Possible existing soil removal	1.0	418	218	4.0	364,496	13,500	cy

US EPA ARCHIVE DOCUMENT