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Centredale Manor Restoration Project
Superfund Site
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EXECUTIVE SUMMARY

The United States Environmental Protection Agency (U.S. EPA) Region 1 and United States Army Corps of Engineers (USACE) New England District are conducting a Remedial Investigation and Feasibility Study (RI/FS) for the Centredale Manor Restoration Project (CMRP) Superfund site located in North Providence, Rhode Island. The main part of the site is located at 2072 and 2074 Smith Street (Route 44). The CMRP site formerly was used for chemical manufacturing and drum recycling operations, and currently is occupied by the Brook Village and Centredale Manor apartment complexes. The study area also includes the 3-mile reach of the Woonasquatucket River from the Route 44 bridge immediately upstream of the Brook Village apartment complex, downstream to the former Dyerville Dam. From north to south, this reach of the river has four dammed impoundments: Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond. The study area includes parts of three Rhode Island towns: North Providence, Providence, and Johnston. This report presents the results of the Remedial Investigation (RI) completed for the site. The purpose of the RI is to determine the sources, nature, and extent of contamination at the site; characterize the fate and transport of contaminants; and evaluate potential human health and ecological risks resulting from exposure to site-related contaminants. Human health and ecological risks are evaluated separately in the *Baseline Human Health Risk Assessment Report* (BHHRA) (MACTEC, 2004b) and the *Baseline Ecological Risk Assessment Report* (BERA) (MACTEC, 2004a).

The main part of the CMRP site, referred to as the source area, encompasses approximately nine acres. Chemical manufacturing activities took place at the source area from approximately 1940 until the early 1970s. Potential historical sources of contamination include improper storage and disposal of chemicals in drums, stockpiles and surface impoundments. It is believed that hexachlorophene was manufactured at the site in approximately 1965. Hexachloroxanthene (HCX) and dioxin were byproducts of this process. Other chemical processes also occurred and could be the source of other contaminants at the site. Chemicals that were potentially used on site were identified based on drum labels and included caustics, halogenated solvents, polychlorinated biphenyls (PCBs), and inks. The New England Container Company, Inc. operated an incinerator-based drum reconditioning facility on a portion of the site from 1952 until the early 1970s. Chemical residues were dumped or burned prior to drum reconditioning. Residues associated with drum reconditioning operations also may have been a source of dioxin and other chemicals at the site. Evidence from historical photographs, state report files and geophysical testing suggests that buried waste material may be present in several areas of the site.

In 1972, a fire destroyed most property structures. Brook Village was constructed in 1977 and Centredale Manor was constructed in 1982. Dioxin was first identified in the area in 1996 in fish collected from the Woonasquatucket River by the U.S. EPA. Since that time, elevated levels of contaminants including dioxin (primarily 2,3,7,8-tetrachlorodibenzo-*p*-dioxin [TCDD]), PCBs, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals have been detected in various media including soil, groundwater, sediment, surface water, and biota.

Contamination at the CMRP site is being addressed in two stages: immediate (removal) actions, and long-term (remedial) actions. A time critical removal action (TCRA) for the source area floodplain soils was conducted at the site in 1999-2000 to reduce the immediate threat to the health of residents on and near the site. The major activities conducted under the TCRA included construction of two interim soil caps and installation of fencing to restrict access to potentially contaminated areas. An Engineering Evaluation/Cost Analysis (EE/CA) was performed in 2000 as the basis for a non-time critical removal action (NTCRA). The NTCRA included reconstruction of the Allendale Dam and restoration of Allendale Pond, and excavation of contaminated floodplain soils in eleven action areas on residential properties and recreational access points along Allendale and Lyman Mill Ponds. Another TCRA was performed in 2003-2004 to cap contaminated soils and sediments in the former tailrace on the east side of the source area.

Several studies were conducted between 1997 and 2004 to characterize the nature and extent of contamination in soil, groundwater, sediment, surface water and biota at the site. Indoor air screening was also performed in both housing complexes at the site. Studies also were conducted to address U.S. EPA's sediment management principles (U.S. EPA, 2002). A variety of contaminants have been detected in source area soils, including dioxins, VOCs, PCBs, SVOCs, pesticides, and inorganic constituents. The majority of the contaminated soils are in areas that are paved or capped. The mean dioxin toxic equivalent (TEQ) concentration in source area soils was approximately 118 nanograms per kilogram (ng/kg). The highest concentrations are found in surface soils beneath the interim soil caps. Dioxin concentrations decrease with increasing depth, with only localized contamination found at depths of greater than 5 ft below ground surface (bgs). Six VOCs have been measured at concentrations exceeding Rhode Island Department of Environmental Management (RIDEM) direct exposure criteria for residential use soils. PCB concentrations are highest in the central and southern parts of the source area, and in the upper 2 ft of soil. The mean total PCB concentration in source area soils is approximately 0.29 milligrams per kilogram (mg/kg). Aroclor 1254 was the most frequently detected PCB. Other detected contaminants in soil were measured at lower concentrations or were not as widely distributed as dioxin and PCBs.

Groundwater contamination at the CMRP site is not pervasive or widespread. Concentrations of VOCs were below RIDEM GB groundwater criteria except for trichloroethylene (TCE) and tetrachloroethylene (PCE) in samples from one well in the Brook Village parking lot and PCE in two other wells. VOC concentrations generally decreased from 2001 to 2002. Trace levels of other contaminants (e.g., phenols and dioxin) have been detected in some groundwater samples. Dioxin has been detected at high concentrations (>1,000 picograms per liter [pg/L]) in the well with the elevated PCE and TCE concentrations in the Brook Village parking lot; the dioxin appears to have been mobilized by the solvents. This plume of VOC-contaminated groundwater appears to discharge into the Woonasquatucket River along approximately 50 ft of its east bank. It is not known whether dioxin is discharging to the river in the VOC plume. Groundwater discharging to Allendale Pond at the south end of the source area contains low levels of VOCs.

The mean dioxin TEQ concentrations in Allendale and Lyman Mill Pond sediments were approximately 972 ng/kg and 491 ng/kg respectively. Sediment dioxin concentrations decrease in a downstream direction. In Allendale and Lyman Mill Ponds, mean dioxin concentrations are highest in the uppermost 1 ft of sediment. Mean concentrations of other chemicals (e.g., PCBs and pesticides) also were highest in Allendale Pond sediments. Radiometric age-dating results indicate that no significant dioxin contamination is found in sediments deposited prior to 1940, and maximum concentrations generally correspond to sediments deposited between about 1950 and 1970. Dioxin concentrations are lowest in samples with less than 20% silt+clay and less than 3% total organic carbon (TOC). Dioxin and other hydrophobic organic compounds tend to adsorb to fine-grained sediment particles and organic material. Additional data collection is in progress to better define the horizontal and vertical distribution of dioxin and other contaminants of concern (COCs) in Lyman Mill Pond.

An environmental forensics review of sediment chemistry data for chlorinated organic compounds suggests that different contaminants may have had different release histories and transport mechanisms. Dioxin (primarily 2,3,7,8-TCDD) and HCX contamination in sediment extended from the source area downstream to approximately half of the sampling locations downstream of Manton Dam. 2,3,7,8-TCDD and HCX concentrations in sediment are significantly higher in the reaches of the river adjacent to and downstream of the CMRP site relative to upstream background concentrations. The mean dioxin concentration in Allendale Pond sediment was higher than the mean concentration in source area soils. Elevated concentrations of PCBs and pesticides in sediment do not appear to extend as far downstream as dioxin and HCX. PCB and pesticide concentrations in sediment generally were not significantly higher than upstream background concentrations below Allendale Dam. These differences could arise from

differences in timing, location, and magnitude of the original releases, and in subsequent transport mechanisms.

HCX and dioxin are believed to be primarily derived from a hexachlorophene manufacturing process, which took place on the CMRP site for a relatively short period of time in the mid-1960s. If these byproducts were contained in waste that was directly discharged to the Woonasquatucket River, then dioxin and HCX could have been carried downstream in the water column adsorbed to suspended sediment particles. Source area contaminants (e.g. dioxins, HCX, PCBs, and pesticides) probably mostly entered the river via surface runoff and erosion and transport of contaminated soils from the source area. These transport mechanisms would have operated for a longer period of time (throughout the duration of waste-related activities on the CMRP site, until contaminated source area soils were capped). Persistent organic contaminants entering the river via surface runoff and erosion from the source area are expected to be more readily attenuated by sediment particles and organic matter in Allendale Pond.

The most important potential transport mechanism currently affecting the CMRP source area is leaching of contaminants from soil to groundwater. The soil caps and paved surfaces currently prevent the erosion and runoff of contaminated soils. A leachability evaluation indicated that except in the vicinity of the Brook Village parking lot, leaching does not appear to be a major pathway of concern. However, PCE and TCE in soil and groundwater beneath the Brook Village parking lot adjacent to the Woonasquatucket River may be mobilizing dioxin. Additional investigation is in progress to determine whether this is a significant transport pathway for dioxin.

Because of the hydrophobic and persistent nature of the primary COCs (dioxin and PCBs), sediment resuspension and downstream transport are the most important potential transport pathways in the Woonasquatucket River. A sediment stability evaluation of Allendale and Lyman Mill Ponds indicated that during a rare flood (i.e., 100-year return period), significant scour (i.e., more than about 1 cm of erosion) will occur over less than 5 percent of the bed area in Allendale Pond. Erosion will generally occur in the northern portion of the pond, near the upstream inlet. Significant scour will occur over a larger area in Lyman Mill Pond, with up to 10 to 15 percent of the Lyman Mill Pond bed experiencing significant scour. Scour would generally occur in the northern portion of Lyman Mill Pond, with maximum erosion near the upstream inlet. Sediment eroded in the upstream portion of each pond during a flood will be transported downstream by river currents. A portion of the eroded sediment is likely to be redeposited within the pond where current velocities tend to decrease. Additional data collection is in progress to reduce uncertainty and refine the sediment stability study conclusions.

Analysis of surface water data from 1999 suggests that minimal net export of dioxin from the two ponds occurs during low-flow, non-resuspending conditions. The water column load of dioxin entering the study area (i.e., the background load) is approximately equal to the load over Lyman Mill Dam during low-flow periods. Additional data collection is in progress to verify this hypothesis.

Bioaccumulation is a significant transport pathway for transfer of contaminants from lower trophic level organisms into upper trophic level organisms. Compounds with a tendency to bioaccumulate are taken up by plants, invertebrates, and fish, and are transferred through aquatic food webs. Wildlife species that consume these lower trophic level organisms are also exposed to site-related contaminants. Humans are also exposed to the contaminants through ingestion of fish and other aquatic organisms.

Vertical dioxin profiles in sediment cores indicate that natural recovery (i.e., burial of contaminated sediment by cleaner sediment) may be occurring in some areas of the ponds, but not in others. A natural recovery trend is not expected to be apparent in the ponds at this point in time because contaminated soils in the source area were not completely capped until 2004 and post-depositional processes (e.g. bioturbation and resuspension) continue to mix surface and subsurface sediment. Radiometric age-dating results

indicate that the average sediment accumulation rate in Allendale Pond is approximately 0.5-0.8 cm/year. Results from a single core from Lyman Mill Pond indicate an average sediment accumulation rate of about 0.3 cm/year.

Overall, findings from the BERA indicate that the greatest ecological risks at the site are associated with exposure to sediments, which pose a bioaccumulation hazard. Sediments in Allendale and Lyman Mill Ponds pose a greater risk than those downstream of Lyman Mill Dam. The primary exposure pathway to ecological receptors is ingestion of contaminated prey. The benthic macroinvertebrate communities that reside in impoundments upstream of dams and fish populations are at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, and tissue. Mammal and bird populations may be at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, floodplain soil (insect-eating mammals and birds only), and prey. Consumption of contaminated prey by mammal and bird populations may result in elevated tissue residues in these receptors resulting in adverse reproductive effects (i.e., bioaccumulation hazard). Chemicals that contribute to ecological risk include dioxins/furans; coplanar PCBs; Aroclor 1254; total Aroclors; 4,4′-DDD; 4,4′-DDE; technical chlordane; aluminum; arsenic, barium; cadmium, selenium; vanadium; and zinc. The concentrations of the predominant risk contributors (e.g., dioxin) in tissue are directly related to corresponding sediment concentrations.

Results from the BHHRA indicate that study areas downstream of the CMRP site have higher cumulative lifetime risks (i.e., cancer risks) and hazards (i.e., non-cancer risks) compared with the background and reference areas. Human health risks associated with exposure to aquatic biota, surface water and sediment are higher in Allendale and Lyman Mill Ponds than in areas downstream of Lyman Mill Dam. Cancer and non-cancer risks from exposure to surface soil at the Fogarty Center on the southeast side of Lyman Mill Pond are below the U.S. EPA levels of concern.

Incremental cancer risks (i.e., risks above background) for current and future residents and visiting recreational anglers from the consumption of fish are above the U.S. EPA Superfund risk range at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond (reasonable maximum exposure [RME] and central tendency exposure [CTE]). Incremental cancer risks from exposure to surface water also exceeded the U.S. EPA Superfund risk range in all four exposure areas (RME in all areas and CTE for Allendale residents only). Risk estimates for the surface water direct exposure pathway currently are being refined. Incremental cancer risks from direct exposure to sediment exceeded the U.S. EPA Superfund risk range for Allendale residents only (RME only). Incremental non-cancer risks for residents and visiting recreational anglers from the consumption of fish are above the U.S. EPA Superfund Hazard Index (HI) benchmark of one at Allendale Pond, Lyman Mill Pond, and Dyerville Pond (RME and CTE). Non-cancer risks from fish consumption exceeded the U.S. EPA Superfund benchmark value for residents in the Manton Pond area (CTE only). Non-cancer risks associated with exposure to surface water and sediment were below the U.S. EPA Superfund benchmark value. Human health contaminants of concern are dioxins/furans; coplanar PCBs; Aroclor 1254; Aroclor 1268; 4,4′-DDE; dieldrin; technical chlordane; benzo(a)pyrene; dibenz(a,h)anthracene, n-nitroso-di-n-propylamine; arsenic; and methylmercury.

Preliminary remediation goals will be developed for pathways and contaminants that were found to be associated with unacceptable ecological and human health risks at the CMRP site. As summarized above, additional data collection is in progress to address important uncertainties identified in the RI and refine the conceptual site model. This information will be incorporated into the Feasibility Study (FS) of remedial alternatives for the CMRP site.

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ABBREVIATIONS AND ACRONYMS

ADD	average daily dose
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
AVS/SEM	acid volatile sulfides / simultaneously extracted metals
BERA	baseline ecological risk assessment
bgs	below ground surface
BHC	benzene hexachloride
BHHRA	baseline human health risk assessment
BOD	biological oxygen demand
BSAF	biota-sediment/soil accumulation factor
CBR	critical body residue
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
cfs	cubic feet per second
CMRP	Centredale Manor Restoration Project
cm/yr	centimeter per year
COC	contaminant of concern
COD	chemical oxygen demand
COI	chemical of interest
COPC	contaminant of potential concern
CSF	cancer slope factor
CSM	conceptual site model
CSO	combined sewer outfall
CTE	central tendency exposure
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
EDI	estimated daily intake
EE/CA	Engineering Evaluation/Cost Analysis
EFDC	Environmental Fluid Dynamics Code
ELS	early life stage
EM	electromagnetic
EPC	exposure point concentration
ERA	ecological risk assessment
ERDC	Environmental Research and Development Center
EROD	ethoxyresorufin-O-deethylase
ERT	(U.S. EPA) Environmental Response Team
ERTC	Environmental Response Team Center
FS	Feasibility Study
GC/MS	gas chromatography/mass spectroscopy
GEC	Goldman Environmental Consultants
GIS	Geographic Information System
GPR	ground penetrating radar

H_c	Henry's Law constant
HCX	hexachloroxanthene
HI	hazard index
HQ	hazard quotient
ID	identification
IRIS	Integrated Risk Information System
K_{oc}	organic carbon partition coefficient
K_{ow}	octanol-water partition coefficient
LOAEL	lowest observed adverse effects level
MAC	Management Action Committee
MFO	mixed-function oxidase
MGD	million gallons per day
mg/kg	milligrams per kilogram
N/A	not applicable
NA	not analyzed
NAPL	nonaqueous-phase liquid
NCDC	National Climatic Data Center
NCP	National Hazardous Substances and Pollution Contingency Plan
ND	not determined
ng/kg	nanograms per kilogram
NOAA	National Oceanographic and Atmospheric Administration
NOAEL	no observed adverse effects level
NPL	National Priorities List
NTCRA	non-time critical removal action
OSWER	(U.S. EPA's) Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCA	principal components analysis
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxin(s)
PCDF	polychlorinated dibenzofuran(s)
PCE	tetrachloroethylene (perchloroethylene)
pg/L	picograms per liter
ppb(v)	parts per billion (per unit volume)
PRG	preliminary remediation goal
QEA	Quantitative Environmental Analysis
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RIPDES	Rhode Island Pollution Discharge Elimination System
RME	reasonable maximum exposure

SVOC	semivolatile organic compound
TCDD	tetrachlorodibenzo-*p*-dioxin
TCE	trichloroethylene
TCRA	time critical removal action
TEF	toxic equivalency factor
TEQ	toxic equivalency quotient
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
TTNUS	TetraTech NUS Inc.
UCL	upper confidence limit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
USACE	United States Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground storage tank
VOC	volatile organic compound
WWTP	wastewater treatment plant

1.0 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) Region I and U.S. Army Corps of Engineers (USACE) New England District are conducting a Remedial Investigation and Feasibility Study (RI/FS) for the Centredale Manor Restoration Project (CMRP) Superfund site located in North Providence, Rhode Island. The main part of the site is located at 2072 and 2074 Smith Street (Route 44) (Figures 1-1 and 1-2). The CMRP site formerly was used for chemical manufacturing and drum recycling operations, and is currently occupied by the Brook Village and Centredale Manor apartment complexes. The site also includes free-flowing reaches and impoundments of the Woonasquatucket River adjacent to and downstream from the site. This report presents the results of the Remedial Investigation (RI) completed for the site. The RI was completed following *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (U.S. EPA, 1988), and the final *RI/FS Work Plan* for the site (Battelle, 2003b).

1.1 Purpose of Report

The purpose of the RI is to determine the sources, nature, and extent of contamination at the site; characterize the fate and transport of contaminants; and evaluate potential human health and ecological risks resulting from exposure to site-related contaminants. Human health and ecological risks are evaluated separately in the *Baseline Human Health Risk Assessment Report* (BHHRA) (MACTEC, 2004b) and the *Baseline Ecological Risk Assessment Report* (BERA) (MACTEC, 2004a). Results of the BHHRA and BERA are summarized in this report.

The Feasibility Study (FS) will evaluate risk management strategies and remedial alternatives for contamination that is found to pose an unacceptable risk to human health or the environment. The FS also will evaluate the long-term effectiveness of time critical and non-time critical removal actions (TCRA and NTCRA) previously performed at the CMRP site to determine whether additional action is needed to achieve a permanent remedy.

The results of the RI/FS will be used to formulate a Proposed Plan for the site. The Proposed Plan will recommend remedial actions that will result in overall protection of human health and the environment, fulfill the requirements of CERCLA, be acceptable to all stakeholders, and satisfy the guidelines in U.S. EPA's *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (U.S. EPA, 2002).

1.2 Report Organization

This report is organized in eight sections and five appendices. Section 1.0 is an introduction and describes the site history and previous investigations performed at the CMRP site. A summary of activities conducted to support the RI is presented in Section 2.0. Physical characteristics of the study area are described in Section 3.0. Contaminant sources and the nature and extent of contamination in soil, groundwater, sediment, and surface water are discussed in Section 4.0 (contaminant data for biota are presented in detail in the BHHRA and BERA reports). Contaminant fate and transport are discussed in Section 5.0. Results from the BHHRA and BERA are summarized in Section 6.0. An integrated conceptual site model (CSM) is presented in Section 7.0. References are provided in Section 8.0.

Appendices A through E contain information used to support the RI. Appendix A describes data management and analysis procedures. Appendix B provides a comprehensive list of samples and associated analytical parameters used in the RI. Appendix C contains statistical summaries of chemical concentrations in various site media. Appendix D presents graphic logs of sediment cores collected at the site. Appendix E provides an environmental forensics review of soil and sediment data.

1.3 Site Background

A general description of the CMRP site and a summary of the site history are provided below.

1.3.1 Site Description

The study area for the CMRP site includes the 3-mile reach of the Woonasquatucket River from the Route 44 bridge immediately upstream of the Brook Village apartment complex, downstream to the former Dyerville Dam (Figure 1-1). This area corresponds to the study area evaluated in the BHHRA and BERA. From north to south, this reach of the river has four dammed impoundments: Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond (only pilings remain of the former Dyerville Dam, which apparently failed in the 1990s). These impoundments are connected by free-flowing channel reaches below each dam. Allendale Dam breached in 1991, reducing the surface water level in Allendale Pond. The dam breached again in 2001, exposing most of the Allendale Pond bottom adjacent to residential properties along the eastern bank of the pond. In early 2002, Allendale Dam was reconstructed and Allendale Pond was restored to its pre-1991 elevation as part of a NTCRA (the NTCRA is discussed further in Section 1.4). Greystone Mill Pond, the reach of the Woonasquatucket River upstream of the Route 44 bridge, was used as a background area for the RI. Assapumpset Brook, which is a tributary of the Woonasquatucket River, was used as a reference area.

The main part of the site, generally referred to as the source area, encompasses approximately nine acres and comprises parking lots, roadways, and the Centredale Manor and Brook Village apartment complexes (Figure 1-2). The source area is bounded on the north by Route 44, on the south by Allendale Pond, on the west by the Woonasquatucket River, and on the east by commercial and residential properties along Route 44. Three interim soil caps have been constructed over contaminated soils in the source area: one to the south of the Centredale Manor south parking lot (Cap Area #1), one to the west of the Centredale Manor building (Cap Area #2), and one in the former tailrace (drainage channel) east of the Centredale Manor building (Cap Area #3). These soil caps are discussed further in Section 1.4.

The land use on the east side of the Woonasquatucket River in the vicinity of the CMRP site in North Providence, RI is primarily residential, with some commercial and light industrial properties. The western side of the river in Johnston, RI is characterized by mixed residential, commercial, and industrial use. The North Smithfield wastewater treatment plant is located upstream from the site, in the Greystone Mill Pond area. The Woonasquatucket River was recognized within the larger Blackstone River drainage as one of fourteen American Heritage Rivers in 1998, and is currently the focus of urban revitalization and watershed restoration efforts. Future land use in the area is not expected to change significantly.

Groundwater in the vicinity of the site and surface water from the Woonasquatucket River are not used as drinking water sources. Groundwater is classified as Class GB, which is defined as "may not be suitable for drinking water use without treatment due to known or presumed degradation" (Rhode Island Department of Environmental Management [RIDEM], 1996). RIDEM water quality regulations designate the reach of the river in the vicinity of the CMRP site as a Class B1 water body, which is defined as follows:

> "Designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges."

A fish consumption advisory was issued by Rhode Island Department of Health (RIDOH) and U.S. EPA in 1999 for dioxin and mercury. This advisory was updated in 2003. The reach of the river that includes

the site is listed as an impaired water body under Section 303(d) of the Clean Water Act. Impairment has been attributed to pathogens, metals (cadmium, lead, copper, and mercury), polychlorinated biphenyls (PCBs), dioxins, excess algal growth, and low dissolved oxygen (DO). RIDEM has initiated a Total Maximum Daily Load (TMDL) study for the river, which will lead to the development of TMDLs for the watershed.

1.3.2 Site History

A chronology of activities at the CMRP site is provided in Table 1-1. In the 1800s, numerous textile mills were constructed along the Woonasquatucket River banks to harness the streamflow to drive machinery. Dams were set in place to pond water near a headrace, a canal that directed water through a water wheel to power mill machinery. Ponds were formed behind the Allendale and Lyman Mill Dams, adjacent to the former Allendale and Lymansville Mills.

Prior to 1936, the CMRP site was occupied by Centredale Worsted Mills, a woolens mill, and the Olneyville Wool Combing Company. The Atlantic Chemical Company began operating on the property in approximately 1943. Atlantic Chemical Company changed its name to Metro Atlantic, Inc., and subsequently to Crown-Metro, Inc. Chemical manufacturing operations on the site continued until the early 1970s. The mill complex buildings were located at the north end of the site, north of the existing Centredale Manor building and north parking lot (Figure 1-3).

Trichlorophenols were shipped to the site, where it is believed that Metro Atlantic manufactured hexachlorophene in approximately 1965. Hexachloroxanthene (HCX) and dioxin are byproducts of this process (Archer and Crone, 2000). The building where this process is believed to have taken place was located on the east bank of the Woonasquatucket River, in what is now the Brook Village parking lot (Figure 1-3). The New England Container Company, Inc. operated an incinerator-based drum reconditioning facility on a portion of the site from 1952 until the early 1970s. Chemical residues were believed to have been dumped or burned prior to drum reconditioning. The drum reconditioning facility was located at the south end of the mill complex, immediately north of the Centredale Manor north parking lot (Figure 1-3).

Prior to about 1940, the Woonasquatucket River flowed along the east side of the CMRP site, in the location of the former tailrace (LEA, 2002c). After about 1940, the majority of the river flow was diverted to the west side of the site. Between 1939 and 1951, the north end of tailrace was filled and it no longer flowed continuously, although surface water was present throughout the rest of the tailrace. During the 1960s and '70s, the tailrace was vegetated and appeared to receive some surface drainage from the site.

In 1972, a fire destroyed most of the structures on the property. Brook Village was constructed in 1977 and Centredale Manor was constructed in 1982. From 1970 to 1986, RIDEM conducted or supervised several investigations of the source area. RIDEM representatives observed hundreds of drums at the site, some of which were visibly smoking. In 1982, RIDEM directed the disposal of approximately 400 drums and 6,000 cubic yards of contaminated soil, which were removed from the site. Chemicals that were potentially used on site were identified based on drum labels and included caustics, halogenated solvents, PCBs, and inks. Evidence from historical photographs, state report files and geophysical testing suggests that buried waste material still may be present in several areas of the site (results of the geophysical surveys are discussed further in Section 1.4).

Evidence of improper waste disposal activities at the source area is documented in an analysis of historical aerial photographs conducted by the U.S. EPA Office of Research and Development (U.S. EPA, 2000). U.S. EPA analyzed thirteen sets of black-and-white historical aerial photographs taken from 1939 to 2000 to assess landscape morphology, patterns of hazardous waste disposal, and other discernible

activities and conditions of environmental significance at the source area. Results from the study showed evidence of waste disposal activities dating back to 1951, including presence of drums, stained soils, grading scars, evidence of solid and liquid waste materials, mixtures of solid waste and drums, and surface impoundments. These features were concentrated in the central and southern parts of the site. The historical aerial photographs show evidence of drainage leading away from waste disposal areas to the west into the Woonasquatucket River, and to the east towards the tailrace along the eastern boundary of the site.

The most significant waste disposal activities, in terms of volume and spatial extent, were observed from 1962 through 1970. Annotated photographs from 1965 and 1970 are provided as Figures 1-4 and 1-5. Environmentally significant features observed from this time period included possible and probable drums, staining, solid and liquid wastes, mixtures of solid waste, and drums. In particular, an apparent waste disposal area is evident at the southwest edge of the site, in the area now occupied by the Centredale Manor south parking lot and Cap Area #1. The 1970 photo shows an impoundment in the central part of the site, which appears to drain into the tailrace in the area now occupied by the Centredale Manor north parking lot.

By 1979, waste-related activities appeared to cease and sparse vegetation was observed across the previously disturbed areas. Even so, historical photographs from 1981 to 1995 suggest that some waste material may still be present in the source area, as evidenced by possible seepage, moist soil, one area of standing liquid, and several areas of sparse vegetation. The U.S. EPA study (2000) also estimated that by 2000 approximately 86% of the areal extent of wetlands in the vicinity of the site had been lost (i.e., 2.6 hectares) compared to 1951 conditions.

Dioxin was first identified in the Woonasquatucket River in 1996 in fish collected by the U.S. EPA as part of a water quality investigation (U.S. EPA, 1996 and 1998b). Since that time, elevated levels of contaminants including dioxins (primarily 2,3,7,8-tetrachlorodibenzo-*p*-dioxin [TCDD]), furans, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals have been detected in various media including soil, groundwater, sediment, surface water, and biota at the site. In 1999, U.S. EPA constructed two interim soil caps in the source area and fenced contaminated areas to reduce the immediate risk from exposure to contaminated soils at the site. The site was listed on the National Priorities List (NPL) in 2000.

1.4 Previous Investigations and Site Actions

Investigations conducted at the CMRP site prior to the RI are summarized in Table 1-2. This table identifies the types of samples collected at the site and the original use of the data. These studies included the initial investigations to establish and confirm the presence of contamination at the site, and to support TCRA and NTCRA activities. Studies conducted to support the development of long term (remedial) actions in the RI/FS are discussed in Section 2.0. All relevant site data were integrated in the RI to evaluate the nature and extent of contamination.

U.S. EPA conducted a number of investigations at the site, including an initial investigation of the Woonasquatucket River in 1996 and an expanded site inspection in 1998 (U.S. EPA, 1996; Roy F. Weston, 1999a). Additional site investigations were performed between 1999 and 2002 to better define the distribution and concentrations of dioxin and other site-related contaminants in soil at the source area and residential properties adjacent to the site, and sediment in Allendale Pond. Contaminants detected in source area soils include dioxins, furans, PCBs, chlorinated and aromatic VOCs, polycyclic aromatic hydrocarbons (PAHs), and various metals.

Drinking water samples from several locations and indoor air samples from Brook Village and Centredale Manor also were collected. Results from these studies indicated that short-term removal actions were needed to minimize exposure to contaminated soils in some areas, and to prevent erosion and transport of contaminated soils into the Woonasquatucket River. Drinking water, indoor air, and soils in recreational use properties adjacent to the site were found to pose no human health risk.

The indoor air survey targeted areas in the Brook Village and Centredale Manor apartment buildings where VOCs have the greatest potential to migrate from the soil to the indoor air environment, such as floor drains, utility conduits, and elevator shafts, as well as the breathing zone in living areas (the buildings do not have basements). The initial screen used a non-specific organic/inorganic vapor and gas monitor using both flame ionization and photoionization detectors. VOC concentrations did not exceed outdoor ambient levels except at three locations in Centredale Manor and two locations in Brook Village. Air samples were collected from these locations using Summa™ canisters; these samples were analyzed with gas chromatography/mass spectroscopy (GC/MS) following U.S. EPA standard operating procedures (U.S. EPA, 1999a). The GC/MS sample results indicated that VOC migration into the buildings at the points where the samples were collected was insignificant.

Geophysical surveys were conducted in the source area in February and April 1999 to determine whether any buried waste material was present in the source area (Roy F. Weston, 1999b). The initial survey in February 1999, which relied on electromagnetic (EM) survey techniques, identified 44 anomalies. A follow-up survey was undertaken in April 1999 using EM methods and ground-penetrating radar (GPR) to better define the most significant anomalies and complete surveys in areas that had not been covered in the initial investigation.

Thirteen significant undetermined EM anomalies were identified in the April 1999 survey. In some cases, these appeared to be buried cultural features such as subsurface utilities. Anomalies beneath the Brook Village parking lot and Cap Area #2 were interpreted to be stratigraphic features (i.e., paleochannels). The origin of a dipping structure identified underneath the Centredale Manor north parking lot was undetermined; it was interpreted as possibly alluvial or anthropogenic (i.e., fill or construction-related). Anomalies beneath the south end of the Centredale Manor south parking lot were interpreted as having the highest potential for containing buried bulk metallic materials (Figure 1-3). The approximate lateral extent of this area is 80 ft in a north-south direction by 120 ft in an east-west direction.

1.4.1 1999-2000 Time Critical Removal Action

A TCRA was conducted at the CMRP site in 1999 and 2000 to reduce the immediate human health threat to residents on and near the site. Pre-removal and post-removal action maps are provided in Figure 1-6. The major activities conducted under the TCRA included the following:

- Construction of fencing in the source area and in residential areas adjoining Allendale Pond to restrict access to potentially contaminated areas.

- Construction of an interim protective cap (Cap Area #1) in a formerly wooded area immediately south of the Centredale Manor parking lot. This area was prone to flooding and had some of the highest concentrations of dioxin and PCBs in surface soil at the site. Contaminated soils were capped with intermediate cover material (6 inches minimum thickness), a geotextile liner, and approximately 12 inches of final cover material. The uppermost layer consists of 4 inches of loam and a vegetative cover.

- Construction of a second interim cap (Cap Area #2) between the Woonasquatucket River and the Centredale Manor building. This area also was prone to flooding and contained elevated

concentrations of dioxin in surface soils. Contaminated soils were capped with a geotextile fabric liner, 6 inches of sand fill, and 12 inches of common fill. The uppermost layer consists of loam and a vegetative cover. A flood control berm was constructed along the western edge of the cap to reduce erosion (Figure 1-7).

- Placement of riprap along the eastern bank of the Woonasquatucket River from the Brook Village apartments to the south end of Cap Area #1 to isolate contaminated bank soils and reduce erosion (see Figure 1-7).

The rationale for the TCRA is provided in a U.S. EPA Region I Action Memorandum, dated May 4, 1999, as amended September 13, 1999 and June 1, 2000. The purpose of the interim caps is to minimize human exposure to contaminated soils and prevent soil erosion and runoff into the Woonasquatucket River. Evaluation of protectiveness from exposure to those contaminated soils and of the integrity of the interim caps, riprap, and existing pavement at the site will be included in the FS as part of the process of selecting components of the permanent remedy.

1.4.2 2002 Non-Time Critical Removal Action

An Engineering Evaluation/Cost Analysis (EE/CA) was performed in 2000 as the basis for a NTCRA (Tetra Tech NUS Inc. [TTNUS], 2000a). The EE/CA included a streamlined human health risk assessment and screening ecological risk assessment (ERA). The streamlined human health risk assessment identified potential risks to residents and recreational users of the pond banks along the Allendale and Lyman Mill Ponds from exposure to site-related chemicals. Dioxin (2,3,7,8-TCDD) was identified as the primary risk driver, and an action level of 1,000 nanograms per kilogram (ng/kg; equivalent to 1 microgram per kilogram [µg/kg] or 1 part per billion [ppb]) dioxin as a toxic equivalency quotient (TEQ) was selected as the action level for the NTCRA based on the U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-26 (*Approaches for Addressing Dioxins in Soil at CERCLA and RCRA Sites*, April 13, 1998). This action level represents the recommended starting point for soil cleanups based on a residential exposure scenario.

The objectives of the NTCRA were to (1) mitigate an unacceptable human health risk from soil contaminated with dioxin and other co-located chemicals on residential and recreational use properties on the Woonasquatucket River floodplain between Route 44 and the Lyman Mill Dam, and (2) minimize further downstream migration of contaminated river sediment from Allendale Pond. The NTCRA included the following elements:

- Reconstruction of the Allendale Dam and restoration of Allendale Pond to prevent further downstream migration of sediment-bound contaminants. This action was largely implemented in early 2002. Waste materials and timber cribbing from the former Allendale Dam were shipped to Canada and incinerated. The restored dam is shown in Figure 1-8.

- Delineation and excavation of contaminated floodplain soils in eleven action areas on residential properties and recreational access points along Allendale and Lyman Mill Ponds to minimize exposure to site-related contaminants. Approximately 100 cubic yards of soil were excavated and transported offsite for disposal. No post-excavation sampling was conducted. Restoration of the remediated areas was implemented in 2003 by replacing topsoil and reestablishing the vegetative cover. NTCRA excavation areas are shown in Figures 1-9 and 1-10.

Details regarding the NTCRA are contained in an Action Memorandum dated January 18, 2001 (U.S. EPA, 2001c) and the Completion of Work Report (LEA, 2005).

1.4.3 2003-2004 TCRA

Another TCRA was performed in 2003-2004 to minimize potential erosion and downstream transport of contaminated soils and sediments in the former tailrace on the east side of the source area (Figure 1-2). The TCRA activities included soil grading within the tailrace, construction of a permeable protective cap over contaminated soils and sediments, installation of a precast modular stormwater control structure at the terminus of a storm drain at the north end of the tailrace, and construction of a drainage swale along the length of the capped area (LEA, 2003). Some tailrace soils were excavated and placed under the protective cap. The majority of the tailrace is capped with a cellular confinement system consisting from the bottom up of approximately 6 inches of sand, a geotextile fabric, and a 6-inch-thick cellular confinement system filled with and covered by 1.5-inch aggregate material. A soil cap consisting of geotextile fabric covered by 20 inches of bank run gravel and 4 inches of loam was constructed at the north end of the tailrace. The TCRA did not include collection and analysis of soil samples. Details regarding the TCRA are provided in a Completion of Work Report (LEA, 2004).

2.0 REMEDIAL INVESTIGATION ACTIVITIES

This section describes activities conducted to support the RI of the CMRP site. Data have been collected to characterize the nature and extent of contamination in soil, groundwater, sediment, and surface water at the site; better understand contaminant fate and transport processes; and support the BHHRA and BERA. Results from these data collection activities were used in conjunction with previously-collected data to complete the RI. Table 2-1 summarizes RI-related investigations. All soil, groundwater, sediment, and surface water samples that were used to characterize the nature and extent of contamination in the RI are considered in Section 4.0. The majority of the data from these studies were validated prior to inclusion in the project database. Sample location maps for each medium showing combined sample locations from all studies are provided in Section 4.0. RI sample collection and data analysis activities are described further below.

2.1 U.S. Geological Survey Vapor-to-Water Diffusion Survey

In the fall of 1999, the U.S. Geological Survey (USGS) conducted a study to characterize the discharge of VOC-contaminated groundwater from the source area to the Woonasquatucket River, former tailrace, and cross-channel at the south end of the source area using more than 100 water-to-vapor diffusion samplers (USGS, 2000a). The samplers consisted of 40-mL, uncapped glass bottles secured inside two poly-ethylene bags with cable ties. Samplers were manually placed 6 to 10 inches deep in channel sediments with the bottle opening facing downward. Organic vapors from VOCs in the water or saturated sediments diffused into the bottle through the polyethylene. The samplers were deployed for two weeks, which was sufficient time for VOCs inside and outside of the bags to equilibrate. Upon retrieval, the outer bag of each sampler was removed and the cap was immediately screwed onto the bottle over the inner bag. Vapor samples were analyzed onsite for VOCs. Target compounds were benzene, chlorobenzene, ethyl-benzene, tetrachloroethylene (PCE), trichloroethylene (TCE), toluene, and xylenes. Sample results were used to provide information about potential discharge areas of contaminated groundwater. Study results are summarized in Section 4.3.

2.2 1999-2000 Woonasquatucket River Investigations

A sampling and analysis program was conducted in the Woonasquatucket River in 1999 and 2000 to determine the nature and extent of contaminants on residential use properties adjacent to the river, and in river sediment and water. Details of the Woonasquatucket River investigations are provided in the *Technical Memorandum, Woonasquatucket River Sediment Investigation* (TTNUS, 2000b) and *Manton and Dyerville Reaches Sediment Sampling* (TTNUS, 2001) and are summarized below. Results of these studies are incorporated into Section 4.0.

2.2.1 1999 Woonasquatucket River Investigation

Residential soil, sediment (bank and river), and surface water samples were collected between Route 44 and Lyman Mill Dam from October through December 1999 (TTNUS, 2000b). A total of 62 residential lots abutting the Woonasquatucket River were sampled within the 100-year floodplain. Generally, at each lot, three surface (0-1 ft) soil samples were collected along a line perpendicular to the pond or river with the first sample collected nearest the water, and the remaining two samples were collected along the line and generally upgradient in the direction of the residential property. All samples were analyzed for dioxins/furans and HCX. One sample from each lot, located closest to the water body, also was analyzed for PCBs, pesticides, SVOCs, and metals.

Bank sediment samples were collected at eight stations, with three samples at each station. Two of the stations were located upstream of the Route 44 bridge, and the remaining six stations were located

downstream of the source area south to Lyman Mill Dam. Surface (0-0.5 ft) sediment samples were analyzed for dioxin/furans, HCX, PCBs, pesticides, and SVOCs.

River sediment samples were collected from 50 stations located in depositional areas along the study area. At each of these stations, surface (0-0.5 ft) sediment was collected and analyzed for dioxins/furans, HCX, PCBs, pesticides, SVOCs, metals, acid volatile sulfides and simultaneously extracted metals (AVS/SEM), total organic carbon (TOC), and grain size distribution. Subsurface sediment samples (0.5-2 ft and 2-4 ft depth intervals) were collected from 15 of the 50 stations and analyzed for dioxin/furans, HCX, PCBs, pesticides, SVOCs and metals.

Surface water samples were collected at 36 of the 50 sediment stations and analyzed for dioxin/furans, HCX, PCBs, pesticides, SVOCs, and metals (total and dissolved). Ancillary measurements including pH, specific conductivity, temperature, turbidity, and dissolved oxygen was recorded on field data sheets at the time of water collection.

2.2.2 2000 Woonasquatucket River Investigation

A second investigation of the Woonasquatucket River was conducted in September 2000 to determine if depositional sediments located downstream of Lyman Mill Dam were impacted by contaminant releases from the site (TTNUS, 2001). Surface (0-0.5 ft) sediment samples were collected from the Manton and Dyerville reaches, and from a reference area (Assapumpset Pond and Assapumpset Brook). A total of 15 sediments were collected and analyzed for dioxins/furans, HCX, PCBs, pesticides, SVOCs, metals, AVS/SEM, TOC, and grain-size distribution.

2.3 Source Area Investigation

A sampling and analysis program was conducted in the source area in 2001 to determine the nature and extent of soil and groundwater contamination, and characterize the hydrogeologic setting and groundwater flow directions and velocities (TTNUS, 2002). Field investigation activities included surface geophysical surveys, soil and bedrock borings and monitoring well installations (including soil sampling and borehole geophysics), water level monitoring, groundwater sampling and analysis, and hydraulic conductivity testing. Details of the source area investigation methods are provided in the *Technical Memorandum, Source Area Investigation* (TTNUS, 2002) and are summarized below.

2.3.1 Geophysical Surveys

Surface geophysical surveys used GPR, 2-D resistivity imaging, and seismic refraction. Data from these surveys were used to characterize overburden materials (i.e., unconsolidated materials present above the bedrock), estimate the thickness of fill material and depth to bedrock, and determine the bedrock surface topography. Results were used to characterize the geology of the site (Section 3.5).

2.3.2 Subsurface Data Collection Activities

Subsurface data collection activities included installation of piezometers and surface water gauges, advancement of soil borings and collection of soil samples, installation of monitoring wells and collection of groundwater samples, and borehole geophysics.

Twenty-one 1-inch-diameter piezometers were screened over a length of 5 ft in the shallow water table to provide groundwater table elevation measurements (Figure 2-1). Staff gauges were installed at three surface water locations, and the USGS Woonasquatucket River gauging station near the Route 44 bridge also was used. Recording electronic transducers were installed at selected piezometer and staff gauge

locations to monitor groundwater and surface water elevation changes at the site. Two long-term monitoring programs included one high water table event and one low water table event. Water level monitoring results are presented in Section 3.6.1.

Two soil borings and 26 monitoring wells were installed during the source area investigation. Seven monitoring wells had been previously installed at the site in the Brook Village parking lot as part of an underground storage tank (UST) removal project (Goldman Environmental Consultants [GEC], 1999). A summary of monitoring wells installed by GEC and TTNUS is provided in Table 2-2, and all well locations are shown in Figure 2-1.

Soil samples collected from subsurface borings were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and dioxins (Appendix B). Soil sampling results were integrated with other data sets and are summarized in Section 4.2.1. Continuous soil samples were collected from each boring and screened for total VOCs using the jar headspace method. Screening results were used in conjunction with soil characteristics and, if observed, evidence of potential contamination (e.g., staining) to identify the saturated zone with the greatest likelihood of contamination; wells were screened across these intervals.

Soil borings were advanced and monitoring wells were installed throughout the source area and around the perimeter of the site to determine the thickness of fill and evaluate the nature and extent of contamination. Five borings were advanced along the centerline of the tailrace, and three of these were converted to shallow monitoring wells (MW-01S, MW-02S, and MW-03S) (Figure 2-1). Four soil borings were advanced in the source area adjacent to suspected contaminant sources based on historical aerial photographs (U.S. EPA, 2000) and geophysical survey results (Roy F. Weston, 1999b). These were completed as monitoring wells MW-06S, MW-07S, MW-08S, and MW-09S.

Monitoring well clusters were installed around the perimeter of the source area, and downgradient of suspected hotspot or discharge areas. Well identification numbers (IDs) with an "S" designation were screened in the shallow portion of the aquifer. Wells IDs with a "D" designation were screened in deep overburden materials, and well IDs with a "B" designation were completed as open holes in bedrock. These well clusters provided information on the depth to bedrock, vertical and horizontal groundwater gradients, and groundwater quality. Borehole geophysical surveys were conducted within bedrock in each well cluster to determine the orientation of linear features in the bedrock, identify zones that produced water under static and stressed conditions, and measure the natural gamma radiation.

Four well clusters were installed around the perimeter of the site (MW-10, MW-11, MW-12, and MW-13), with two or three wells in each cluster (Figure 2-1). Soil samples for chemical analysis were not collected from these borings. Five well clusters (MW-04, MW-05, MW-02, MW-14, and MW-15) were installed downgradient of suspected hot spots or discharge areas within the source area (Figure 2-1). The rationale for the location of each well or well cluster is summarized in Table 2-2.

2.3.3 Groundwater Sample Collection

Two groundwater sampling events were conducted as part of the source area investigation. Groundwater samples were collected using low-flow sampling methods, and were analyzed for VOCs, SVOCs, pesticides, PCBs, metals (total and dissolved), dioxins, alkalinity, sulfides, and TOC. The first round of groundwater sampling was conducted in the spring of 2001 after installation of the shallow monitoring wells in the tailrace and source area (seven new wells). The existing wells installed by GEC in the Brook Village parking lot also were sampled. The second round of groundwater sampling was conducted in the summer of 2001 after all drilling activities were completed. All 33 monitoring wells were sampled in this event, including the seven GEC wells. Groundwater sample results are described in Section 4.3.

2.3.4 Hydraulic Conductivity Tests

Hydraulic conductivity tests were performed at each overburden monitoring well to evaluate groundwater flow conditions. The data were used to estimate groundwater velocities for each stratigraphic unit identified at the site. Constant discharge tests were performed by pumping at a given rate and measuring drawdown in the well until steady-state conditions were achieved, or for a maximum of 15 minutes. Slug tests were performed in wells that were screened in soils with lower hydraulic conductivity. Slug tests were conducted by adding or withdrawing a solid slug from the well, resulting in a near-instantaneous change in water level. The rate of recovery of the water level to static conditions was measured. Hydraulic conductivity in bedrock was estimated based on Packer tests. Hydraulic conductivity results are discussed in Section 3.6.1.

2.4 Interim Data Collection

An interim data collection study was conducted in the fall of 2002 to address data gaps identified in *Summary of Data Needs for the Centredale Manor Restoration Project Superfund Site RI/FS* (Battelle, 2002c).

Surface and subsurface soil samples were collected from the tailrace on the east side of the source area to better define the distribution and extent of dioxin contamination, and screen for the presence of other site-related contaminants. Nine soil borings were advanced to a depth of 9 ft in the tailrace. Surface and subsurface soil samples were analyzed for dioxin and HCX, and two samples analyzed for SVOCs, pesticides, PCBs, and metals, grain size, and TOC. Geologic descriptions of the soil borings were used to characterize fill material, infer the depositional history in the tailrace, and explain the distribution of dioxin.

Surface soil samples also were collected from the John E. Fogarty Center property on the southeast shore of Lyman Mill Pond to evaluate potential human health risks to site users. Samples were analyzed for conventional parameters (grain size and TOC) and chemicals of potential concern including dioxin/furans, HCX, metals, SVOCs, chlorinated pesticides, and PCBs. Soil sample results were analyzed in the BHHRA (MACTEC, 2004b).

Groundwater samples were collected from the 33 existing monitoring wells to evaluate temporal trends in contaminant concentrations. All groundwater samples were analyzed for VOCs, and groundwater samples from one well (MW-05S) were analyzed for dioxin. Water level measurements were collected from all wells and piezometers to confirm groundwater flow information collected in the source area investigation (TTNUS, 2002).

Additional information regarding the interim data collection is provided in Battelle (2003a). An evaluation of the sample data for tailrace soils and groundwater is provided in Sections 4.2 and 4.3.

2.5 2002-2004 Sediment Investigations

In 2002-2004, several sediment-related studies were conducted in the Allendale and Lyman Mill reaches of the Woonasquatucket River to address *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (U.S. EPA, 2002). This guidance document presents eleven risk management principles that should be considered when investigating and managing contaminated sediment sites. The sediment investigations are described below.

2.5.1 Geomorphology Investigation

In 2002, the USACE Engineer Research and Development Center (ERDC) conducted a geomorphology investigation of the Woonasquatucket River located in Rhode Island (USACE/ERDC, 2004). This study evaluated historic aerial photographs, USGS topographic quadrangles, published documents, and field investigation results to identify morphological features (e.g., floodplains, terraces, abandoned channels) and changes along the Woonasquatucket River over time. Geomorphic data were used to identify features and areas where sediment contamination is likely to accumulate. This information was used in conjunction with geophysical data collected in 2002 (Section 2.5.2) to target areas for sediment coring in May 2003 (Section 2.5.3). The results of the geomorphology investigation are summarized in Section 3.1.

2.5.2 Geophysical Investigation

The U.S. EPA Environmental Response Team Center (ERTC) performed a geophysical investigation of the Allendale and Lyman Mill ponds in the fall of 2002 (Lockheed Martin, 2003). The purpose of the study was to map water depth and soft sediment thickness in both of the ponds. Waterborne geophysical surveys were performed from a low-draft, pontoon-type boat. Two geophysical methods were attempted: GPR imaging and acoustic sub-bottom profiling. The sub-bottom profiling was unsuccessful due to heavy vegetation and gas bubbles on the pond bottoms, and was abandoned. GPR was used to map soft sediment thickness in both of the ponds. Soft sediments were also manually probed to verify GPR data. Water depth data also were collected and verified using manual measurements.

Maps of water depth and apparent soft sediment thickness were prepared and incorporated into the Geographic Information System (GIS) for the site. These maps are presented in Section 3.0. Geophysical cross-sections of the sediments in the ponds were prepared from the GPR data. These are referred to as "pseudosections" because they do not represent sub-bottom conditions directly, although they can be used to infer stratigraphic features. Results from the geophysical investigation were used in conjunction with the results of the geomorphology study to target depositional areas for the May 2003 sediment coring study (Section 2.5.3). The results of the geophysical survey are presented as part of the sediment and surface water description in Section 3.7.

2.5.3 2003 Sediment Characterization Study

A sediment characterization study was performed jointly by U.S. EPA/ERTC and USACE/ERDC during the spring of 2003 (Lockheed Martin, 2002). U.S. EPA/ERTC collected 20 sediment cores from Allendale Pond and 10 cores from Lyman Mill Pond (six cores also were collected by hand from the forested wetland southwest of Allendale Dam). Cores were collected using vibracore methods to a depth of at least 4 ft, unless refusal was encountered at a shallower depth. USACE/ERDC personnel visually examined the cores, documented sediment lithology, and collected subsamples for laboratory analysis. Samples from various depth intervals were collected for radiometric age dating, dioxin, TOC, and geotechnical analyses (water content, specific gravity, Atterberg limits, grain-size distribution, moisture content, ash content, and organic content). One half of each sediment core was used to obtain dioxin, TOC, and age-dating samples, and the other half of each core was used to obtain samples for geotechnical analysis.

Radiometric age dating (i.e., ^{210}Pb and ^{137}Cs) was performed using surface and subsurface samples from nine Allendale Pond cores and three Lyman Mill Pond cores. Sediment accumulation rates were estimated using the age-dating results. Samples for dioxin analysis were selected based on sediment lithology and estimated age based on radiometric dating results. Dioxin analysis was conducted on surface and subsurface samples from ten Allendale Pond cores and four Lyman Mill Pond cores. In addition, surface and subsurface samples from 20 cores from Allendale Pond and 10 cores from Lyman Mill Pond were

also analyzed for TOC. Geotechnical parameters were measured in samples from 18 Allendale Pond cores and 10 Lyman Mill Pond cores.

Sediment characterization data were used to:

- Identify the sediment depth associated with the onset of waste-related activities at the site through visual inspection of sediment cores and radiometric age dating.
- Identify any relationships between sediment depth, age, and dioxin concentration.
- Estimate the rate of sediment accumulation in depositional areas and assess the degree to which natural recovery (i.e., burial) appears to be occurring.

In addition, selected samples from Lyman Mill Pond were analyzed for total petroleum hydrocarbon (TPH) content, alkanes, isoprenoids, PAHs, and biomarkers to characterize the nature and possible origin of petroleum hydrocarbons observed in a gelatinous, organic silt layer in Lyman Mill Pond (Battelle, 2003c). Results from the 2003 sediment investigation are presented in Sections 3.7 and 4.4.

2.5.4 Sediment Stability Evaluation

A sediment stability evaluation was performed at the CMRP site to assess the impacts of sediment erosion, transport, and deposition processes on surficial sediment bed and water column concentrations of dioxin within the Allendale and Lyman Mill reaches of the Woonasquatucket River (Quantitative Environmental Analysis [QEA], 2004a). The sediment stability evaluation considered both the hydrodynamic forces that induce sediment resuspension and the properties of the sediment bed that influence erosion rates. The sediment stability study specifically addressed the following questions:

- What is the impact of floods of various magnitudes on surficial dioxin TEQ concentrations in Allendale and Lyman Mill Ponds?
  - Where is scour likely to occur within the ponds?
  - What scour depth will be caused by floods of various magnitudes?
- What effect will different remedial alternatives have on mitigating the impacts of a rare (i.e., 100-year) flood?

A two-phased approach was used to address these questions as described in the *Final Sediment Stability Work Plan* (QEA, 2004b). In Phase I, site data were compiled, analyzed and synthesized to develop an overall understanding of sediment transport in the study area. The results of the data synthesis task were used to develop a CSM for sediment transport. A CSM is an important component of a sediment stability analysis because consistency must be maintained between the CSM and the results of quantitative and qualitative sediment stability analyses. The sediment transport CSM is a qualitative description of the processes (e.g., deposition and erosion) and system characteristics (e.g., upstream and tributary sediment loads, spatial distribution of bed properties) that control sediment dynamics within the study area.

In Phase II, a hydrodynamic model, Environmental Fluid Dynamics Code (EFDC), was developed and applied. The hydrodynamic model was used to evaluate the potential impacts of a range of floods on bed stability. Impacts of floods with 5-, 10-, 25-, 50- and 100-year return periods were investigated. For each flood simulation, two methods were used to analyze the potential impacts on bed stability: (1) comparison of bottom shear stress and current velocity to critical values for those parameters; and (2) estimation of scour depth. Results of the sediment stability analysis are provided in the *Final Technical Memorandum,*

Sediment Stability Study (QEA, 2004a) and are summarized in Section 5.0 of this report. Additional data collection activities are planned to refine the sediment transport CSM and reduce uncertainties; revised results will be incorporated into the FS.

2.6 Baseline Ecological Risk Assessment

A BERA was conducted to assess current and potential future risk to ecological receptors at the CMRP site. The BERA was conducted in accordance with the U.S. EPA *Ecological Risk Assessment Guidance for Superfund, Process Document for Designing and Conducting Ecological Risk Assessments* (U.S. EPA, 1997b), as well as U.S. EPA Region I risk assessment guidance contained in Risk Updates (U.S. EPA, 1994, 1995, 1999b). The detailed scope, methods, and results for the BERA are provided in the *Interim Final Baseline Ecological Risk Assessment* (MACTEC, 2004a).

Data collected from several site investigations were used in the BERA. In 2001, soil, surface water, sediment, and biota samples were collected from areas along the Woonasquatucket River. Specifically, samples were collected from the source area, four reaches of the river downstream of the site (i.e., Allendale, Lyman Mill, Manton, and Dyerville), at an upstream background area (Greystone Mill Pond) and at a reference area (Assapumpset Brook and Pond, a tributary that flows into the river). Biota samples (i.e., fish, crayfish, emerging insects, and earthworms) were analyzed for dioxins/furans, HCX, PCBs, pesticides, metals and lipid content; fish were also analyzed for SVOCs. Aquatic sediment and floodplain soil samples were analyzed for conventional parameters (grain size, TOC) and contaminants of potential concern (COPCs) including dioxins/furans, HCX, PCBs, pesticides, metals and SVOCs; sediments also were analyzed for AVS/SEM. Surface water samples were analyzed for PCBs, pesticides, SVOCs, VOCs, metals (dissolved and total), hardness, biological oxygen demand (BOD), and nutrients.

Data from other site investigations used to support the BERA included tree swallow studies conducted by the USGS annually from 2000 to 2003. Samples of tree swallow nestling, egg and diet tissue were analyzed for dioxins/furans. Tree swallow samples from 2000 and 2001 were analyzed for PCB congeners and lipid content, and selected tree swallow samples from 2001 were also analyzed for PCB Aroclors, pesticides and metals. USACE conducted an early life stage (ELS) test in 2001, which included collection of fish from Allendale and Lyman Mill ponds and analysis of samples for dioxins/furans, HCX, PCB congeners, and lipid content. Results from the ELS test are presented in Appendix H of the BERA (MACTEC, 2004a). Additionally, floodplain soil, sediment, and groundwater data collected by TTNUS (Sections 2.2 and 2.3) were also used in the BERA.

Data from site investigations were used in the BERA to:

- Evaluate risk to wildlife receptors associated with the consumption of contaminated prey, drinking water, and incidental ingestion of surface soil and sediment at the site; and,

- Evaluate risk to other ecological receptors associated with direct contact with and ingestion of surface water, sediment, and floodplain soil present in the portion of the Woonasquatucket River that constitutes the site.

Contaminants that are present in the surface water and aquatic sediment may have bioaccumulated in fish and other biota present in the Woonasquatucket River. Aquatic receptors (including invertebrates and both demersal and pelagic fish species) are exposed to COPCs in sediment and surface water via direct contact, direct ingestion, or by consuming prey items that have bioaccumulated contaminants. Semi-aquatic receptors (including mammals, birds, reptiles, and amphibians) may be exposed as a result of incidental ingestion of sediment, consumption of water, or ingestion of contaminated prey. Terrestrial

invertebrates and wildlife that prey on these species may be exposed to contaminants in floodplain soil directly or by ingesting contaminated prey.

The overall objective of the BERA is to analyze potential adverse ecological effects for both current and future conditions caused by hazardous substance releases from the site in the absence of any actions to control or mitigate these releases. The BERA was conducted when the Allendale Dam was breached and floodplain soils were exposed in the pond. General types of adverse ecological effects include mortality, growth or reproductive effects, or indirect effects associated with a substantial reduction in abundance of prey populations.

Results from field population and community studies were evaluated to assess potential population level effects (e.g., survival, growth, or reproduction) or community-level effects (e.g., species richness and abundance) associated with exposure to site media. The six assessment endpoint receptor groups selected for the BERA are as follows:

- Aquatic and floodplain invertebrates (crayfish, earthworms);
- Demersal and omnivorous fish;
- Pelagic, piscivorous, or semi-piscivorous fish;
- Piscivorous mammals and birds;
- Insectivorous mammals and birds; and
- Omnivorous mammals and birds.

Acceptable risks to wildlife and other ecological receptors will be achieved and/or maintained through risk management procedures that may include development of preliminary remediation goals (PRGs) for sediment and other media as appropriate. Results and conclusions from the BERA are presented in Section 6.1.

2.7 Baseline Human Health Risk Assessment

A BHHRA was conducted to assess current and potential future risk to human health from exposure to contamination from the CMRP site. The BHHRA was conducted in accordance with the U.S. EPA *Risk Assessment Guidance for Superfund (RAGS) Parts A, D, and E* (U.S. EPA, 1989, 2001a, and 2001b), as well as U.S. EPA Region I risk assessment guidance contained in Risk Updates (U.S. EPA, 1994, 1995, 1999b). The detailed scope, methods and results for the BHHRA are provided in the *Interim Final Baseline Human Health Risk Assessment* (MACTEC, 2004b).

Data collected from several site investigations were used in the BHHRA. Soil, surface water, sediment and fish data collected in the 2001 field investigation (Section 2.6), and floodplain soil and sediment data collected by TTNUS (Section 2.2) were used to support the BHHRA.

The overall goals of the BHHRA were to:

- Evaluate the current and potential future risk to human health associated with the consumption of fish present in the portion of the Woonasquatucket River that constitutes the site; and,

- Evaluate current and potential future risk to human health associated with human contact with surface water, sediment, and bank soil present in the portion of the Woonasquatucket River that constitutes the site.

Contaminants that are present in surface water and aquatic sediments may have bioaccumulated in fish and other biota present in the Woonasquatucket River. These fish may be consumed by individuals that catch and/or consume biota from the river. Both neighborhood residents and visitors to the site could contact surface water, sediment, and bank soils during angling activities or other recreational activities (e.g., swimming) at or adjacent to the river. Risk to residents and visitors was evaluated at the four reaches of the river downstream of the site (i.e., Allendale, Lyman Mill, Manton, and Dyerville), the Fogarty Center (located on eastern shore of Lyman Mill Pond), and at an upstream background area (Greystone Mill Pond) and at a reference area (Assapumpset Brook and Pond).

The objective of the BHHRA was to analyze potential adverse human health effects for both current and future conditions caused by hazardous substance releases from the site in the absence of any actions to control or mitigate these releases (i.e., assuming no action or the absence of the RIDOH health advisories on fish consumption for this particular site). Anecdotal information provided to the U.S. EPA suggests that the fish consumption advisory issued by the State of Rhode Island is not preventing exposure to biota from the Woonasquatucket River in the short-term, although no site-specific data have been collected to verify the effectiveness of the advisory. Current and potential future exposure to fish and other biota (including high lipid content biota such as eels) may occur at the river. U.S. EPA's goal is the return of a fishable and swimmable condition to the Woonasquatucket River and associated reaches and impoundments.

Acceptable risks associated with biota consumption and contact with bank soil, surface water and sediment will be achieved and/or maintained through risk management procedures that may include development of PRGs for sediment and other media as appropriate. Results and conclusions from the BHHRA are presented in Section 6.2.

2.8 2004 Oxbow Area Study

Floodplain sediment samples were collected in June 2004 from the forested wetland (i.e., oxbow area) located southwest of Allendale Dam to investigate the nature and extent of site-related contamination. Sample locations excluded areas of artificial fill or gravel, and targeted topographically low areas. Three surface sediment samples were collected within the abandoned channel within the oxbow area. Two surface sediment samples were collected north of the channel, and two were collected south of the channel. All samples were analyzed for dioxins/furans. Samples from three of the stations were also analyzed for PCBs, pesticides, metals, and TOC. Sample results are presented in Section 4.4.

2.9 Environmental Forensics Review

An environmental forensics review of soil and sediment chemistry data from the source area and the Woonasquatucket River was conducted to compare the chemical composition of chlorinated organic compounds (dioxins, PCBs, and chlorinated pesticides) in source area soil; sediments adjacent to and downstream from the CMRP site; and sediments from upstream (i.e., background) and reference locations. The purpose of the forensics review was to differentiate if possible chemical contaminant signatures from the CMRP site from those in background or reference samples. The results were used to help define the nature and extent of site-related contamination. Results are summarized in Section 4.4, and provided as a letter report in Appendix E.

2.10 Community Relations

A variety of mechanisms have been used to keep the public informed about activities at the site, and to solicit input from the public and stakeholders on critical issues. These mechanisms include public meetings, open houses, dissemination of numerous site updates and fact sheets (more than ten since 1999),

press releases, and individual contact with residents near the site on an as-needed basis. Updated site information is made available to the public on the U.S. EPA Superfund Web site (http://www.epa.gov/ne/superfund/sites/centredale). These mechanisms appear to be effective.

The "Do's and Don'ts of the Woonasquatucket River" that address swimming, playing, fishing and other activities were developed as a fact sheet that was widely disseminated. The "Do's and Don'ts" also were developed as curriculum that was presented in North Providence-area schools. Advisory signs summarizing the "Do's and Don'ts" pictorially and in multiple languages have been posted along the river in readily accessible locations.

A Management Action Committee (MAC) has met monthly since 2000 to discuss project-specific issues and progress. The MAC meetings include representatives from local, state and federal agencies, community leaders, and community-based environmental groups. For example, the community provided input through the MAC regarding the TCRA of soils and sediments in the tailrace on the east side of the site, and U.S. EPA responded to community input by minimizing the loss of trees and using a geotextile membrane to reduce the spread of phragmites in the newly-constructed drainage channel.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

Physical characteristics of the CMRP site and surrounding region are described in this section.

3.1 Geomorphology

The area of the site from the Route 44 bridge downstream to the Lyman Mill Dam was studied by USACE/ERDC to identify geomorphic features and changes along the Woonasquatucket River over time. The results of the geomorphic assessment were used to identify existing and historic features where contamination from the site is likely to accumulate, and to contribute to the overall understanding of contaminant fate and transport. Details of the methods and results of the geomorphic study are provided in *Geomorphic Assessment of the Woonasquatucket River, RI* (USACE/ERDC, 2004). A description of the geomorphology of the site based on this report is provided in following paragraphs.

The Woonasquatucket River was once typical of most New England rivers: narrow, slightly sinuous, and fast flowing. The man-made alterations of the river channel from the construction of mill dams in the 1800s greatly influenced the river morphology and sedimentation regime. Surficial deposits in the area of the Woonasquatucket River watershed are predominantly of glacial origin and can be classified broadly as glacial till or stratified drift (Figure 3-1) (Krinsley, 1949; Smith, 1956). At higher altitudes, glacial till is exposed as ground moraine. In low-lying areas, stratified drift dominates the morphologic features. According to Smith (1956), the stratified drift consists of glacial outwash plains and other ice-contact features. The remainder of the surficial deposits along the Woonasquatucket River is alluvium deposited when the river overtops its banks. The alluvium, mapped as floodplain or alluvial deposits, is reworked glacial outwash and river terrace. The bedrock underlying the surficial deposits consists of Pennsylvanian sandstone, shale, and conglomerate of the Narragansett Basin and older igneous and metamorphic rocks surrounding the basin (Smith, 1956).

The Woonasquatucket River is entrenched in a valley train, a glacial feature described by Smith (1956) as a graded outwash that was deposited by glacial streams, which fills a valley bottom from wall to wall. The valley train is derived primarily from crystalline rock and, because the rock has been transported a considerable distance, consists of well-rounded grains. The outwash plain extends the length of the Woonasquatucket River.

Major changes in the Woonasquatucket River channel from 1951 through 2000 as shown by aerial photography are shown in Figure 3-2. These outlines show that the river channel is well confined by the valley train, with no significant lateral migration. The orange arrows show the abandonment of a river channel immediately south of the Allendale Dam between 1970 and 1976. This abandoned meander is described further later in this section.

Geomorphic features along the Woonasquatucket River are shown in Figure 3-3. The features are typical of those found in riverine and glacial systems. The valley train limits the movement of Allendale Pond to the west; as a result, the position of the west bank of the Woonasquatucket River has changed very little over time. The east bank of the river in this area was developed as a residential area between 1888 and 1935. The former Allendale Mill is situated on the river terrace, an ideal setting for the building because of the elevated topography. Because the river terrace along the east bank of the Woonasquatucket River is a former floodplain, it is classified as a depositional feature. The Centredale Manor and Brook Village Apartments are constructed on artificial fill on the floodplain of the river. Floodplain deposition occurs when sediment is transported over the riverbanks during periods of high flow.

The Allendale reach has undergone significant changes because of the breaching of Allendale Dam in 1991 and 2001. The breach may have contributed to the transport of contaminated sediment downstream

of the dam and also altered geomorphic features along the river. As the water level in the pond subsided, more sediment was exposed along the eastern shore of the river, bordering a residential area. Figure 3-4 shows the configuration of Allendale Pond in 1987 (before the dam breach) and 2000 (after the dam breach). The river assumed the characteristics of a braided channel in response to the dam breach. In early 2002, Allendale Dam was reconstructed in order to restore Allendale Pond to its pre-1991 elevation and minimize the potential for transport of contaminated sediments downstream of the dam.

Anthropogenic influences are evident in the river channel immediately below the Allendale Dam. The river channel has been straightened at the point where water from the former Allendale Mill entered the river immediately below the Allendale Dam (Figure 3-3). Dredged material from the channelization was used to build a levee covered with cobbles from the river channel. Floodplain deposits were observed to the west of this ridge in a forested wetland (i.e., oxbow area) during a field reconnaissance in 2003. These deposits indicate that overbank river flow has occurred in this area.

Historical aerial photography and field mapping revealed an abandoned channel in the forested wetland southwest of Allendale Dam (mapped as floodplain deposits in Figure 3-3; this also is referred to as the oxbow area). Abandoned channels are segments of a channel abandoned by the river when it shortens its course. This abandoned meander appears to be the response of the river to the man-made cut-off where the river was straightened. The area within the meander contains fine-grained sediment deposited as the river adjusted to its new path and the meander cut-off was filled. Analysis of historic topographic maps and field mapping revealed evidence of three previous channels near this meander, reflecting channel migration. During flooding, overbank deposits still may be introduced into the abandoned channel. The most recent meander loop is still in communication with the river during times of high water (as evident in the 1995 aerial photography).

Lyman Mill Pond is bordered by valley train on the west bank and by river terrace deposits on the right bank (Figure 3-3). The former Lymansville Mill also is located on a river terrace. Below the Lyman Mill Dam, the river was diverted almost due east to accommodate the Lymansville Mill. The original path of the river prior to mill construction is difficult to trace, although two abandoned channels can be seen on aerial photography in addition to the current river channel.

3.2 Soils

Soils at and near the CMRP site reflect post-glacial development. The Soil Survey of Rhode Island (U.S. Department of Agriculture, 1977), published prior to the construction of Brook Village and Centredale Manor and updated in 1996, was used to assess the soil type and conditions surrounding the sites. Soil types were characterized as part of the geomorphic investigation (USACE/ERDC, 2004) and are summarized below.

Soil types in the Allendale reach of the river are shown in Figure 3-5. Soils on both sides of the Woonasquatucket River in this area are primarily classified as Canton-Urban soil complex. These soils are well drained and composed of fine sandy loam; urban areas are covered by pavement and buildings. The west bank of Allendale Pond is identified as the Udorthents-Urban soil complex, which is moderately to excessively drained and disturbed by cutting or filling. An area of Hinckley gravelly sandy loam lies to the east of the source area. This soil is excessively drained and found on terraces and outwash plains. The Podunk soil is present to the southwest of Allendale Dam, in a forested wetland area. This series consists of moderately well-drained fine sandy loam soils that formed in recent alluvium on floodplains.

A variety of soil types characterize the Lyman Mill reach of the river (Figure 3-6). Adrian muck is found at the north end of the reach, in the southern part of the forested wetland (i.e., oxbow area). This soil is very poorly drained and forms in depressions and drainage channels in an outwash plain. It is composed

of black muck at the surface and fine sand in the subsurface. The west side of the river is covered primarily by Hinckley gravelly sandy loam. Udorthents-Urban soils and sand and gravel pits also are found on the west side of the river. A narrow band of Sudbury sandy loam occurs on the west bank of the south end of Lyman Mill Pond. This soil is moderately drained and forms in depressions in terraces and outwash plains. The eastern side of Lyman Mill Pond is covered by Canton-Urban and Merrimac sandy loam soils. The Merrimac sandy loam is somewhat excessively drained and forms on terraces and outwash plains.

3.3 Meteorology

According to National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC), the weather in the vicinity of Providence (including Centredale) is influenced by its proximity to Narragansett Bay and the Atlantic Ocean. Winter temperatures are modified considerably, and major snowstorms often change to rain before reaching the area. Hot summer days are often cooled by sea breezes. In early fall, severe coastal storms of tropical origin occasionally bring destructive winds to the area. Coastal storms usually produce the severest weather. Since 1900, Rhode Island has experienced five hurricanes, including three major hurricanes (i.e., > Category 3). Hurricanes affecting New England typically occur in late summer or early fall (http://www.nhc.gov/paststate.html).

Temperatures are generally moderate and average around 50°F on an annual basis. The average temperature between late May and late September is approximately 70°F. During this period, it is not unusual for several days to reach 90°F; however, it is rare that the temperature exceeds 100°F. Freezing temperatures occur on the average about 125 days per year, and are very common between late November and March. However, sub-zero weather in winter seldom occurs. Measurable precipitation occurs on about one day out of every three, and is fairly evenly distributed throughout the year. There is usually no definite dry season, but occasionally droughts do occur.

Thunderstorms are responsible for much of the rainfall from May through August, and usually produce heavy rainfall. Over the last 10 years, three floods and one flash flood have been documented in Providence County, RI. The most recent documented flooding of the Woonasquatucket River occurred on June 30, 1998. According to the NCDC, the river overflowed its banks flooding low-lying areas after a slow moving storm system produced several hours of torrential rainfall (3 to 6 inches) across northern Rhode Island. The Woonasquatucket River overflowed its banks again on September 10, 1999 after a slow moving cold front, combined with tropical moisture, produced heavy rainfall throughout Rhode Island and resulted in a flash flood.

3.4 Surface Water Hydrology

The USGS has monitored streamflow for the Woonasquatucket River at Centredale (USGS gauge station 01114500) since the early 1940s and has a wide range of streamflow statistical data available on the Web (http://nwis.waterdata.usgs.gov/nwis/), including daily, monthly, annual and peak streamflows. Streamflow is from north to south. Annual mean streamflow has ranged from 50 cubic ft per second (cfs) to 100 cfs in most years (Figure 3-7). The lowest annual mean streamflow was observed in 1966, at 35.3 cfs. The highest annual mean streamflows were observed in 1972 and 1983, at 122 cfs and 126 cfs, respectively.

Peak streamflow data from 1936 to 2002 for the Woonasquatucket River is presented in Figure 3-8. Over the last 60 years, peak streamflow ranged between 250 cfs and 750 cfs 64% of the time. Between 1942 and 1966, peak streamflow was fairly consistent and fell within this specified range, except in September 1954 and October 1955 when peak streamflow exceeded 950 cfs. Since 1966, peak streamflow has been somewhat more variable, with values ranging from 190 cfs to 1,520 cfs. The highest measured peak

streamflow (1,520 cfs) was recorded in June 1998, which corresponds with the last documented flooding of the Woonasquatucket River.

Historical flowrate data from the USGS gauging station were used by USACE/ERDC to conduct a flood frequency analysis. Table 3-1 shows the flowrates for floods with return periods ranging from 5 to 100 years. These flowrates were used in the sediment stability study to predict areas and depths of erosion resulting from flood events (QEA, 2004a).

3.5 Geology

In 2001, an investigation of the subsurface geology in the source area at the CMRP site was carried out by TetraTech NUS Inc. According to TTNUS (2002), the overburden at the site largely comprises silty sands and gravels. These unconsolidated materials are underlain by bedrock. Geophysical data indicate that the site is situated above a north-south trending bedrock valley. The following stratigraphic units were identified at the site:

Fill – The majority of the site is covered with a loose to very dense fill composed of unsorted silt, sand, and gravel with trace amounts of anthropogenic debris. Anthropogenic material included fragments of wood, metal, brick, glass, plastic, paper, vitrified clay, asphalt, coal or charcoal, and slag. Fill thickness appears to vary significantly across the site, with a typical thickness of approximately 6-8 ft.

Silt/Organic Silt/Wetland Deposits – Fine-grained deposits consisting primarily of silt and fine sand-size particles with variable amounts of organic matter are found underlying the fill at selected locations at the site. These relatively thin layers of fine grained sediments appear to have been deposited in former wetland or floodplain areas. In the former tailrace, the organic rich silt was at the surface prior to the installation of Cap #3. Where found, the thickness of this unit ranges in thickness from 0.2 ft to 2.7 ft.

Sand and Gravel – The most common soil type present at the site consists of relatively coarse-grained materials, ranging from fine to coarse gravel and cobbles to poorly-graded, silty, fine to medium sands. Discontinuous lenses of silty fine sand and sandy silt were encountered in this unit. Cobbles and boulders occur individually or in layers up to 5 ft thick. This soil type underlies both the fill and the finer-grained floodplain deposits and overlies the majority of the glacially-carved bedrock valley throughout the site, and corresponds to the valley train deposits described in Section 3.1 (Smith, 1956). Thickness of this unit ranges from 12.5 ft to 43 ft, and appears to extend well beyond the boundaries of the site (Smith, 1956).

Fine Sand and Silt – A dense, fine-grained unit varying from fine sand, some silt to silt with trace fine sand and trace clay is present either within or beneath the coarse-grained sand and gravel unit at several locations on the site. This unit has a rhythmic bedding pattern, indicating a relatively short-term presence of a glacial lake or pond, where seasonal depositional variations formed varves in the sediment. Where found, this unit ranges in thickness from 2 to 12 ft.

Possible Till – At most locations within the site, a dense to very dense, unsorted mixture of grain sizes, possibly representing a basal till, is present beneath the coarse-grained sand and gravel unit. The thickness of the possible till unit ranges from approximately 3 ft to 40 ft. This unit may represent the ground moraine described in Section 3.1 (Smith, 1956).

Bedrock – Bedrock is located approximately 40 to 60 ft below ground surface (bgs) in the source area. Bedrock recovered from five boreholes drilled around the perimeter of the site was

composed of foliated, gray to green schist or gneiss. Granite was found in one of the boreholes (MW-10B; Figure 2-1).

During the source area investigation (TTNUS, 2002), seismic refraction and GPR surveys were conducted to evaluate overburden stratigraphy, depth to bedrock and topography of bedrock. Figure 3-9 is a map of the bedrock topography based on site boring logs and GPR and seismic refraction data points. The map indicates that the CMRP site is situated above a north-south trending bedrock valley. From Route 44 to the south end of the Brook Village parking lot, the deepest part of the valley lies west of the Woonasquatucket River. South of the Brook Village parking lot, the valley turns to the southeast, and bifurcates around a bedrock knob under the Centredale Manor south parking lot and Cap #1. The deeper branch of the valley runs beneath the Centredale Manor building. Geophysical data were sparse south of Cap #1, but the bedrock valley appears to trend south beneath the river channel south of the site. A geologic cross-section of the site showing site bedrock and overburden stratigraphy is provided in Figure 3-10 (the cross-section location is shown in Figure 3-9). Hydraulic conductivity values shown in the cross section are discussed further in Section 3.6.

3.6 Hydrogeology

TTNUS (2002) characterized groundwater flow at the site based on overburden and bedrock borings, geophysical surveys, hydraulic conductivity tests, and water level measurements taken during the spring and fall of 2001.

3.6.1 Groundwater Flow Directions, Gradients, and Surface Water Interactions

Water level measurements were collected from March 21 through May 9, 2001 from the USGS gauge station 01114500 (shown as SP-4 in Figure 2-1), several other surface water locations in the river and tailrace, and 21 shallow overburden piezometers installed in the source area (Figure 2-1). On March 30, 2001, water levels in the river and aquifer reached a local maximum from a 3-inch precipitation event. Figure 3-11 shows the configuration of the water table when the water levels peaked in response to this event. Under these conditions, groundwater flow is apparently to the east-southeast and the river recharges the aquifer everywhere except in the immediate vicinity of the small groundwater mound located beneath the Brook Village parking lot. This local groundwater high may be due to groundwater perched above a low-permeability silt lens or man-made structure. The fast response to and recovery from these precipitation events in the shallow piezometers indicate that the shallow subsurface soils are highly permeable. Figure 3-12 shows the water table on May 4, 2001 after 20 days of no significant precipitation. Under these conditions, the groundwater flow is to the south. The localized groundwater mound beneath the Brook Village parking lot was still apparent.

Groundwater-surface water interactions were evaluated by comparing concurrent water level data collected in the spring of 2001 from each surface water monitoring location and the closest shallow piezometer. Results from two staff gauge locations in the former tailrace on the east side of the source area indicated that prior to the installation of Cap #3, groundwater consistently discharged to the tailrace. At the north end of the site near the USGS gauge station (SP-04), groundwater discharged to the river at all times except during two heavy precipitation events in March (Figure 3-13). During these events, the flow direction reversed and the river recharged the aquifer. At the south end of the source area near staff gauge SP-03, it appears that the river always lost water to the aquifer, even during March 2001 high flow events (Figure 3-13). Although the staff gauge record did not begin until April 2, 2001, water levels at the staff gauge were much higher than those in adjacent piezometer P-17 only two days after the March 30, 2001 event, and remained higher until the end of the data recording period.

Continuous water level measurements were also collected from the river, monitoring wells, and selected piezometers from October 4 through November 1, 2001. No significant precipitation occurred during this time. The shallow water table map constructed from measurements collected on November 1 indicated that groundwater flow patterns were similar to those encountered under low flow conditions in the spring of 2001, although water levels were lower, and the groundwater mound beneath the Brook Village parking lot was not as pronounced (TTNUS, 2002). Groundwater flow through the deep overburden and bedrock beneath the northern and central portions of the site was generally to the south-southeast.

Horizontal and vertical hydraulic gradients were estimated from the fall 2001 water level data (TTNUS, 2002). The average horizontal gradient was 0.0032 in the shallow overburden, 0.0033 in the deep overburden, and 0.0038 in the bedrock. Groundwater elevations in deep overburden and bedrock wells were similar to those in shallow overburden wells. Small downward vertical gradients were observed in several well clusters; otherwise the gradients were flat or upwards. These measurements indicate the absence of a strong, sitewide vertical hydraulic gradient.

Water level measurements were also collected in October 2002. Groundwater elevations were consistent with those measured in the fall of 2001. The direction of shallow groundwater flow was generally to the south. The groundwater mound beneath the Brook Village parking lot was not observed. Small differences in groundwater elevations in collocated shallow, deep, and bedrock wells indicate that there are no strong vertical hydraulic gradients, which is also consistent with previous groundwater measurements at the site (TTNUS, 2002).

3.6.2 Hydraulic Conductivity, Hydraulic Gradient, and Groundwater Velocity

Hydraulic conductivity of various stratigraphic units at the site was estimated using single-well pump tests. Slug tests and packer tests were also conducted on bedrock wells. Details of the aquifer testing are provided in TTNUS (2002) and results are summarized below.

Hydraulic conductivity values are summarized in Table 3-2. Hydraulic conductivities in the shallow overburden unit ranged from 4 to 55 feet per day (ft/d), with an average of 23 ft/d. Hydraulic conductivities in the deep overburden unit ranged from 10 to 190 ft/d, with an average of 58 ft/d. The lowest hydraulic conductivities (i.e., <10 ft/d) in both units were associated with silt- and organic-rich deposits. The average hydraulic conductivity in the bedrock unit was 7 ft/d based on slug and pump test data (results for packer test data were lower; however, these data represent deeper bedrock whereas most of the bedrock flow appears to occur in the uppermost 2-10 ft).

Measurements of horizontal hydraulic gradients, mean hydraulic conductivity, and effective porosity were used to calculate groundwater velocities in the overburden and bedrock (Table 3-2). The average groundwater velocity in the shallow overburden is estimated at 0.21 ft/d. The average velocities in the deeper overburden and bedrock are estimated to be 0.55 ft/d and 27 ft/d, respectively. The difference in average groundwater velocity between the shallow and deep overburden is primarily due to the difference in mean hydraulic conductivity. The much higher velocity in the bedrock, despite its relative low hydraulic conductivity, is due to its lower effective porosity. The bedrock estimate has the greatest uncertainty because the effective porosity can be highly variable, although published values for fractured crystalline rocks are orders of magnitude lower than those for sands and gravels.

3.7 Sediment and Surface Water

The Woonasquatucket River is approximately 19 miles long, originating in North Smithfield, RI and discharging to Providence Harbor approximately 8.5 miles downstream of the CMRP site. The river drains an area of approximately 38.5 square miles. Upstream of Route 44, the river generally has a low current

velocity. Samples collected from the upstream reach have a silt and clay content ranging from 8% to 97%, with a mean of 58% (Table C-6, Appendix C). Floodplain and wetland areas border parts of the river channel in this reach. Approximately 200 ft upstream of the Route 44 bridge, the current velocity increases and the bottom consists of cobbles, boulders, and gravel.

3.7.1 Allendale Reach

The Allendale reach of the Woonasquatucket River encompasses the portion of the river from Route 44 past the CMRP source area to the Allendale Dam. The river channel from the Route 44 bridge to the head of Allendale pond is straight and approximately 500 ft long. The channel bed is composed of gravel, cobbles, and sand. The eastern bank of the river along this reach is armored with rip rap that was installed in 1999 to prevent bank erosion. An abandoned railway bed follows the river bank on the west side of the channel.

Allendale Pond, which is restored to its pre-1991 level, has an area of about 11 acres. The bathymetry in Allendale Pond was mapped in October 2002 based on GPR data (Lockheed Martin, 2003) (Figure 3-14). Water depths also were measured manually in some locations to confirm the GPR measurements; in many cases, the manually-measured depths were about 0.5 ft deeper than the depths indicated by the GPR. Water depths range from less than 0.5 ft to a maximum of about 10 ft (the maximum water depth measured manually was 8.4 ft at southeastern part of the pond). The deepest area in the pond is the recent flow channel that trends from northwest to southeast across the southern part of Allendale Pond (this was the main channel when the dam was breached and the water level in the pond was low). Smaller tributary channels are also evident. Most of the sediments that were formerly exposed as floodplain soils in the 1990s are now covered by less than 2 ft of water. Depths in the southern part of the pond are generally 4-6 ft.

The apparent soft sediment thickness in Allendale Pond based on GPR data is shown in Figure 3-15 (Lockheed Martin, 2003). Soft sediments were probed in many areas of the pond to confirm the GPR measurements; measurements were generally in good agreement. The flow channels that were exposed when the dam was breached contain gravel and sand with little or no soft sediment. Apparent bedrock was observed on the east side of the pond, approximately halfway between the head of the pond and Allendale Dam (bedrock outcrops at the surface in this area). The apparent soft sediment thickness contours indicate areas where the greatest sediment accumulation has occurred. The thickest soft sediments occur away from the present flow channel, in shallow water depths, although thick sediments also occur in deeper water in the southern part of the pond.

Two layers of material were apparent in most of the GPR data: soft sediment underlain by relatively hard sediment or possible bedrock. The hard sediment may represent original gravel and sand river channel prior to the construction of Allendale Dam. In a few locations, deep layering was apparent beneath the top of the hard sediment layer. In some areas, the boundary between soft and hard sediment was clearly identified, although in other areas it was not well-defined or appeared hummocky. Geophysical cross-section data are currently being integrated with geomorphology and sediment core data to refine the interpretation of sub-bottom features.

Surface sediment grain size expressed as percent fines (percent silt + percent clay) in Allendale Pond based on samples collected from 1999 through 2003 is shown in Figure 3-16. In general, sediments are coarser near the inlet to Allendale Pond and in the flow channel that was exposed when the pond level was lower. Sediments are finer in the pond sediments on either side of the flow channel.

Twenty sediment cores collected in May 2003 targeted depositional areas in Allendale Pond. Cores ranged from 1.2 ft to 4.5 ft in length. May 2003 core sample locations are shown in Figure 3-17.

Detailed core logs are provided in Appendix D. A surface layer of highly organic fine-grained material (classified as peat) was found in all cores except one (CMS-SD-4214), which had approximately 0.5 ft of sand on top of the peat. The peat layer as measured in the cores varied from less than 0.5 ft to greater than 3.4 ft, with the thickest accumulation in an embayment on the east side of the pond (CMS-SD-4210). The thickness of the peat layer was most variable at the north end of the pond. Sand, silt and clay layers occurred in the peat at several locations. The peat layer was underlain by sand and gravel.

Sediment samples were collected from selected cores and analyzed for the radioisotopes ^{210}Pb and ^{137}Cs to determine the sedimentation rate. Radiometric age dating results are discussed in USACE/ERDC (2004) and QEA (2004a) and are summarized in Table 3-3. Independent estimates of sedimentation rate are provided by the ^{210}Pb and ^{137}Cs analyses. Frequency distributions of upper- and lower-bound estimates of sedimentation rates based on the ^{210}Pb and ^{137}Cs analyses in Allendale Pond are presented in Figure 3-18 (results for core CMS-SD-4210 are excluded from the distribution because those results are exceptionally high, inconsistent with ^{137}Cs results for the same core, and thus are considered unreliable). Methods for determining the upper and lower bound estimates are described in QEA (2004a). These results indicate that, generally, the ^{210}Pb and ^{137}Cs analyses produce consistent upper- and lower-bound estimates of sedimentation rate (QEA, 2004a). Median values of lower- and upper-bound sedimentation rates are about 0.5 and 0.8 cm/yr, respectively. Although there is variability in sedimentation rate in Allendale Pond, a reasonable estimate of a representative (or average) range of sedimentation rate for this pond is 0.5 to 0.8 cm/yr.

Core samples also were analyzed for dioxin, TOC, and geotechnical parameters. Dioxin and TOC chemistry results are discussed in Section 4.4. Geotechnical data are included on the core logs (Appendix D) and will be used to support the development of remedial alternatives in the FS.

3.7.2 Lyman Mill Reach

Below the Allendale Dam, the Woonasquatucket River is channelized. As described in Section 3.1, a forested wetland (i.e., oxbow area) is located on the west side of the channel below the dam. Lyman Mill Pond has an area of approximately 24 acres. The water level in Lyman Mill Pond probably has remained relatively constant for many years. Bathymetry in Lyman Mill Pond in October 2002 based on GPR data is shown in Figure 3-19 (Lockheed Martin, 2003). Water depths range from less than 1 ft to a maximum of greater than 6 ft (the maximum water depth measured manually was 9 ft in the southeastern part of the pond). A deep flow channel is apparent along the eastern side of the pond. A prominent ridge divides the southern part of the pond.

Apparent soft sediment thickness as inferred from the GPR data is shown in Figure 3-20. Shallow water in the north end of the pond corresponds with thicker soft sediments. A thicker layer of soft sediment is also found at the south end of the pond, behind the dam. As in Allendale Pond, the soft sediments are underlain by a relatively hard sediment or possibly bedrock. GPR data suggest that bedrock is probably close to the surface in the central part of the pond (Lockheed Martin, 2003).

Surface sediment grain size expressed as percent fines (percent silt + percent clay) in Lyman Mill Pond based on samples collected from 1999 through 2003 is shown in Figure 3-21. Surface sediments generally are coarser in the channel and at the north end of Lyman Mill Pond, and finer in the central and southern parts of the pond. Coarser surface sediments are also found along the southwestern shore of the pond.

Ten sediment cores were collected in May 2003 from depositional areas in Lyman Mill Pond. Core ranged from 2.0 ft to 4.4 ft in length. May 2003 core sample locations are shown in Figure 3-22. Detailed core logs are provided in Appendix D. A layer of gelatinous, highly organic silt was found at the

sediment surface at all but one (LPX-SD-4202) of the cores. The gelatinous, organic silt layer ranged in thickness from 1 to >3.5 ft, with an average thickness of about 2 ft. The organic silt layer was underlain by peat, clay, and sand in most locations. Gravel was found in four of the cores, three of which appear to be located in the flow channel (LPX-SD-4206, LPX-SD-4208, and LPX-SD-4209).

One core from Lyman Mill Pond was subsampled for radiometric age dating. The ^{210}Pb results indicated a sedimentation rate of approximately 0.3 cm/yr, which is confirmed by the ^{137}Cs results (Table 3-3).

3.7.3 Downstream of Lyman Mill Dam

Below the Lyman Mill Dam, the Woonasquatucket River occupies a well defined channel with a gravel and sand bottom and short riffle areas (TTNUS, 2001). The current velocity decreases downstream as the channel turns east and then south (Figure 3-3). Manton Pond is a small shallow impoundment behind the Manton Dam. The reach between the Manton Dam and the former Dyerville Dam is relatively straight, with generally steep banks and a cobble bottom.

3.8 Demography and Land Use

The Brook Village and Centredale Manor apartment complexes occupy the northern part of the CMRP site. This area is currently occupied and covered by buildings, pavement, landscaping, and interim protective caps, and is expected to remain a multi-family residential use area. The land use on the east side of the Woonasquatucket River in the vicinity of the CMRP site in North Providence, RI is primarily residential, with some commercial and light industrial properties. The western side of the river in Johnston, RI is characterized by mixed residential, commercial and industrial use. Groundwater in the vicinity of the site is not used as a drinking water source. The Woonasquatucket River was recognized within the larger Blackstone River drainage as one of fourteen American Heritage Rivers in 1998, and is currently the focus of urban revitalization and watershed restoration efforts. Future land use in the area is not expected to change significantly.

3.9 Ecology

The following is a summary of the ecological habitat types at the site as described in the *Interim Final BERA* (MACTEC, 2004a). The habitats associated with the site are characteristic of fragmented, disturbed, and developed landscapes in the New England region and include riverine, lacustrine, and palustrine systems. The following briefly describes the ecological habitats extending from north of the site (i.e., Greystone) to south (i.e., Dyerville Pond). Wetland classifications follow the system presented in Cowardin et al. (1978).

Greystone – Riverine and palustrine wetland types dominate the section of the Woonasquatucket River located upstream of the source area (i.e., Greystone). The river above Greystone Mill Pond is consistent with a lower perennial riverine system (i.e., slow flow and gradient), with well developed floodplains, bordered by palustrine scrub shrub and emergent wetlands. The river below the dam is relatively shallow with sections of higher flow and gradient (i.e., riffle and run). The bottom substrate varies from rock cobble bottom to unconsolidated sand and muck. Water depths range from several inches to approximately six ft. The river is bordered by palustrine forested, and emergent wetland present along the western edge of the river, while the eastern edge is dominated by palustrine and forested wetlands.

The Greystone Mill Pond is characterized as palustrine unconsolidated bottom and aquatic bed wetland. Dense rooted submergent vegetation (i.e., water milfoil [*Myriophyllum* sp.]) dominates the bottom of the pond; however, there are large areas of unvegetated muck, mostly in front of the

dam. Aquatic vegetation above the dam includes rooted submergent, emergent and floating leafed plants including water milfoil, water lilies (*Nuphar* and *Nymphaea* spp.), and duck weed (*Lemna* sp.). The palustrine scrub shrub wetlands bordering the upper reaches of the river and Pond are dominated by water willow (*Decodon verticlatus*), alders (*Alnus* sp.), sweet pepper bush (*Clethra alnifolia*), willows (*Salix* spp.), birches (*Betula* sp.) and red maples (*Acer rubrum*). Avian wildlife observed in the upper sections of the river and Pond included tree swallow (*Tachycineta bicolor*), mallard duck (*Anas platyrhynchos*), black duck (*A. rubripes*), wood duck (*Aix sponsa*), mute swan (*Cygnus olor*), Canada goose (*Branta canadensis*), belted kingfisher (*Ceryle alcyon*), green heron (*Butroidies striatus*), great blue heron (*Ardea herodias*). Other wildlife observed using these areas included muskrat (*Ondatra zibethica*) and raccoon (*Procyon lotor*). Reptiles and amphibians observed in the lacustrine and riverine sections included painted and snapping turtles (*Chrysemys picta* and *Chelydra serpentina*, respectively) and frogs (*Rana* spp.). Chorusing male wood frogs (*R. sylvatica*) were heard in 2001 and 2002 upstream of Greystone by a U.S. Fish and Wildlife Service census team, which suggests that habitat is available for wood frogs, spotted salamanders (Ambystoma spp.) and other obligate vernal pool species. Fish species observed included chain pickerel (*Esox niger*), brown and yellow bullhead (*Ameiurus nebulosus* and *Ameiurus natalis*), white sucker (*Catostomus commerson*), tessellated darter (*Etheostoma olmstedi*), and American eel (*Anguilla rostrata*).

Allendale – This section encompasses the river section between the Route 44 bridge and Allendale dam, and is considered the source area. The upper portion of this reach is characterized as upper perennial riverine habitat dominated by cobble bottom. There is very little emergent or submergent vegetation associated with this section of the river. The western bank of the river is relatively steep and undercut and dominated by trees and scrub shrub vegetation. The eastern bank of the river is mostly developed (i.e., Brook Village and Centredale Manor) and included rip rap along two capped areas. Several muskrats and mallard ducks were observed in this section of the river.

The lower portion of the reach is characterized as riverine wetland habitat dominated by unconsolidated bottom (e.g., sand and muck) bordered by palustrine emergent and scrub shrub wetland habitat. Vegetation includes yellow birch (*Betula alleghaniensis*), gray birch (*Betula populifolia*), dogwood (*Cornus amomum*), black willow (*Salix nigra*), and red maple. The palustrine emergent wetland is dominated by jewel weed (*Impatiens capensis*), smart weed (*Polygonum* spp.), nettle (*Laportea* sp.), cattails (*Typha* sp.), woolgrass (*Scirpus cyperinus*), and purple loosestrife (*Lythrum salicaria*). Wildlife observed in these areas includes tree swallow, killdeer (*Charadrius vociferous*), Canada goose, mourning doves (*Zenaida macroura*), muskrat, and mink (*Mustela vision*). Reptiles and amphibians including snapping turtles and green frogs (*Rana clamitans*), pickerel frogs (*R. palustris*), bullfrogs (*R. catesbiana*), spring peepers (*Pseudacris crucifer*), and gray tree frogs (*Hyla versicolor*) also were observed. Fish observed in this reach included American eel, brown bullhead, tessellated darter, and white sucker.

Lyman Mill – This river reach is located immediately downstream of the source area and is bounded by the Allendale dam to the north and the Lyman Mill Pond Dam to the south. This area includes riverine, palustrine, and lacustrine wetland habitats. Immediately below the Allendale Dam, the river flow is channelized with a section of riffle/run habitat before the impact of the Lyman Mill Dam is encountered. Palustrine forested, scrub shrub, and emergent wetland habitats are associated with the riverine section, as well as the upper portion and borders of Lyman Mill Pond. The pond itself is classified as lacustrine wetland habitat based on its size (>20 acres).

The section of river below the Allendale Dam is classified as upper perennial with a rock cobble bottom. The banks are steep and undercut for most of the section. The banks are vegetated with

overhanging shrubs and trees including dogwood, witch hazel (*Hamamelis virginiana*), birch, red maples, and oaks (*Quercus* sp.), tree of heaven (*Ailanthus altissima*), catalpa (*Catalpa specios*), ash (*Fraxinus* sp.), and sweet gum (*Nyssa sylvatica*). A large forest borders the western bank, while a thin strip of scrub shrub habitat and residential properties as well as a ball field and recreational complex border the eastern bank. The riverine habitat transitions into a palustrine scrub shrub and emergent wetland at the upper end of Lyman Mill Pond. Button bush (*Cephalanthus occidentalis*) dominates the palustrine scrub shrub wetland north of Lyman Mill Pond. Subordinate species identified in this habitat included alders, dogwood, purple loosestrife, poison ivy (*Rhus radicans*), cattails, and red maple saplings. Water willow dominates along the upper borders of the Lyman Mill Pond, between the palustrine and littoral lacustrine wetland habitat.

Lyman Mill Pond is characterized as a lacustrine wetland habitat. The majority of the pond is classified as littoral (i.e., less than 3 m deep). Aquatic beds of water milfoil and pond weed (*Potamogeton* spp.) dominate the pond bottom and water column. Approximately 10 to 20 percent of the bottom is unvegetated; unvegetated areas are generally limited to confluences with tributaries (e.g., Assapumpset Brook) and immediately upstream of the Lyman Mill Dam. Osprey were observed feeding frequently in Lyman Mill Pond in 2001 and fish observed in this reach include American eel, brown bullhead, tessellated darter, golden shiner (*Notemigonus crysoleucas*), bluegill sunfish (*Lepomis macrochirus*), chain pickerel, white sucker, and largemouth bass (*Micropterus salmoides*).

Manton – This section of the site is located downstream of Lyman Mill, and habitat and river morphology is very similar to the Lyman Mill Pond reach although the impounded portion of the river area behind the Manton Dam is approximately a tenth of the area.

Dyerville – This section of the site is located downstream of the Manton Pond Reach. Only pilings remain of the former Dyerville Dam, and the area is primarily riverine in nature and classified as upper perennial with a rock cobble bottom. The banks are generally steep and undercut for most of the reach although scrub shrub habitat occurs along terraces. The upland forest and palustrine scrub shrub wetland/floodplain habitat that occurs between Manton Pond and the former Dyerville Dam pilings is similar to that described for upstream areas. Elms, green ash, red maple, and birch are found along the bank side slopes and abut scrub shrub species such as alders, sweet pepper bush and willow species.

Assapumpset – This section is the off-site reference area for the source area. Assapumpset Pond is approximately four acres and primarily provides lacustrine wetland habitat although fringing scrub shrub wetland occurs along the western portion of the pond. The pond discharges to Assapumpset Brook at a spillway located to the southeast, which flows in a generally easterly direction before discharging to Lyman Mill Pond. The brook is narrow (approximately 3-4 ft wide) with a rocky bottom and is heavily shaded as it flows through upland forest habitat.

4.0 NATURE AND EXTENT OF CONTAMINATION

An evaluation of the nature and extent of contamination based on all relevant and existing site data is provided in this section. All existing data for the site are compiled in a project database and GIS. Data for soils excavated as part of the NTCRA are archived in a separate table in the database and are not included in the RI data analyses. Table 4-1 lists the number of samples currently in the database for each class of contaminants for various media in the source area, area upstream (background) of the Route 44 bridge, Allendale reach excluding the source area, Lyman Mill reach, Manton reach, and area downstream of the Manton Dam. Assapumpset Brook, the reference area for the BERA and BHHRA, is summarized separately.

Data management and analysis procedures are described in Appendix A, and a complete list of samples used in the RI is provided in Appendix B. A source characterization is presented below in Section 4.1, followed by an evaluation of the nature and extent of contamination in soil, groundwater, sediment, and surface water at the site (Sections 4.2 through 4.5). Contaminant concentrations in biota and their significance are evaluated in the BERA and BHHRA (MACTEC, 2004b and 2004a). Section 4.4.5 presents the results of an environmental forensics review of data for persistent chlorinated organic compounds (dioxins, furans, PCBs and chlorinated pesticides) in soil and sediment. The objective of the environmental forensics review was to help characterize the nature of sediment contamination based on concentration gradients and compositional relationships.

4.1 Source Characterization

As described in Section 1.3.2, potential historical sources of contamination at the CMRP site include improper storage and disposal of chemicals in drums, stockpiles and surface impoundments. These activities appear to have been concentrated in the central and southern parts of the source area. Chemicals apparently were released directly to the ground, buried, and discharged directly to the Woonasquatucket River. Chemical residues from the drum recycling operation were apparently dumped or burned prior to reconditioning. Other materials related to site operations also were apparently buried on the site (e.g. metal and construction debris such as bricks and asphalt).

Because a variety of chemical manufacturing processes took place in the source area and drums for reconditioning were received from a variety of sources, contamination by a diverse mixture of chemicals would be expected. The Agency for Toxic Substances and Disease Registry (ATDSR) Health Consultation for the site identified dioxin as the primary contaminant of concern in soil (ATDSR, 1999). VOCs, SVOCs, PCBs, pesticides and inorganic constituents have also been detected in various media at the site. Dioxin (primarily 2,3,7,8-TCDD) and HCX are byproducts of the hexachlorophene manufacturing process (Archer and Crone, 2000), which is known to have taken place at the CMRP site. Dioxins and furans also may have been produced by incineration of waste material at the site.

Geophysical surveys indicate that the largest concentration of buried bulk metallic materials appears to be at the south end of the Centredale Manor south parking lot and northwest part of Cap #1 (Figure 1-3) (Roy F. Weston, 1999b). This area has the greatest potential for containing residual waste material from former site operations. However, the primary sources of contamination to the site are no longer active.

Non-site related contaminants may enter the Woonasquatucket River upstream and downstream of the CMRP site. Any current or historic releases from sources upstream of Centredale are expected to be reflected in the background chemical signature measured in sediment and water samples from the upstream background area. Other possible sources of contaminants to the river are briefly described below; however, the types and volumes of chemicals that could be attributed to these sources were not characterized in detail.

Table 4-2 lists permitted upstream discharges to the river north of the CMRP site as identified by the RI Pollution Discharge Elimination System (RIPDES) program (RIDEM, 2004). This list includes all types of point discharges (i.e., from a discharge pipe) located within the Woonasquatucket River basin upstream of the site. No combined sewer outfalls (CSOs) are located upstream of Centredale (RIDEM, 2004). Fifteen active CSOs discharge into the river downstream of the CMRP site (Louis Berger Group, 2000). Stormwater outfalls discharge to the river along its entire length. The watershed is less urbanized and developed upstream of the Centredale Manor site than downstream of it; therefore, impacts from stormwater runoff would be expected to be greater in the downstream reaches. The North Smithfield Wastewater Treatment Plant (WWTP) located upstream of the CMRP site has a design capacity of 3.5 million gallons per day (MGD), with an average daily flow of 1.75 MGD (Louis Berger Group, 2000). Treatment consists of conventional activated sludge, and disinfection using sodium hypochlorite and dechlorination using sodium bisulfite. The North Smithfield WWTP is under a Consent Decree to plan, design and build an advanced wastewater treatment facility capable of phosphorus removal.

The Water Quality *Characterization for the Woonasquatucket River Basin* was performed to support development of TMDLs for the Woonasquatucket River (Louis Berger Group, 2000). This report identifies pollutant sources to the river, including historic point sources, minor permitted dischargers, the North Smithfield WWTP and CSOs. In 1976 there were approximately 26 known dischargers, with discharges consisting of cooling water, industrial wastewater, and sanitary wastewater. The majority of these discharges terminated following construction of the Smithfield WWTP (the currently permitted discharges are listed in Table 4-2). The Woonasquatucket River watershed contains fourteen RIDEM State Hazardous Waste Sites and CERCLA sites, including the CMRP site (Louis Berger Group, 2000). Four of these sites are inactive, including one adjacent to Lyman Mill Pond and two downstream of Lyman Mill Dam. All of the active hazardous waste sites are located upstream of Centredale, and any impacts from these sites are expected to be reflected in the upstream (background area) sediment and surface water.

4.2 Soil

This section describes the nature and extent of contamination in soil within the source area, along the east shore of the Woonasquatucket River between the source area and Allendale Dam, and on the east shore of the river between Allendale Dam and Lyman Mill Dam. A list of soil samples used in the RI and associated analytical parameters is provided in Table B-1 (Appendix B).

4.2.1 Source Area Soil

Soil sampling efforts in the source area have focused on characterizing the distribution of dioxin (primarily 2,3,7,8-TCDD), which was identified as the primary contaminant of concern in the Health Consultation for the site (ATSDR, 1999). A subset of soil samples also was analyzed for other site-related chemicals. Sample locations and station IDs are shown in Figure 4-1, including stations located on the west bank of the Woonasquatucket River across from the source area. Statistical summaries of the source area soil data are provided in Table C-1 (Appendix C). Methods used to calculate summary statistics are described in Appendix A. The statistical summaries include the following information for each analyte: number of samples, detection frequency, minimum concentration, maximum concentration, central tendency (either geometric mean, arithmetic mean, or median, depending on the distribution of the data), standard deviation, and location of the maximum detected value. A value of one-half the method detection limit was used to represent non-detected sample results in the determination of summary statistics. For analytes with less than 50% detected sample results, only the minimum, maximum and median concentrations were determined.

The horizontal and vertical distributions of various chemicals in source area soils are described below. Dioxin results are evaluated relative to an action level of 1,000 ng/kg dioxin (TEQ), which is the

recommended preliminary cleanup level for residential properties (U.S. EPA, 1998a). This action level was used as the basis for the first TCRA and the NTCRA (Sections 1.4.1 and 1.4.2, respectively).

Results for other contaminants are compared to residential direct exposure and leachability criteria promulgated in the RIDEM Remediation Regulations (RIDEM, 1993). Section 8.02 of the RIDEM Remediation Regulations states that soil contaminated as a result of a release of hazardous materials must be remediated in a manner that meets the direct exposure *and* leachability criteria for each hazardous substance present. Because the CMRP site is used for residential purposes, the residential direct exposure criteria are potential applicable or relevant and appropriate requirements (ARARs) for the site. These criteria must be applied to soils throughout the vadose zone in accordance with Rule 8.02.A. Leachability criteria also apply to vadose zone soils. The average thickness of the vadose zone at the CMRP site is approximately 5 ft. The leachability criteria are intended to ensure protection of the designated groundwater classification. The groundwater underlying and downgradient of the CMRP site is classified by RIDEM as GB (Section 1.3.1); therefore, the GB leachability criteria apply to site soils as long as application of these criteria does not contribute to actual or potential adverse impacts to surface water and/or sediment. GB leachability criteria are established for VOCs and PCBs only.

Table 4-3 summarizes chemical concentrations in source area soil samples and the number of vadose zone soil samples with concentrations exceeding the RIDEM residential direct exposure criteria. Table 4-4 summarizes detections above the GB leachability criteria for VOCs (the leachability criterion for PCBs is 10 milligrams per kilogram (mg/kg), which is the same as the RIDEM residential direct exposure criteria). Non-detected results with detection limits that were higher than the direct exposure or leachability criteria were excluded from the analysis. In some samples, the detection limits for some parameters (primarily VOCs and SVOCs) were higher than the RIDEM residential direct exposure criteria. While these parameters were not detected, it is possible that they are present at concentrations above the direct exposure criteria.

The contaminants most frequently detected at concentrations exceeding the direct exposure criteria are dioxin, medium to high molecular weight PAHs, PCBs, and several inorganics. VOCs exceeded the direct exposure criteria in some samples, but at a lower frequency than the analytes noted above. Leachability criteria for VOCs were exceeded in samples from six locations. The results for each contaminant type are discussed further below.

4.2.1.1 Dioxins and Furans

Dioxin and furan concentration data typically were reported on an individual congener basis and as 2,3,7,8-TCDD TEQ concentrations. In cases where TEQ values were not reported in the database, they were calculated according to a toxicity weighting scale. 2,3,7,8-TCDD is considered the most toxic compound and is assigned a weighting factor of 1.0. The remaining 16 dioxin and furan congeners were assigned weighting factors (toxicity equivalency factors [TEFs]) according to Van den Berg et al. (1998), ranging from 0.001 to 0.5 (the list of TEFs is provided in Appendix A). The observed concentrations of these seventeen dioxin and furan congeners are multiplied by the corresponding weighting factors (TEFs), and the products are summed to determine the 2,3,7,8-TCDD TEQ concentration.

Table 4-3 indicates that 155 out of 690 vadose zone samples from the source area had dioxin TEQ concentrations exceeding 1,000 ng/kg. The mean dioxin TEQ concentration in the all source area soil samples is 118 ng/kg.

Figure 4-2 shows the distribution of dioxin in surface soils (0-0.25 ft) across the source area (fewer samples were collected from the 0-1 ft interval than the 0-0.25 ft interval; although these sample results are not shown, the dioxin distribution in the upper 1 ft is similar to the 0-0.25 ft interval). It should be

noted that sample results for soils in the former tailrace on the east side of the site no longer may be representative because the soils were graded during the TCRA conducted in 2003-2004 (Section 1.4.3). Dioxin TEQ concentrations in surface soils are below 1,000 ng/kg at the north end of the site, except at a few locations along the bank of the Woonasquatucket River by the Brook Village parking lot. Dioxin is most widespread and present at the highest concentrations under Cap Area #1, and numerous locations with a dioxin TEQ above 1,000 ng/kg also were found beneath Cap Area #2. This distribution pattern is consistent with the analysis of historical activities on the site. The north end of the site was primarily occupied by former facility buildings, whereas waste-related activities were concentrated in the central and southern parts of the site. A former waste disposal area was identified at the southwestern part of the site, under Cap Area #1. A former chemical manufacturing building was located on the east bank of the Woonasquatucket River in what is now the Brook Village parking lot adjacent to where high dioxin concentrations were found in bank soils (these soils are now covered with riprap).

Figures 4-3 through 4-6 show the distribution of dioxin in subsurface soils. Although there are fewer samples with increasing depth, concentrations generally decrease with increasing depth beneath Cap Areas #1 and #2. In other areas, the peak dioxin concentration is found at the surface in some locations and at depth in others (e.g. CMS-420 in the Centredale Manor north parking lot; MW-15D in the Brook Village parking lot). At a depth of 4-5 ft bgs, dioxin TEQ concentrations exceed 1,000 ng/kg in five borings, three in the Brook Village parking lot (MW-05S, CMS-451, and MW-15D), one in the Centredale Manor north parking lot (CMS-425), and one under Cap Area #1 (MW-09S) (Figure 4-6). The variable distribution of dioxin with depth suggests that different mechanisms were responsible for its deposition in different areas. Under Caps #1 and #2, the higher surface concentrations indicate discharge to the ground surface. In other areas, burial of waste material or use of contaminated fill may have resulted in higher subsurface concentrations.

4.2.1.2 Volatile Organic Compounds

VOCs were detected in less than 50% of the source area soil samples. Six VOCs exceeded the RIDEM residential direct exposure criteria in more than one vadose zone soil sample: benzene, chlorobenzene, PCE, TCE, vinyl chloride, and xylenes (Table 4-3). These VOCs are solvents, solvent breakdown products, or fuel-related compounds. The majority of the exceedances occurred in samples from boring locations CMS-417 (north end of Cap Area #2), CMS-419 (Centredale Manor north parking lot), and MW-05S (Brook Village parking lot) (Figure 4-1). All of the benzene exceedances were found in two borings from the Centredale Manor south parking lot (CMS-405 and CMS-408). These boring locations are in areas that are currently capped or paved. In general, the elevated VOC concentrations appear to have resulted from localized releases because the contamination is not laterally extensive.

The highest VOC concentrations found in source area soils were in samples from borings CMS-417, CMS-419, and MW-05S. The vertical distribution of selected VOCs in these borings is shown in Table 4-5. The highest concentrations were found in the 1-2 ft interval at CMS-417 and CMS-419, and in the 4-6 ft interval at MW-05S. These results suggest that the contaminants at CMS-417 and CMS-419 originated from surface spills or discharges, whereas the contamination near MW-05S appears to be due to a subsurface release, or lateral migration from a nearby surface source, perhaps on top of a low-permeability soil horizon. Although low-permeability soils were not noted on the boring log for Well MW-05S, the logs for nearby wells GEC-4 and GEC-5 noted a silt layer underlying the fill from 5-13.5 ft (GEC-4) and 7.5-22 ft (GEC-5).

GB leachability criteria for VOCs were exceeded in vadose samples from the Brook Village parking lot, Cap Area #2, the Centredale Manor north parking lot, and the Centredale Manor south parking lot (Table 4-4). Figure 4-7 shows the boring locations where leachability criteria are exceeded, and the associated chemicals. Solvent-related VOCs (PCE and TCE) exceed leachability criteria on the west side

of the Brook Village parking lot (CMS-060 and MW-05S). A variety of solvent- and fuel-related VOCs exceed criteria at the northern ends of Cap Area #2 and the Centredale Manor north parking lot (CMS-417 and CMS-419), and benzene exceeds the criteria at the south end of the Centredale Manor south parking lot (CMS-405 and CMS-408). As noted above, these areas appear to have been contaminated by separate, localized releases.

Figure 4-8 shows the distribution of PCE in vadose zone samples from the source area. PCE was chosen as a representative VOC because it is one of the most frequently detected compounds, and is the only VOC in groundwater (except for TCE in one well) that exceeds the GB groundwater objective (see Section 4.3). PCE exceeds the residential direct exposure and GB leachability criteria in the Brook Village parking lot, Cap Area #2, and the Centredale Manor north parking lot. PCE exceeds the leachability criterion only in the Centredale Manor south parking lot.

4.2.1.3 Semivolatile Organic Compounds

Six PAHs were detected in more than 50% of the source area soil samples. Concentrations of medium to high molecular weight PAHs exceeded the RIDEM residential direct exposure criteria in numerous vadose zone soil samples across the site (Table 4-3). Chrysene and benzo(a)pyrene were the most frequently detected PAHs. The PAHs could have been derived from the asphalt pavement that covers much of the source area. Several other SVOCs (i.e., chlorinated benzenes) also exceeded the criteria in several samples. The elevated levels of chlorinated benzenes were found in samples from borings CMS-417 and CMS-419 (Figure 4-1), which also contained elevated levels of various VOCs (Section 4.2.1.2).

4.2.1.4 Pesticides and PCBs

Dieldrin exceeded the direct exposure criteria in 4 out of 122 vadose zone soil samples (Table 4-3). Total PCBs exceeded the residential direct exposure and GB leachability criteria of 10 mg/kg in 56 out of 313 vadose zone soil samples (Table 4-3). Figures 4-9 through 4-13 show the distribution of PCBs with increasing depth in the source area. PCB concentrations exceed 10 mg/kg at numerous locations in the central and southern part of the source area (but not in the Brook Village parking lot). The highest PCB concentrations generally occur within the upper 2 ft of soil. At depths of greater than 4 ft, PCB concentrations exceeded 10 mg/kg at only two locations: CMS-410 under Cap Area #1, and CMS-427 in the Centredale Manor north parking lot.

Table 4-6 summarizes the Aroclor distribution of PCBs detected in source area soils. All Aroclors except Aroclor 1221 were detected. Aroclor 1254 was detected the most frequently and at the highest concentrations. The locations of the highest concentrations of Aroclors 1242, 1248, and 1254 (CMS-410, CMS-402, and CMS-147, respectively) are all adjacent to the border between the Centredale Manor south parking lot and Cap Area #1 (Figure 4-9). This area was identified as having a significant geophysical anomaly possibly related to the presence of bulk metallic material (Figure 1-3). High levels of PCBs in this area may be related to the disposal of the material responsible for the geophysical anomaly. Aroclor 1268 was detected in two samples collected from the former tailrace on the east side of the source area.

4.2.1.5 Inorganics

Beryllium and lead exceeded the RIDEM residential direct exposure criteria in numerous source area vadose zone samples (Table 4-3). The mean beryllium concentration of 0.41 mg/kg is approximately equal to the residential direct exposure criterion. Lead exceeded the direct exposure criterion in 40 out of 116 vadose zone soil samples south of the Brook Village parking lot (Figure 4-14). Other metals, including antimony, arsenic, cadmium, manganese and thallium also exceeded the direct exposure criteria, but at a lower frequency compared to beryllium and lead (Table 4-3). It should be noted that the direct

exposure criteria for metals represent background concentrations for Rhode Island soils. Site-specific background soil data are not available for the CMRP site.

4.2.2 Allendale and Lyman Mill Soil

Soil samples were collected from residential and recreational use properties along the east bank of the Woonasquatucket River between the source area and Allendale Dam, and between Allendale Dam and Lyman Mill Dam. Sample locations and station IDs are shown in Figures 4-15 and 4-16. Statistical summaries of the Allendale and Lyman Mill area soil data are provided in Tables C-2 and C-3 (Appendix C). Samples collected from areas that were excavated as part of the NTCRA (Section 1.4.2) are not included on the maps or in the statistical summaries. Residential and recreational use soils along Allendale and Lyman Mill Ponds were evaluated as part of the EE/CA (TTNUS, 2000a), and areas that were found to pose an unacceptable human health risk were excavated.

4.3 Groundwater

A list of all groundwater samples used in the RI is provided in Table B-2 (Appendix B). Groundwater monitoring well locations at the CMRP site are shown in Figure 2-1. Groundwater samples were collected at the site in 2001 and 2002 (Sections 2.3.3 and 2.4). Statistical summaries of all groundwater sample results are provided in Table C-4. The source area investigation conducted in 2001 (TTNUS, 2002) indicated that the most significant groundwater contamination at the site was found in the vicinity of Well MW-05S on the east bank of the Woonasquatucket River, adjacent to the Brook Village parking lot. A small building formerly located in this area (Figure 1-3) is believed to be where hexachlorophene was manufactured. High levels of chlorinated solvents and dioxin were detected in groundwater samples from this well, and a small quantity of a nonaqueous-phase liquid (NAPL) was found in subsurface soil samples (NAPL has not been found in groundwater from MW-05S). These contaminants may be residual waste material from the hexachlorophene manufacturing process. PCE was detected in some of the deeper monitoring wells elsewhere on the site at concentrations in the hundreds of micrograms per liter (µg/L) , and lower concentrations of VOCs were detected in samples from some of the shallow monitoring wells. Trace levels of several other contaminants (e.g., phenols and dioxin) were also detected in some samples.

An additional round of groundwater samples from all monitoring wells was collected in October and November 2002 as part of the interim data collection effort (Section 2.4). All samples were analyzed for VOCs, and the sample from MW-05S also was analyzed for dioxin. Table 4-7 presents VOC concentrations measured in groundwater samples collected in 2001 and 2002 and compares them to GB groundwater objectives. Rule 8.03 of the Rhode Island Remediation Regulations states that groundwater contaminated as a result of a release of hazardous materials located in a GB area shall be remediated to a concentration that meets the GB groundwater objectives. GB groundwater objectives are established for VOCs only.

These results indicate that VOC concentrations generally decreased or remained consistent from 2001 to 2002. All VOC concentrations detected in 2002 were below the GB groundwater objectives except for PCE and TCE in the sample from Well MW-05S, and PCE in the samples from Wells MW-13D and MW-14M. PCE concentrations in 2002 groundwater samples are shown in Figure 4-17. The PCE concentrations in Wells MW-05S and MS-13D have decreased since 2001. However, the PCE concentration in Well MW-14M increased from below detection in 2001 to 1,900 µg/L in 2002. This well is in the Brook Village parking lot, south-southeast (downgradient) of Well MW-05S, which has the highest PCE concentration on site. These results suggest that the PCE plume has migrated downgradient from the vicinity of Well MW-05S to Well MW-14M. The lateral extent of this PCE plume is well-defined in shallow groundwater, but is not defined at depth. The origin of the PCE detected in deep overburden

wells on the southeast edge of the site (MW-02M and MW-13D) is not clear. Drums and contaminated soil were removed from the vicinity of the Centredale Manor apartment complex when it was under construction; these materials may have been the source of this contamination.

Dioxin (2,3,7,8-TCDD) concentrations measured in groundwater samples from Well MW-05S were 4,180 picograms per liter (pg/L) in 2001, and 1,030 pg/L (1,460 pg/L in a field duplicate sample) in 2002 (Battelle, 2003a). Dioxin was detected in groundwater samples from eleven other monitoring wells in 2001 at concentrations that were two to three orders of magnitude lower than the concentration measured in the sample from Well MW-05S (TTNUS, 2002).

The nature and extent of VOC contamination in groundwater as determined by laboratory analysis of groundwater samples is consistent with the results of a USGS study using vapor-to-water diffusion samplers deployed in the Woonasquatucket River, tailrace and Allendale Pond (USGS, 2000a). The scope of this study is summarized in Section 2.1. VOCs were detected at 84 of the 104 sites where samplers were retrieved. PCE and TCE were the principal VOCs that were detected. Results for PCE, which was detected at the highest concentrations, are presented in Figure 4-18. Results are presented as concentration per unit volume (i.e., parts per billion per unit volume, or ppbv). Sampler results are higher than concentrations in surface water or groundwater, and should be interpreted qualitatively as relative values to identify VOC discharge areas. This survey identified the seepage of VOC-contaminated groundwater along a 500-ft stretch of the Woonasquatucket River immediately downstream of Well MW-05S. Lower concentrations of VOCs appear to be discharging to the river at the south end of the source area.

The BERA (MACTEC, 2004a) indicated that VOCs are not having an adverse impact on surface water and sediment quality in the river. However, it is possible that VOC contamination in the vicinity of Well MW-05S has increased dissolved concentrations of dioxin in groundwater, which may be subsequently discharging to river. A qualitative assessment of groundwater data indicates no apparent correlation between dissolved dioxin and elevated VOC concentrations in groundwater except at well MW-05S. Additional investigation is planned to confirm whether dioxin is discharging to the river near Well MW-05S.

4.4 Sediment

Table B-3 (Appendix B) lists all sediment sample data that were used in the RI. Figures 4-19 through 4-23 show sediment sample locations in the upstream, Allendale, Lyman Mill, Manton, and downstream of Manton reaches of the river. Sediment sample locations in Assapumpset Brook are shown in Figure 4-24. Nine floodplain soil samples (including two field duplicates) were collected from the forested wetland (oxbow area) southwest of the Allendale Dam in June 2004. Sample locations are shown in Figure 4-25. Statistical summaries for all analytical parameters in each reach of the river and in Assapumpset Brook are provided in Tables C-5 through C-11 (Appendix C). Statistical analysis methods are described in Appendix A. In addition to calculating summary statistics (i.e., frequency of detection, minimum and maximum values, central tendency, standard deviation and location of maximum value), groups of samples from different reaches of the river were statistically compared to upstream (background) samples to determine whether or not chemical concentrations were significantly different than background.

The horizontal and vertical distributions of various contaminants in sediment are described below in Sections 4.4.1 through 4.4.4. This discussion focuses on parameters that were determined to contribute to ecological and human health risk (MACTEC, 2004a and 2004b; summarized in Sections 6.1.5 and 6.2.5, respectively). The chemicals of concern identified in the BERA and BHHRA are listed in Table 4-8. Section 4.4.5 summarizes an environmental forensics review of dioxin/furan, PCB, and chlorinated

pesticide data that further investigates the possible sources of persistent chlorinated organic chemicals detected in site sediments.

4.4.1 Dioxins and Furans

The nature and extent of dioxin and furan contamination in Woonasquatucket River sediments and the forested wetland southwest of the Allendale Dam (i.e., oxbow area) are described below. Dioxin and furan congener data are summarized below as dioxin TEQ concentrations. Distribution patterns for specific dioxin/furan congeners and HCX are discussed in Section 4.4.5.

A statistical summary of dioxin TEQ concentrations in sediment from various reaches of the Woonasquatucket River is provided in Table 4-9, and sample results are shown graphically as side-by-side boxplots in Figure 4-26 (note the logarithmic scale). Each boxplot shows the data distribution. The ends of the box represent the 25th and 75th quartiles, and the line across the middle represents the median value. The solid lines are "whiskers" that extend to the minimum and maximum values. The dioxin TEQ data indicate that concentrations are lowest in the Assapumpset (reference) and upstream (background) areas (mean concentrations of 3.29 and 21.0 ng/kg, respectively). Sediment dioxin concentrations are highest in Allendale Pond, with a mean TEQ concentration of 972 ng/kg. The maximum concentration measured in a sediment sample was 110,000 ng/kg in Allendale Pond. Mean dioxin concentrations in sediment decrease in a downstream direction. TEQ concentrations are significantly higher than upstream background concentrations in all reaches of the river adjacent to and downstream of the source area (oxbow area floodplain soil data were not statistically compared to background). Dioxin TEQ concentrations in the oxbow area floodplain soils southwest of Allendale Dam were within the range measured in sediment samples from Allendale and Lyman Mill Ponds (Table 4-9), indicating that low-lying areas in the forested wetland have been affected by contamination from the CMRP site.

Figures 4-27 through 4-30 show the dioxin TEQ distribution with increasing depth in Allendale Pond. These maps include data collected from 1999 through 2003. Dioxin concentrations in surface sediment in many areas of the pond are between 1,000 and 10,000 ng/kg. Localized hotspots of higher concentrations (i.e., >10,000 ng/kg) are found throughout the pond. Relatively lower concentrations (i.e., >1,000 ng/kg) tend to occur in the shallower area on the northern edge of the central part of the pond. Comparison of the surface dioxin distribution patterns with apparent soft sediment thickness in Allendale Pond (Figure 3-15) indicates that higher surface concentrations generally correspond to areas with thicker accumulations of soft sediment (i.e., depositional areas). Dioxin concentrations are generally below 1,000 ng/kg from 1-2 ft below the sediment surface, and continue to decrease with increasing depth. Additional analysis of geophysical, geomorphic, and chemical data is in progress to identify features and areas that are likely to enhance the accumulation of contaminated sediments.

The dioxin TEQ distribution in surface and subsurface sediments in Lyman Mill Pond is shown in Figures 4-31 and 4-32. Dioxin concentrations in surface sediment (0-1 ft) are generally between 100 and 8,000 ng/kg. The maximum concentration measured in Lyman Mill Pond is 8,030 ng/kg. Surface concentrations are lower in the shallow embayment on the east side of the pond. Little subsurface sediment sample data (i.e., for samples from >1 ft depth) are currently available for Lyman Mill Pond; additional samples in Lyman Mill Pond were collected in March 2005 and will be included in the FS.

Figures 4-33 and 4-34 show the vertical distribution of dioxin TEQ concentrations in samples from the May 2003 sediment cores collected in Allendale and Lyman Mill Ponds, respectively. In Allendale Pond, dioxin concentrations are higher in the 0-1 ft interval than below 1 ft. The highest dioxin concentrations are found at the surface in some cores, and in the subsurface in others. In one core from Lyman Mill Pond, higher concentrations are found in samples below 1 ft. Again, the dioxin concentration peak is near the surface in some cores, and in the subsurface in others.

Figure 4-35 shows the relationship of dioxin TEQ concentration with TOC content in sediment samples from Allendale and Lyman Mill Ponds. The top panel in Figure 4-35 includes all samples with paired dioxin-TOC data, and the bottom panel includes only the sediment core samples collected in May 2003. Dioxin TEQ concentration and TOC content are not well correlated (i.e., correlation coefficient <0.3), although samples with less than 3% TOC generally have lower TEQ concentrations. Additional investigation of possible lognormal relationships between TEQ and TOC did not substantially improve the correlation (i.e., correlation coefficient <0.35). The lack of a strong correlation is probably due to the abundance of organic matter in most of the sediment that has accumulated in the ponds since the dams were built. Although dioxins and furans have a strong tendency to adsorb to organic material, other factors such as time of release and depositional processes also influence their distribution. Some high TOC sediments were deposited before and after the discharge of dioxin from the CMRP site, yielding samples with high TOC and low TEQ concentrations. Additionally, depositional areas of the river appear to have accumulated dioxin-contaminated sediments; sediments in other parts of the river may have abundant organic material but lower TEQ concentrations.

Figure 4-36 shows the relationship of grain size (expressed as percent fines) and dioxin TEQ concentration. Dioxin and other hydrophobic organic compounds have a strong tendency to adsorb to fine-grained sediment particles. As expected, dioxin TEQ concentrations are lowest in samples with less than 20% silt+clay (with the exception of one sample), although overall the correlation between percent fines and TEQ is not strong (i.e., correlation coefficient <0.3).

The May 2003 core logs provided in Appendix D show the sediment type, dioxin and TOC concentrations, location of the 1940 time horizon based on radiometric age dating results, and geotechnical characteristics of selected sediment samples (the 1940 time horizon incorporates uncertainty associated with the sediment age estimates, and represents the segment of the core that corresponds to the onset of CMRP site-related activities). Radiometric age dating results show a good correlation with dioxin concentrations, with no significant contamination found in sediments deposited prior to 1940, and maximum concentrations generally corresponding to samples dated from about 1950 to 1970 (Figure 4-37). These dates encompass the period when hexachlorophene was manufactured on the site (around 1965). The most recently deposited sediments still show evidence of dioxin contamination, which may reflect the fact that the major upland sources were not controlled (i.e., contaminated soils in the source area were not capped) until approximately 2000. Additionally, post-depositional processes including bioturbation and sediment resuspension mix surface and subsurface sediments, resulting in the distribution of dioxin throughout the active layer. Assuming an average sedimentation rate in Allendale Pond of 0.5 to 0.8 cm/year (Section 3.7.1), a 1 ft depth corresponds to an age of 40 to 60 years (i.e., 1943-1963).

4.4.2 Semivolatile Organic Compounds

Statistical summaries of SVOC concentrations in sediment are provided in Tables C-5 though C-11 (Appendix C). Benzo(a)pyrene and dibenz(a,h)anthracene were found to contribute to human health risk at the CMRP site (Table 4-8). Concentration data for these two PAH compounds are summarized in Table 4-9 (samples from the oxbow area were not analyzed for SVOCs), and boxplots are provided in Appendix C. Benzo(a)pyrene was detected in more than 50% of the samples from all reaches of the river. Dibenz(a,h)anthracene was detected in less than 50% of the samples collected in the Allendale and Lyman Mill reaches. The mean concentration of benzo(a)pyrene is highest in the upstream background sediments and lowest in the Assapumpset (reference) sediment. Concentrations in the reaches adjacent to and downstream of the CMRP site are not significantly higher than those in background sediments. N-nitroso-di-n-propylamine was also identified as a human health chemical of concern. This SVOC was only detected in one sediment sample from the Manton reach of the river.

A petroleum hydrocarbon assessment, including fingerprinting analysis of PAH composition, was performed in 2003 using five sediment core samples from Allendale and Lyman Mill Ponds (Battelle, 2003c). The results indicate that the gelatinous organic silt layer observed at the sediment surface over much of Lyman Mill Pond likely contains combustion byproducts (soot) and residual petroleum (asphalt, motor oil, and possibly other residual petroleum products) consistent with an urban background signature. The signature of urban runoff was more pronounced in samples from the central part of Lyman Mill Pond, possibly due to the greater density of human activity, incidental hydrocarbon releases from vehicular traffic, and commercial activity in adjacent upland locations. No pronounced localized signatures of petroleum and tar products were detected in the samples.

4.4.3 PCBs and Pesticides

Statistical summaries of PCB and pesticide concentrations in sediments are provided in Tables C-5 though C-11 (Appendix C). As previously noted, the PCBs and pesticides that contribute to ecological and human health risk are coplanar PCB congeners, Aroclor 1254, Aroclor 1268, total Aroclors, 4,4′-DDD, 4,4′-DDE, dieldrin, and technical chlordane. Table 4-9 includes summary statistics for these chemicals, and boxplots are provided in Appendix C (results for 4,4′-DDT are included in Table 4-9 because it is the parent compound of 4,4′-DDD and 4,4′-DDE).

The procedure used to convert PCB congener concentrations into PCB TEQ concentrations is described in Appendix A. Only a small number of sediment samples were analyzed for coplanar PCB congeners (two in the upstream reach, one in the Allendale reach, and three in the Lyman Mill reach). Sample results suggest that PCB TEQ concentrations are higher in the Allendale Reach than in the upstream or Lyman Mill reaches (Table 4-9). The highest detection frequencies for Aroclor 1254 were in samples from the Allendale, Lyman Mill, and upstream reaches of the river. A boxplot of Aroclor 1254 concentrations is provided in Figure 4-38. Aroclor 1254 was detected in less than 50% of the samples from the Manton and downstream of Manton reaches of the river, and from Assapumpset Brook. Aroclor 1254 concentrations in the Allendale reach only are significantly higher than concentrations in the upstream (background) reach. The maximum detected Aroclor 1254 concentrations in floodplain soil samples from the oxbow area is similar to the maximum detected concentration in Lyman Mill Pond (Table 4-9). Aroclor 1268 and total Aroclor concentrations in reaches of the river adjacent to and downstream of the CMRP site are not significantly higher than background concentrations (Table 4-9).

Concentrations of the pesticides in sediment adjacent to and downstream of the CMRP site are not significantly higher than background concentrations (Table 4-9). A boxplot of dieldrin sample results is provided in Figure 4-39; this pesticide was detected in less than 50% of the samples collected from all reaches of the river except the oxbow area floodplain soil samples. Dieldrin concentrations in oxbow area soil samples are similar to those in Allendale and Lyman Mill Ponds.

4.4.4 Metals and Inorganics

Statistical summaries of metal and inorganic constituent concentrations in sediments are provided in Tables C-5 though C-11 (Appendix C). Metal and inorganic chemicals contributing to risk at the CMRP site are aluminum, arsenic, barium, cadmium, methylmercury, selenium, vanadium, and zinc (Table 4-8). Summary statistics for these chemicals are presented in Table 4-9, and boxplots are provided in Appendix C (results for total mercury are included in Table 4-9 because it is the source of methylmercury). None of the metal or inorganic chemicals of concern are significantly higher in sediments adjacent to and downstream of the CMRP than in upstream (background) sediment. Methylmercury is produced from inorganic mercury by microbial activity. Total mercury concentrations adjacent to and downstream of the CMRP site were not significantly higher than background concentrations.

4.4.5 Environmental Forensic Review of Chlorinated Organic Compounds in Sediment

An environmental forensics review of persistent chlorinated organic compounds at the CMRP site was performed to characterize compositional relationships among analytes detected in the study area and to differentiate, if possible, between assemblages of contaminants associated with the CMRP source area from those associated with current or historic activities that are not site-related. The complete review is presented in NewFields (2005) (provided as Appendix E) and is summarized below. The forensics review relied upon three data analysis methods: (1) statistical analysis of chemical concentration data for various RI sample groups, (2) examination of correlation relationships between various classes of compounds, and (3) principal components analysis (PCA) to characterize compositional patterns on a sample-specific basis. Analyte concentration data and compositional trends were used to infer likely sources of contamination to the study area. Major findings of this review are summarized below, and the full analysis is provided in Appendix E.

Patterns of PCDDs and PCDFs (i.e., fingerprints) are commonly indicative of the process that generated them. Consequently, the PCDD/DF fingerprints between candidate source and release areas can be compared to determine the origin of these compounds in the environment. Hexachlorophene was reportedly manufactured within the source area in the mid-1960s. Hexachlorophene was produced by reaction of raw materials such as 2,4,5-trichlorophenol and 2,4,5-trichloroaninsole and used as an additive for antibacterial soap and cosmetics (Archer and Crone, 2000). In addition to the co-generation of 2,3,7,8-TCDD, the manufacture of hexachlorophene produced HCX in widely varying amounts depending on the reaction conditions of the manufacturing process (Archer and Crone, 2000). Previous investigators recommended the use of detected levels of HCX to identify residues of the hexachlorophene manufacturing process; however, the high variability of the process prevents the use of source ratios, such as HCX:2,3,7,8-TCDD, for the reliable identification of hexachlorophene byproducts (Archer and Crone, 2000).

Table 4-10 summarizes concentrations of various chlorinated organic analyte concentrations by area. Chemical concentrations in upstream (background) sediment samples were statistically compared with data for reaches of the Woonasquatucket River adjacent to and downstream from the CMRP site (i.e., Allendale, Lyman Mill, Manton, and downstream of Manton reaches). Chemicals with concentrations that were significantly higher than upstream background concentrations were considered to be potentially influenced by CMRP site activities or other local sources not reflected in the upstream background concentrations.

Dioxin (2,3,7,8-TCDD) concentrations were highest in Allendale Pond sediments and decreased in a downstream direction. 2,3,7,8-TCDD concentrations were significantly higher than upstream background concentrations in sediments from all reaches of the river downstream of the CMRP site. Concentrations in Allendale Pond sediments were higher than source area soil concentrations. Dioxin congeners other than 2,3,7,8-TCDD were not significantly higher than upstream background concentrations. HCX was found throughout the study area, with highest concentrations found in Allendale Pond, Lyman Mill Pond, downstream of Manton, and source area samples. HCX concentrations in Allendale Pond were higher than source area soil concentrations. The HCX concentration fluctuated independently relative to the 2,3,7,8-TCDD concentration, presumably because of variable manufacturing processes for hexachlorophene. HCX also was detected in many upstream background samples. The presence of HCX in the upstream background samples may be due to discharge of soaps or cosmetics containing hexachlorophene into the river, possibly from the North Smithfield WWTP. However, HCX concentrations were significantly higher than upstream background concentrations in all reaches of the river downstream of the CMRP site, and residues of the historical manufacturing of hexachlorophene at the CMRP site appeared to extend downstream from the source area to approximately half of the sampling locations

downstream of Manton Dam. The long downstream migration path for 2,3,7,8-TCDD and HCX is consistent with a manufacturing discharge in which the chemicals were not adsorbed to heavy soil particles capable of retarding movement.

Furan concentrations in Woonasquatucket River sediments were not significantly higher than upstream background concentrations except for two HxCDF congeners in Manton Pond. These furans are believed to be from a local, non-CMRP related source. Furan concentrations were higher in Allendale Pond sediments than in source area soils. A high degree of variability in the furan pattern may be the result of variable manufacturing processes for hexachlorophene, or of multiple PCDF sources.

The highest concentrations and greatest compositional diversity of dioxins and furans were observed in Allendale Pond sediments. The PCDD/DF fingerprint that was evident in source area samples could be seen in samples from Allendale Pond, Lyman Mill Pond, Manton Pond, and downstream sediments largely based on the higher levels of TCDD relative to other congeners. This signature was most evident in the top 2 ft of sediment. These results were consistent with the tracking of the source area signature based on HCX distribution.

Diverse mixtures of high-concentration PCBs and pesticides were largely confined to the source area. Aroclor 1254 was the dominant PCB; other Aroclors were spatially limited in the source area. Detection frequencies for Aroclors in Allendale Pond were similar to those in the source area. Aroclor concentrations in Woonsquatucket River sediments downstream of the CMRP site were not significantly higher than upstream background concentrations with the exception of Aroclor 1254 in Allendale Pond, Aroclor 1248 in Allendale and Lyman Mill Ponds, and Aroclor 1242 in the downstream of Manton reach. PCBs most likely migrated on soil particles into Allendale Pond; below Allendale Pond, PCB mixtures are indistinguishable from background.

The chlorinated pesticide signature in upstream background area samples contained a mixture of chlordane, endosulfan, and DDT-related compounds. The source area samples shared this basic fingerprint with variations in the relative abundances of dieldrin, endrin, benzene hexachloride (BHC), and other pesticides. This chemical diversity is consistent with the drum reconditioning operation that received used drums from various sources. Pesticide assemblages in many samples from Allendale Pond resembled source area mixed with background signatures. Although it is possible that pesticides from the source area reached Lyman Mill Pond, upland soils adjacent to Lyman Mill Pond more closely matched the pattern in these sediments. Below Lyman Mill Pond, the sediment pesticide patterns were consistent with background conditions. Sediment samples from Assapumpset Pond and Brook exhibited no chemical influence from historical activities at the CMRP site based on concentration and compositional data.

Total PCB and dioxin TEQ concentrations were poorly correlated (i.e., correlation coefficients <0.3), which suggests that these contaminants have different release histories. High-concentration Aroclors were largely confined to the source area. The former drum reconditioning facility probably received chemical shipping and storage containers from numerous sources and may be the original source of the PCBs. As previously noted, dioxin distribution patterns suggest that it may have been contained in manufacturing discharge from the hexachlorophene production process. Total PCB and total pesticide concentrations were moderately correlated (i.e., correlation coefficients >0.5), indicating that high concentrations of PCBs tended to occur with high concentrations of pesticides.

The following conceptual model is consistent with the findings of the environmental forensics analysis:

- Dioxins (primarily 2,3,7,8-TCDD), furans, and HCX were generated as hexachlorophene byproducts that were discharged directly into the Woonasquatucket River. 2,3,7,8-TCDD

and HCX ratios are not constant because of variations in the hexachlorophene production process; however, the co-occurrence of HCX and 2,3,7,8-TCDD above background levels in sediments from Allendale Pond to downstream of Manton Dam indicates that the contaminants came from the manufacture of hexachlorophene on the CMRP site.

- The former drum reconditioning operation in the source area likely washed pesticide and PCB residues into the source area soils. Surface soil erosion and transport transported some of these residues to downgradient locations. Localized soil erosion and inputs from upstream background locations altered and diluted the source area signature. Aroclor and pesticide contributions to river sediments are generally indistinguishable from background below Lyman Mill Pond.

4.5 Surface Water

Table B-4 (Appendix B) lists all surface water samples collected at the CMRP site and the associated analytical parameters. Surface water sample locations from north to south are shown in Figures 4-19, 4-40, 4-41, 4-22, and 4-23. Reference surface water sample locations are shown in Figure 4-24. Statistical summaries for all analytical parameters in surface water samples from the source area and each reach of the river are provided in Tables C-12 through C-18. Source area surface water samples were collected from the former tailrace prior to capping in 2003-2004. Therefore, data for these samples no longer represent current conditions on the site. The discussion below focuses on dioxin, which is the only parameter that was found to potentially contribute to unacceptable risk. The BHHRA found that potential risks from direct exposure to dioxin in surface water exceeded the risk management range for Superfund, although this finding is based on total dioxin concentration data rather than dissolved-phase data (MACTEC, 2004b). Uncertainties associated with the direct exposure pathway are currently being evaluated in greater detail. The BERA found that potential risks to ecological receptors from ingestion of or direct contact with surface water were not significant compared with potential risks from bioaccumulation and trophic transfer (MACTEC, 2004a).

A statistical summary of dioxin TEQ results for surface water is provided in Table 4-11, and a boxplot is shown in Figure 4-42. Few samples were collected in the background and reference areas, and none were collected downstream from Lyman Mill Dam. Dioxins were not detected in the Assapumpset Brook reference sample, and at trace levels in one of the background area samples from Greystone Mill Pond. Median dioxin TEQ concentrations in surface water samples from the Allendale and Lyman Mill reaches of the river were similar, although the maximum concentration was measured in a sample from Allendale Pond.

5.0 CONTAMINANT FATE AND TRANSPORT

This section describes the most significant fate and transport processes that currently influence the movement of contaminants at the CMRP site (historical release and transport mechanisms are summarized as part of the CSM in Section 7.0). These processes control how site-related contaminants migrate from the source area into various media (soil, groundwater, sediment, and surface water) and ultimately to human and ecological receptors. The following discussion focuses on the COCs identified in the BERA and BHHRA that were found to be significantly higher in sediments adjacent and downstream from the CMRP site than in upstream (background) sediments: dioxins (particularly 2,3,7,8-TCDD), Aroclor 1254, dieldrin, and methylmercury. Coplanar PCBs also are included, although insufficient data were available for statistical comparisons to upstream (background) concentrations.

Potentially important fate and transport processes in the CMRP source area include the erosion and runoff of contaminated soils, volatilization of VOCs from vadose zone soils, and leaching of contaminants from soils into groundwater. Potential fate and transport pathways in the Woonasquatucket River are resuspension and downstream transport of contaminated sediment particles, partitioning of contaminants from sediment to water and transport via diffusion and advection, transformation and/or biodegradation of contaminants in the sediment bed, and bioaccumulation (transfer of contaminants into the tissues of organisms from direct contact with or ingestion of sediments and water). The environmental behavior of various contaminants is controlled by their physical and chemical properties. These properties are described below, followed by an evaluation of fate and transport processes in the CMRP source area and Woonasquatucket River.

5.1 Physical and Chemical Properties of Primary COCs

Important physical and chemical properties that control the fate and transport of contaminants at the CMRP site are water solubility, organic carbon partition coefficient (K_{oc}), octanol-water partition coefficient (K_{ow}), and the Henry's Law constant (H_c). These parameters control the partitioning of chemicals between various phases. Water solubility influences the movement of a compound from solid to liquid phases (i.e., from soil to groundwater and sediments to porewater and surface water). The organic carbon partition coefficient is a measure of the equilibrium concentration of a compound between organic carbon and water. Log K_{oc} increases as the tendency for a compound to adsorb to organic carbon increases. The octanol-water partition coefficient is a measure of the equilibrium concentration of a compound between octanol and water. The log K_{ow} increases as the tendency for the compound to partition from water into lipids increases. A high Log K_{ow} value indicates a tendency for the compound to bioaccumulate into plant and animal tissue. Henry's Law constant is a vapor-water partition coefficient. Vapor pressure is a measure of the tendency for a chemical to volatilize.

Table 5-1 presents typical values of these parameters for the chlorinated organic COCs that are driving risk at the CMRP site. 2,3,7,8-TCDD is one of the most toxic dioxin congeners, and is detected at high concentrations in many samples from the CMRP site relative to other congeners (Figure 5-1). 2,3,7,8-TCDD can cause chloracne and cancer in humans, and a variety of effects in animals including reproductive damage and disruption of the endocrine system (ATSDR, 1998). Other PCDDs, PCDFs, and coplanar PCBs have similar physical properties and environmental behavior as 2,3,7,8-TCDD. Dioxins and furans are highly hydrophobic, lipophilic, and very stable under most environmental conditions. They have very low vapor pressures and do not tend to volatilize. Binding to particulates and sediment and bioaccumulation by aquatic organisms are the most significant fate and transport processes (ATSDR, 1998). In most environments, dioxins and furans are strongly adsorbed to particulate and organic matter and are relatively immobile. Therefore, the primary transport mechanism for dioxins and furans at the CMRP site is expected to be transport on soil or sediment particles.

Dioxins adsorb more strongly to soils with a higher organic carbon content than those with a lower organic carbon content (Yousefi and Walters, 1987). However, the vertical mobility of dioxin in soil will increase if organic solvents are present in the soil (Podoll et al., 1986). Dioxins resist degradation by oxidation, hydrolysis, or biological activity (Arthur and Frea, 1989). Aroclor 1254 and dieldrin also have low solubilities and a tendency to adsorb to particles and organic matter and bioaccumulate in aquatic organisms.

The BHHRA found that methylmercury contributed to risk from fish consumption (MACTEC, 2004a). Mercury was not identified as a COC in the source area (i.e., mercury concentrations did not exceed the RIDEM direct exposure criterion for residential use soils), and total mercury concentrations in sediment adjacent to and downstream from the source area were not significantly higher than upstream (background) concentrations. As noted in Section 4.4.4, methylmercury is produced from inorganic mercury by microbial activity. Methylmercury is soluble, mobile, and quickly enters the aquatic food chain (ATSDR, 1999). The exact mechanisms by which mercury enters the food chain are not known or clearly understood (USGS, 2000b).

5.2 Fate and Transport Processes in Source Area

Contaminated soils in the source area currently are not posing an unacceptable human health or ecological risk because the majority of the area is either capped or paved. Groundwater also is not believed to be posing an unacceptable human health risk, although it could be pathway for the discharge of dioxin to the Woonasquatucket River adjacent to the Brook Village parking lot (Section 4.3).

Because the majority of the soils are capped or paved, erosion and runoff are not significant transport pathways as long as the capped and paved surfaces are maintained. Floodwaters periodically inundate the source area (e.g., as in 1998), and the soil caps must be able to withstand the erosive forces of floodwaters to prevent migration of contaminated soils.

Elevated concentrations of VOCs in source area soils are localized and in areas that are either capped or paved (Section 4.2.1.2). An air survey was performed by U.S. EPA in 1999 to investigate whether VOCs were migrating into the indoor air environment in the Centeredale Manor and Brook Village apartment buildings (U.S. EPA, 1999a). The screening results of the survey indicated no significant migration of VOCs from soils into buildings, and therefore no significant potential risk exists from the inhalation pathway (see Section 1.4). Therefore, volatilization does not appear to be a significant pathway of contaminants from the source area.

Leaching of contaminants from soil to groundwater in the source area was evaluated as part of an approach for developing a long-term remedy for source area soils (Battelle, 2004d). Results of this evaluation are summarized in Section 4.2. RIDEM leachability criteria are intended to protect the designated groundwater quality (GB for the CMRP site). Although GB leachability criteria were exceeded in some soils (primarily beneath parking lots), GB groundwater criteria were exceeded only in samples from two wells in the Brook Village parking lot, and one deep well on the southeast side of the site. These results indicate that except in the vicinity of the Brook Village parking lot, leaching does not appear to be a major pathway of concern. PCE and TCE in soil and groundwater beneath the Brook Village parking lot adjacent to the Woonasquatucket River may be mobilizing dioxin. The VOC-contaminated groundwater is discharging to the river over a distance of about 50 ft. However, it is not clear if dioxins also are discharging to river in VOC-contaminated groundwater, and if so, whether the magnitude of the discharge is significant. Additional investigation is in progress to determine whether this is a significant transport pathway for dioxin.

5.3 Fate and Transport Processes in Woonasquatucket River

Dioxin (2,3,7,8-TCDD) is the primary COC in the Woonasquatucket River. Average dioxin (and HCX) concentrations are higher in Allendale Pond sediments than in source area soils, and concentrations exceeding background levels appear to extend farther downstream than concentrations of site-related PCBs and pesticides (Section 4.4.5). Additionally, concentrations of dioxin and PCBs in sediment are poorly correlated, which suggests that these contaminants do not co-occur and may have different release histories and/or transport mechanisms.

One source of dioxin (primarily 2,3,7,8-TCDD) and HCX to the river may have been the direct discharge of dioxin-bearing waste from the hexachlorophene manufacturing process into the river. Dioxins and HCX directly discharged to the river would have a strong tendency to adsorb to organic material and fine-grained suspended sediment particles. These particles would eventually be deposited downstream in lower energy depositional areas. This mechanism could explain why 2,3,7,8-TCDD and HCX appear to have been transported farther downstream than other site-related contaminants such as Aroclor 1254, and why concentrations of these contaminants are higher in Allendale Pond sediments than source area soils (although higher TOC content and finer grain size in pond sediments relative to source area soils also could facilitate concentration of dioxin and HCX). This type of transport would have occurred for a short period of time in the mid-1960s. The relatively brief period of release could explain the lack of a strong correlation between TEQ and TOC concentrations in sediment samples from the river: highly organic silts deposited before and after the 1960s would have a high organic carbon content, but little or no dioxin contamination.

Other contaminants from the source area (e.g., PCBs, pesticides, dioxins/furans) probably entered the river primarily via surface runoff and erosion of contaminated source area soils. Chemicals present in runoff from the site would tend to adsorb to fine-grained sediment particles in Allendale Pond. Concentrations of these COCs (with the exception of some dioxins/furans) are lower in Allendale Pond sediments than in source area soils, and do not appear to have migrated as far downstream. These mechanisms would have operated from the time that waste-related activities began at the site until all contaminated source area soils were capped. Contaminated sediments now act as secondary sources of contamination. Potentially significant fate and transport processes are discussed further below.

5.3.1 Sediment Resuspension and Transport

A sediment stability evaluation of Allendale and Lyman Mill Ponds was conducted as described in Section 2.5.4 to evaluate the potential for sediment resuspension and downstream transport under typical and extreme conditions (QEA, 2004a). The sediment stability evaluation considered both the hydrodynamic forces that induce sediment resuspension and the properties of the sediment bed that influence erosion rates. Erosion from a sediment bed occurs through two modes of transport: (1) bed load transport, which is the near-bed transport of sand and gravel; and (2) suspended load transport, which is resuspension of clay, silt, and fine sand into the water column. The eroded sediment particles eventually deposit at a different location.

A two-phased approach was used to characterize sediment stability in Allendale and Lyman Mill Ponds. In Phase I, site data were compiled, analyzed, and synthesized to develop a coherent understanding of sediment transport in the study area. Results of the data-based analyses were used to develop a CSM for sediment transport. A sediment transport CSM is a detailed component of the overall CSM presented in Section 7.0. The sediment transport CSM is a qualitative description of the processes (e.g., deposition and erosion) and system characteristics (e.g., spatial distribution of bed properties) that control sediment dynamics within the study area.

Based on the data-based analyses, the following CSM for sediment transport was proposed (QEA, 2004a):

- The surficial layer of the sediment bed in each pond (i.e., approximately the upper 1-2 ft) is generally composed of cohesive sediment. Cohesive sediments have a median particle diameter of less than 250 μm and clay/silt content of greater than 15 percent (Ziegler and Nisbet, 1994). Relatively small areas of noncohesive sediment are found in each pond, and are typically in locations where higher current velocities exist.

- The composition of surficial sediment is finer in the downstream pond (Lyman Mill Pond) due to the selective deposition of coarser sediment in the upstream pond (Allendale Pond).

- The two ponds are net depositional environments for most flowrates. Significant erosion during a high-flow event is expected to occur over small areas within each pond.

- The river channel upstream of each pond (i.e., impoundment) is composed of coarse, noncohesive sediment and is typically non-depositional. The river channels serve as conduits for suspended sediment into and between the ponds.

The potential impacts of rare floods (i.e., 100-year return frequency) on bed stability in the two ponds were evaluated using the EFDC hydrodynamic model. The primary results of the modeling are as follows:

- In Allendale Pond, significant scour will occur over less than 5 percent of the bed area in the pond during a rare flood. Significant erosion, i.e., greater than approximately 1 cm, will generally occur in the northern portion of the pond, near the upstream inlet (Figure 5-2).

- Significant scour will occur over a larger area in Lyman Mill Pond than in Allendale Pond, with up to 10 to 15 percent of the Lyman Mill Pond bed having erosion greater than approximately 1 cm. Bed scour generally occurs in the northern portion of Lyman Mill Pond, with maximum erosion near the upstream inlet (Figure 5-3).

- The absolute magnitude of the model predictions is more uncertain than the relative magnitude. For example, predictions of mass of sediment eroded during a 100-year flood (195 and 2,400 metric tons in Allendale and Lyman Mill Ponds, respectively) have an order-of-magnitude accuracy, at best. The relative difference between the two predictions, i.e., the magnitude of erosion is expected to be much larger in Lyman Mill Pond than in Allendale Pond, is probably more accurate and reliable.

The model-based analyses appear to be consistent with the proposed CSM. The impacts of rare floods on bed scour are predicted to be restricted to a relatively small portion (i.e., less than approximately 5 to 15 percent of pond area) of the sediment bed in each pond. The modeling results suggest that deposition occurs over large portions of Allendale and Lyman Mill Ponds during high-flow events; deposition rates during a flood will be spatially variable within each pond due to variations in sediment load and bottom shear stress. In addition, sediment eroded in the upstream portions of each pond during a flood will be transported downstream by river currents. A portion of the eroded sediment will be redeposited within the pond; current velocity and bottom shear stress tend to decrease in the downstream portions of each pond, making those areas conducive to redeposition of eroded material from upstream locations. However, the hydrodynamic model is unable to predict the proportion of sediment redeposited within each pond, or the amount potentially transported downstream of Allendale and Lyman Mill Dams.

The validity of the sediment stability study conclusions depends on the uncertainty in the data and model. Attempts were made to incorporate the effects of uncertainty in the data-based analyses. Uncertainty in the data-based analyses was reflected in the conclusions through use of ranges of results, rather than specific numbers.

Uncertainty in the model-based conclusions is due to these primary sources: (1) lack of model calibration; (2) insufficient data to develop a detailed bed map for the ponds; and (3) lack of site-specific erosion potential data. Additional data collection was conducted in 2005 to reduce these uncertainties.

5.3.2 Advective and Diffusive Flux

The flux of dioxin from the sediment bed to the water column in Allendale and Lyman Mill Ponds under low flow (i.e., non-resuspending) conditions was evaluated as part of the sediment stability study (QEA, 2004a). Water column samples collected in October and November 1999 were used in the evaluation (TTNUS, 2000b). The sampling was carried out during low to moderate flow conditions during which it is expected that sediment resuspension does not occur. Under non-resuspending conditions, COC flux (i.e., dioxin flux) from the bed to the water column occurs due to a combination of various processes, including diffusion, bioturbation and groundwater flux. The flux analysis is presented in detail in QEA (2004a) and is summarized below.

The spatial distribution of dioxin concentrations suggested that the study area could be divided into five zones (Table 5-2 and Figures 5-4 and 5-5). Dioxin concentrations increased between Zones 1 and 2 (i.e., from the upstream area to the source/upstream portion of Allendale Pond area), with average concentrations increasing from 27 to 1,160 pg/L (Table 5-2). Moving from Zone 2 to 3 (i.e., from upstream portion to downstream portion in Allendale Pond), concentrations decreased to levels observed in Zone 1. In Zone 4 (i.e., upstream portion of Lyman Mill Pond), dioxin water column concentrations increased again to an average value of 105 pg/L. As in Allendale Pond, concentrations in Zone 5 declined to values comparable to Zone 1 and 3 concentrations.

Dioxin loads were calculated by multiplying the observed dioxin water column concentration by the daily average flowrate for the day of sample collection (Table 5-3). The calculated water column loads have a spatial pattern that is similar to the one observed for water column concentrations. Higher loads occur in Zones 2 and 4, while lower loads are observed in Zones 1, 3 and 5. Dioxin loads ranged from about 2 to 870 mg/day during this low-flow period.

Results of the water column load analysis were used to draw preliminary conclusions about dioxin loading to the water column during non-resuspending conditions in Allendale and Lyman Mill Ponds. First, dioxin loads of approximately 110 and 11 mg/day, on average, are added to the water column in Zones 2 and 4, respectively. It assumed that the sediment bed is a source of the dioxin loading to the water column in Zones 2 and 4; mass transfer of porewater from the bed to water column (due to processes such as diffusion, bioturbation, and groundwater advection) is probably the main source of dioxin. Another possible source of dioxin in Zone 2 is contaminated groundwater discharge to the river in the vicinity of the Brook Village parking lot. Second, transport processes within Allendale and Lyman Mill Ponds appear to remove the loads from Zones 2 and 4, resulting in a return to background levels in the downstream portion of each pond. Background dioxin loads in the river appear to be approximately 4 mg/day. The processes responsible for the apparent removal of the loads from Zones 2 and 4 are not known. Third, minimal increase in dioxin loading occurs between the upstream boundary of the study area and Lyman Mill Dam. Minimal net export of dioxin from the two ponds occurs during low-flow, non-resuspending conditions; the water-column load of dioxin entering the study area (i.e., the background load) is approximately equal to the load over Lyman Mill Dam during low-flow periods.

The data set used for this analysis is limited, with only three to five samples from Zones 1, 3 and 5. Thus, uncertainty exists in the estimates of dioxin loads and the preliminary conclusions drawn from the analysis. Additional data collection is in progress to assess the validity of these hypotheses.

6.0 BASELINE RISK ASSESSMENT

This section presents results from the baseline risk assessments conducted for the CMRP site. BERA and BHHRA investigations were initiated in 2001, and included an evaluation of current and future potential risks to the environment and public health. Results from the risk assessments will form the basis for any future remedial activities at the site. The following is a summary from the BERA and BHHRA reports; complete details are presented in MACTEC (2004a and 2004b).

6.1 Ecological Risk Assessment

The BERA analyzes potential adverse ecological effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action at the site). Samples were collected to support the BERA when the Allendale Dam was breached and floodplain soils were exposed in Allendale Pond, although the BERA assumed a restored condition. The dam was restored in 2001, and the water level in the pond was raised. The potential impact of using samples collected when the dam was breached is addressed in the BERA uncertainty analysis. In accordance with U.S. EPA guidance, the BERA consists of four components: problem formulation, exposure assessment, effects assessment, and risk characterization (including an evaluation of risk uncertainties) (U.S. EPA, 1997b). Each of these components is described below.

6.1.1 Problem Formulation

The problem formulation focuses the BERA and establishes the goals, breadth, and major issues for consideration, and includes a description of the environmental setting and resources potentially at risk; the selection of COPCs and their fate, transport, and ecotoxicity; the selection of receptors of concern and species profiles; a CSM with complete exposure pathways; assessment and measurement endpoints along with the study rationale, and risk hypotheses.

Environmental Setting

The Woonasquatucket River is designated as a Class B1 waterbody, suitable for primary and secondary human contact recreation and fish and wildlife habitat. The land-use for the eastern shore of Allendale and Lyman Mill reaches is primarily residential with some commercial and industrial activity. Residential, commercial, and industrial properties are located approximately 200 ft or more from the western shore of Allendale and Lyman Mill. Undeveloped land adjacent to the river includes palustrine forest, scrub-shrub, and emergent marsh. Fish and aquatic invertebrates associated with the Woonasquatucket River are typical of a warm-water fishery in New England; these organisms in turn support of variety of wildlife species that specialize on fish, invertebrate, or mixed diets (piscivores, insectivores/vermivores, and omnivores, respectively).

Conceptual Site Model

The CSM identifies the sources, media, pathways and routes of exposure evaluated in the BERA, and the relationship between the measurement endpoints and the assessment endpoints (U.S. EPA, 1997b). It serves as a communication tool that illustrates the major pathways by which ecological receptors might be exposed to COPCs associated with releases from the site source area. Figure 6-1 presents a generalized ecological CSM for the site.

A description of the source area, history of improper waste disposal activities conducted at site, and contaminants detected in various environmental media (e.g., soil, sediment, fish, water and groundwater) at the site is provided in Section 1.3. Downstream sediments have been impacted through the transport and deposition of contaminants from the source area. Partial breaching of Allendale Dam in 1991 and again in 2001 may have facilitated additional contaminant migration.

Contaminants that were discharged from the source area entered the Woonasquatucket River and were transported downstream dissolved in the water column and/or adsorbed to suspended sediments. Over-land flow during flooding events resulted in contamination of lateral floodplain habitats associated with the river. Over time, contaminants preferentially accumulated in floodplain soils and sediments located in low energy depositional areas, which are characterized by higher organic carbon content. Compounds with a propensity to bioaccumulate were taken up by plants, invertebrates, and fish and were transferred through aquatic food webs. Wildlife species that consume these lower trophic level organisms could also be exposed to site-related contaminants. Contaminants that were deposited in floodplain soils could also enter the terrestrial food webs by a similar process.

- **Potential Ecological Receptors.** Potential ecological receptor species considered in the BERA are aquatic and floodplain invertebrates, amphibians, fish, birds, and mammals that depend on aquatic resources of the Woonasquatucket River. In general, aquatic receptors (including invertebrates and both demersal and pelagic fish species) are exposed to COPCs in sediment and surface water via direct contact, direct ingestion, or by consuming prey items that have bioaccumulated COPCs. Semi-aquatic receptors (including mammals, birds, reptiles, and amphibians) may be exposed as a result of incidental ingestion of sediment, consumption of water, or ingestion of contaminated prey. Terrestrial invertebrates and wildlife that prey on these species may be exposed to contaminants in floodplain soil directly or by ingesting contaminated prey.

- **Ecological Exposure Pathways.** Ecological receptors may be exposed to site-related contaminants through a variety of exposure pathways. A complete exposure pathway involves a potential for contact between a given receptor and contamination either through direct exposure to an abiotic medium (air, soil, sediment, water) or indirectly through prey consumption. Pathways are evaluated by considering information on contaminant fate and transport, ecosystems potentially affected, and the magnitude and extent of contamination (U.S. EPA, 1997b).

The BERA includes evaluation of the following exposure pathways: direct contact with surface water, sediment and floodplain soils by invertebrate receptors; ingestion of biota by piscivorous, insectivorous, and omnivorous wildlife receptors from a background location, a reference area, and the reach of the Woonasquatucket River that constitutes the site; consumption of surface water by wildlife receptors; and incidental ingestion of sediment and floodplain soil by wildlife receptors.

Animals and plants that occur in or adjacent to the Woonasquatucket River, including invertebrates, fish, amphibians, birds, and mammals, could be exposed to contaminants through contact with floodplain soil, sediment, surface water, and prey consumption. Species representing various trophic levels were selected as representative receptor species to evaluate the assessment endpoints. The selected species are intended to be representative of other species at the same trophic level that share similar ecological characteristics. These groups of species are generally referred to as guilds. By evaluating a representative member of a guild and by accounting for the predominant guilds, the uncertainty associated with missing an important species group or pathway is reduced.

Summary of Data

Dioxins and furans (particularly 2,3,7,8-TCDD), HCX, Aroclor 1254, and possibly PCB-77 appear to be the primary chemical parameters that are detected in environmental media with frequency of detection and concentrations that are indicative of site-related impacts (MACTEC, 2004a). In other words, these parameters have clearly elevated concentrations in biota tissue (including fish, earthworms, emerging insects, tree swallow eggs, nestlings, and stomach contents) and sediments in the site-related exposure areas (Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond) compared to the Greystone

Mill Pond upstream background area and the Assapumpset Pond and Brook reference area. In addition, a distinctive dioxin/furan "signature" characterized the site sediment, floodplain soil, white sucker, American eel, largemouth bass, crayfish, emerging insects, earthworms, and tree swallow eggs, nestlings, and stomach contents. In virtually all cases, the average 2,3,7,8-TCDD concentrations are 10 to 100 times higher in sediment and tissue samples from Allendale and Lyman Mill compared to the background and reference areas.

Chemicals of Potential Concern Selection

Using the data collected in soil, surface water, sediment, and biota (white sucker, largemouth bass, American eel, crayfish, earthworms, emerging insects, and tree swallow eggs, nestlings, and stomach content), chemicals were initially identified as COPCs by media for the site and chemicals of interest (COIs) in reference/background areas. COPCs require further evaluation in the risk assessment if the chemical concentrations are above risk-based screening concentrations.

COPCs selected for the environmental media include the following:

1. **Surface water:** *bis*-2-ethylhexylphthalate, several pesticides, inorganics (total and dissolved), ammonia, dioxins and furans, and HCX.
2. **Overburden groundwater:** COPCs include two VOCs and six SVOCs.
3. **Sediment:** SVOCs, particularly PAHs, pesticides, inorganics, PCBs, and dioxins, furans, and HCX.
4. **Crayfish tissue:** Pesticides, inorganics, PCBs, and dioxins, furans, and HCX.
5. **Emerging insects:** PCBs, and dioxins, furans, and HCX.
6. **Fish tissue:** SVOCs (particularly PAHs), pesticides, inorganics, PCBs, and dioxins, furans, and HCX.
7. **Floodplain soil:** SVOCs (particularly PAHs), pesticides, inorganics, PCBs, and dioxins, furans, and HCX.
8. **Earthworm tissue:** Pesticides, inorganics, PCBs, and dioxins, furans, and HCX.
9. **Tree swallow egg tissue:** Pesticides, PCBs, and dioxin, furans, and HCX.
10. **Tree swallow nestling tissue:** Pesticides, PCBs, and dioxin, furans, and HCX.

The list of COIs for the background and reference areas is very similar to that for the site. For the background area and reference area, sediment COPCs include SVOCs, particularly PAHs, pesticides, inorganics, PCBs, and dioxins, furans, and HCX. In fish tissue, COPCs also include SVOCs, particularly PAHs, pesticides, inorganics, PCBs, and dioxins and furans. HCX was not detected and therefore was not selected as a COI for white sucker, but HCX was selected as a COPC for American eel and largemouth bass. In surface water, COPCs include no VOCs, no SVOCs, no pesticides, inorganics (total and dissolved), and dioxins and furans.

Ecotoxicology of Selected COPCs

The BERA summarized the available toxicological literature for all classes of compounds identified as COPCs for each evaluated receptor category (i.e., invertebrates, fish, birds, and mammals). The TEQ approach was employed in the BERA to overcome the difficulty in assessing the overall toxicity of dioxin mixtures. Specific TEFs have been developed for human/mammals, birds, and fish. A TEQ concentration was derived by summing the products of the individual congener concentrations and their corresponding TEFs for a given environmental sample. The TEQ values presented in the BERA are reported separately for the sum of dioxin and furan congeners and the sum of PCB congeners.

No TEF has been established for HCX and interim values for mammals, birds, and fish were developed as part of the BERA based on a biochemical competition assay to assess the relative affinity of HCX relative to TCDD for binding to both fish (trout) and mammal (human) Ah-receptors (Hahn, 2001). The selected

interim TEF (0.0002) for HCX was supported by both *in vitro* and *in vivo* laboratory studies reported in the literature.

Assessment and Measurement Endpoints
The assessment and measurement endpoints evaluated in the BERA are summarized in Table 6-1.

6.1.2 Exposure Assessment

The objective of the exposure assessment is to estimate the type and magnitude of an ecological receptors' exposures to COPCs at or migrating from the site. The exposure assessment is conducted to: (1) characterize the relevant exposure areas, exposure pathways, and receptors and (2) identify the concentration, or dose, of COPCs that receptors may receive through the identified exposure pathways.

Identification of Exposure Areas
The exposure points correspond to the exposure areas identified above as follows:

- Allendale exposure area;
- Lyman Mill exposure area;
- Manton exposure area;
- Dyerville exposure area;
- The upstream background area is referred to as the Greystone Mill Pond exposure area; and
- The reference area is referred to as the Assapumpset Brook and Pond exposure area.

Exposure Point Concentrations
For each contaminant selected as a COPC, at each exposure point, representative concentrations in fish (American eel, largemouth bass, and white sucker), submerged sediment, surface water, and bank soil were identified as the basis for the exposure assessments. The representative concentrations (exposure point concentrations [EPCs]) were calculated based on the 95% UCL on the arithmetic mean concentration of the data. The procedures used to identify the 95% UCL and the EPC were selected based on the size of the data set and the distribution type for the concentration data. Exposures were assessed primarily using the central tendency exposure (CTE), which represents typical or average exposure conditions; however, the exposures are not actually measured and there is variability among receptors which might be present at the site with respect to frequency and duration of exposure and their consumption rates. Therefore, the reasonable maximum exposure (RME), expressed as the highest estimate of exposure, also was evaluated in order to bound the exposure estimates.

Identification of Exposure Models and Parameters
Chemical-specific intakes were calculated in a manner consistent with U.S. EPA guidance for risk assessment. Estimated daily intakes (EDIs) of COPCs were calculated as the measure of exposure for each selected wildlife receptor. The EDIs are expressed as milligrams of contaminant per kilogram of body-weight per day (mg/kg/day). The following exposure parameters are included in the dose calculations employed in the BERA:

- Concentrations in biota tissue, sediment, surface water, and floodplain soil
- Consumption rate
- Exposure frequency
- Fraction ingested from contaminated source
- Exposure duration
- Body weight.

6.1.3 Effects Assessment

The purpose of the effects assessment is to characterize the relationship between the concentration or dose of COPC administered or received and the incidence of adverse effects in the ecological endpoint receptor at the appropriate level of ecological organization (i.e., usually population- or community-level). The following types of information were used in the BERA:

- Toxicity reference values (TRVs) that relate a threshold concentration or ingested dose to an adverse and relevant biological response. TRVs were established for surface water, sediment, floodplain soil, and biological tissue (including invertebrates, fish, birds, and mammals)
- Sediment bioassay
- Aquatic macroinvertebrate community study
- Study of emerging insect productivity
- Floodplain macroinvertebrate community study
- Fish community survey (including fish length-weight relationships, percent gross lesions in individual fish, demographic structure analysis, and fish species richness)
- Fish ichthyoplankton study
- ELS laboratory bioassay
- Multiple year tree swallow reproductive and nestling study
- Multiple year amphibian call survey.

It is important to note that all but the first type are site-specific measures of effects were derived specifically for this BERA.

6.1.4 Risk Characterization

The risk characterization describes the types and magnitude of potential risk from contaminants for different ecological receptors. However, because of the many different interactions in a complex ecosystem like the Woonasquatucket River, there is some uncertainty that is considered when determining potential ecological risk. These uncertainties are evaluated using statistical methods, and the potential risk for different ecological receptors is expressed in terms about how certain that risk is. Table 6-2 summarizes the principal risk uncertainties and identifies the relevant assessment endpoint(s) and COPCs, as well as the direction (i.e., under- or over-estimating risks) and magnitude of likely effect. Those uncertainties that likely resulted in the BERA risk estimates being substantially under-estimated are indicated by shading, and include the following: (1) not deriving TCDD plant tissue concentrations to evaluate omnivorous mammal risks, (2) not characterizing floodplain exposures in the Manton and Dyerville exposure areas, (3) the lack of critical body residue data for certain COPCs, and (4) the limited ichthyological survey results. On the other hand, the following categories probably resulted in risk estimates generally being over-estimated in the BERA: (1) estimated fish tissue EPCs for Dyerville, (2) the use of relatively large fish in the tissue sampling program, and (3) the use of standard screening benchmarks as one line of evidence for several of the assessment endpoints. It is not clear whether uncertainties regarding the

Allendale Dam restoration resulted in an over-estimate or under-estimate of risk; however, the magnitude of any possible effect is expected to be low.

6.1.5 Major Findings of the BERA

Major findings of the BERA are detailed in MACTEC (2004a). Table 6-3 summarizes the results of the BERA for each of the assessment endpoints. Incremental risk for each assessment endpoint, using a representative ecological receptor, is presented in Figures 6-2 through 6-7. Incremental risk is presented as the range in *additive* hazard quotients (HQ) by chemical class, ranging from the lowest LOAEL-based (lowest observed adverse effect level) CTE HQ to the highest NOAEL-based (no observed adverse effect level) RME HQ.

Overall, findings from the BERA indicate that the greatest ecological risks at the site are associated with exposure to sediment, in that contaminants present in the site sediments pose a bioaccumulation hazard and risks are associated with the ingestion of contaminated prey. Key findings of the BERA include:

- The benthic macroinvertebrate community that resides in low-gradient habitats (lentic) upstream of dams within the study area is at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, and tissue residues.

- Discharge of VOC-contaminated groundwater into the reach of the Woonasquatucket River adjacent to the site does not appear to have adversely affected the benthic macroinvertebrate community associated with lotic (riffle/run) habitats.

- The soil invertebrate community that resides within the Woonasquatucket River floodplain does not appear to be at substantial risk of harm due to exposure to site-related contaminants in floodplain soil or tissue residues.

- Fish populations may be at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, and tissue residues. Contaminants of concern are dioxins/furans; coplanar PCBs; Aroclor 1254; 4,4′-DDD; 4,4′-DDE; technical chlordane; aluminum; barium; selenium; vanadium; and zinc.

- Mammal and bird populations may be at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, floodplain soil (insect-eating mammals and birds only), and prey.

- Consumption of contaminated prey by mammal and bird populations may result in elevated tissue residues in these receptors resulting in adverse reproductive effects (i.e., bioaccumulation hazard).

- Chemicals of concern for fish-eating animals include dioxins and furans (particularly 2,3,7,8-TCDD); coplanar PCBs; Aroclor 1254; total Aroclors; 4,4′-DDD; 4,4′-DDE; technical chlordane and zinc.

- Dioxins and furans (particularly 2,3,7,8-TCDD) and coplanar PCBs appear to be the primary contributors to risks for insect-eating animals. For example, elevated dioxin concentrations were associated with a reduction in egg hatching success for tree swallows.

- The chemicals of concern for earthworm-eating (vermivorous) wildlife that forage in floodplain soils adjacent to the Woonasquatucket River are dioxins and furans (particularly 2,3,7,8-TCDD), Aroclor 1254, arsenic, cadmium, and selenium.

- HCX was an insignificant contributor to the risk based on use of a more realistic interim TEF value derived as part of the BERA and as supported by the findings of ELS bioassay.

- The time course of ELS mortality (i.e., majority within a week of exposure) in the laboratory bioassay may corroborate findings of the ichthyoplankton survey; limited evidence of facial-cranial malformations was observed in both the laboratory and field studies.

- The large and positive accumulation rates of TCDD in swallow nestlings and induction of elevated ethoxyresorufin-O-deethylase (EROD) activity in their livers are strongly indicative of local contamination from the individual exposure areas where the birds nested because of the limited foraging behaviors of the adult birds. Moreover, the swallow study also demonstrated a strong correlation between TCDD concentrations in tree swallow nestling tissue and stomach contents.

- Dietary exposures and measured or modeled tissue burdens in avian eggs and mammal whole body tissue pose a substantial risk of harm to piscivorous and insectivorous wildlife species.

- Omnivorous mammal and bird populations that forage within the study area are not at substantial risk of harm due to exposure to site-related contaminants in surface water, floodplain soil, and terrestrial prey items. However, omnivorous mammals could be adversely affected as a result of exposure to site-related contaminants in sediment and aquatic prey. Although the exclusive use of aquatic habitat by omnivorous mammals, such as the raccoon, could result in substantial population-level effects, the spatially and temporally varied diets and exposures of these receptors minimizes the likelihood that demographically significant effects would occur.

The concentrations in biota tissue of the predominant risk contributors (e.g., dioxin) are directly related to corresponding sediment concentrations (MACTEC, 2004a). Although direct contact exposures to sediments are not associated with the largest risks at the site (i.e., COPCs pose primarily a bioaccumulation hazard and risks are associated with the indirect trophic transfer of COPCs), the greatest risks at the site appear to be associated with the sediments.

6.2 Human Health Risk Assessment

The BHHRA analyzes potential adverse human health effects for both current and future conditions caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action or in the absence of the RIDOH health advisories on fish consumption for this particular site). Currently, there is a fish consumption advisory issued by the State of Rhode Island that is not believed to be a sufficient barrier to preventing exposure to biota from the Woonasquatucket River in the short-term.

In accordance with U.S. EPA guidance (U.S. EPA, 1989, 1994, 1995c, 1999, 2001a, and 2001b), the BHHRA consists of four components: hazard identification, exposure assessment, toxicity assessment, and risk characterization (including an evaluation of risk uncertainties). Each of these components is described below.

6.2.1 Hazard Identification

The purpose of the hazard identification 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 biota, sediment, surface water, and bank soil on which the quantitative assessment of risk will be based. The BHHRA is based on data collected from several site investigations in soil, surface water, and sediment, as well as in biota found in and adjacent to the Woonasquatucket River. Data were collected from the source area, four reaches of the Woonasquatucket River adjacent to and downstream of the site (Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond), and at an upstream background area (Greystone Mill Pond) and a reference area (Assapumpset Brook), both of which are believed to be unimpacted by the site.

COPC Selection for Biota, Sediment, Surface Water, and Bank Soils.
Using the data collected in soil, surface water, sediment, and biota (American eel, largemouth bass, and white sucker), chemicals were initially identified as COPCs by media for the site and the reference/background areas. COPCs require further evaluation in the risk assessment if the chemical concentrations are above risk-based screening concentrations.

Consistent with U.S. EPA Region I guidance, COPCs were selected based on frequency of detection and comparison of detected concentrations to risk-based screening criteria. U.S. EPA Region 9 residential soil PRGs were used in the selection of COPCs for bank soil and sediments. Region 9 PRGs for tap water were used in the selection of COPCs for surface water and U.S. EPA Region III risk-based concentrations for fish tissue were used in the selection of COPCs for fish tissue consumption.

For the site sediments and fish tissue, COPCs include SVOCs, particularly PAHs, pesticides, metals and inorganics, PCBs, dioxins and furans, and HCX (sediment only). In surface water, COPCs include one VOC, one SVOC, one pesticide, one PCB (Aroclor 1254), ten metals or inorganics, HCX, and dioxins and furans. In bank soil, 2,3,7,8-TCDD was identified as the COPC.

Dioxins and furans (particularly 2,3,7,8-TCDD), HCX, Aroclor 1254 and possibly PCB-77 appear to be the primary chemical parameters that are detected in environmental media with frequency of detection and concentrations that are indicative of site-related impacts. In other words, these parameters have clearly elevated concentrations in fish tissue and sediments in the site-related exposure areas (Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond) compared to the Greystone Mill Pond upstream background area and at the Assapumpset Pond and Brook reference area.

The list of COPCs for the background area and reference area is very similar to that for the site. For the background area and reference area sediment COPCs include SVOCs, particularly PAHs, pesticides, metals and inorganics, PCBs, dioxins and furans, and HCX). The COPCs in fish tissue are the same with the exception of HCX. HCX was not detected and therefore not selected as a COPC for white sucker, but HCX was selected as a COPC for American eel and largemouth bass. In surface water, COPCs include three metals or inorganics, and dioxins and furans.

6.2.2 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 consumption of biota from the Woonasquatucket River and direct contact with surface water, sediment and bank soil at and adjacent to the river; (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 human health CSM for site is presented in Figure 6-8.

Identification of Potentially Exposed Human Populations

The potentially exposed human populations have been identified for evaluation in the BHHRA include "Residents Living Along the Woonasquatucket River"; "Visiting Recreational Anglers" who do not live in the immediate vicinity of the site, but who would visit the site for recreational angling activities; and "Commercial/Industrial Employees" of The Fogarty Center at 220 Woonasquatucket Avenue (a disability business enterprise). In addition to these receptors, "Subsistence Anglers" were identified as potential receptors. However, due to the uncertainty in the Subsistence Angler scenario, this receptor has been evaluated in an appendix to the BHHRA.

Identification of Exposure Points

The exposure points correspond to the exposure areas identified above as follows:

- Allendale Pond exposure point;
- Lyman Mill Pond exposure point;
- Manton Pond exposure point;
- Dyerville Pond exposure point;
- The Fogarty Center is a specific exposure point on the eastern shore of Lyman Mill Pond;
- The upstream background area is referred to as the Greystone Mill Pond area exposure point; and
- The reference area is referred to as the Assapumpset Brook and Pond exposure point.

Exposure Scenarios and Routes of Exposure

Based on the current and likely future land use of the site, the BHHRA evaluated the following exposure scenarios. Residents Living Along the Woonasquatucket River (child, older child, and adult) and Visiting Recreational Anglers (child, older child, and adult) are assumed to consume a combined fish diet consisting of fish caught at the exposure points and to contact (incidental ingestion and skin contact) surface water and sediment within the Woonasquatucket River, and to contact (incidental ingestion and skin contact) bank soil (Greystone Mill Pond and Allendale Pond exposure points only). For the Visiting Recreational Angler, the child is assumed to consume fish caught by other family members, but it is assumed the young child does not visit the site for recreational angling and is therefore not exposed to surface water, sediment, or bank soil. For the Resident Living Along the River and the Visiting Recreational Angler, exposures were evaluated at a total of six exposure points, including the Allendale Pond reach, Lyman Mill Pond reach, Manton Pond reach, and Dyerville Pond reach as well as the Greystone Mill Pond area (upstream background) and the Assapumpset Brook and Pond (reference area). For the Employee of the Fogarty Center, incidental ingestion and skin contact with surface soil were evaluated.

Exposure Point Concentrations

The Resident Living Along the River and the Visiting Recreational Angler have been assumed to each have a favorite fishing spot at one of the identified exposure areas. For each COPC, at each exposure point, representative concentrations in fish (American eel, largemouth bass, and white sucker), submerged sediment, surface water, and bank soil were identified as the basis for the exposure assessments. Representative concentrations of COPCs in surface soil were identified for the Employee of the Fogarty Center. The representative concentrations (i.e., EPCs) were calculated based on the 95% UCL on the mean concentration of the data. The procedures used to identify the 95% UCL and the EPC were selected based on the size of the data set and the distribution type for the concentration data.

Identification of Exposure Models and Parameters

Chemical-specific intakes were calculated in a manner consistent with U.S. EPA 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). The following exposure parameters are included in the dose calculations:

- Concentrations in fish tissue, sediment, surface water, and bank soil
- Consumption rate
- Exposure frequency
- Fraction ingested from contaminated source
- Exposure duration
- Body weight
- Averaging time – cancer and non-cancer
- Skin surface area exposed.

Consistent with U.S. EPA guidance (U.S. EPA, 1989), exposures were assessed for both RME, expressed as the highest estimate of exposure that is likely to occur, and CTE, which represents typical or average exposure conditions. The two scenarios are assessed to place some boundaries on the estimates of exposure, because the exposures are not actually measured and there is variability among people who might be present at the site with respect to frequency and duration of exposure, the contact rates and consumption rates, and the locations where they are present now and in the future.

6.2.3 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 reference concentrations) 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 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 were evaluated for potential non-carcinogenic health effects. In addition, any substance considered to be a known, probable, or possible human carcinogen also was 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 U.S. EPA recommended sources, including the U.S. EPA's Integrated Risk Information System (IRIS), U.S. EPA Region III Risk-Based Concentration Table, the U.S. EPA Region 9 PRGs table, and the U.S. EPA's National Center for Environmental Assessment publications, and various U.S. EPA reports. Published, peer-reviewed toxicity values for HCX were not available.

Due to the uncertainty in the toxicity of HCX, that compound has been evaluated separately in an appendix of the BHHRA report.

6.2.4 Risk Characterization

The risk characterization describes the potential health risks and identifies which chemicals are causing the risk. Using U.S. EPA-approved toxicity values, potential risks associated with current and future exposure for Residents Living Along the River, Visiting Recreational Anglers, and Visiting Subsistence Anglers were evaluated based on fish consumption, exposures to surface water and sediment at four exposure points (Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond) within the Woonasquatucket River, at the Greystone Mill Pond (background) and Assapumpset Brook and Pond (reference area), and exposure to bank soil within Allendale Pond, Lyman Mill Pond, and the Greystone Mill Pond area. Risks to adult workers associated with direct contact with surface soils at the Fogarty Center have also been evaluated. Risks were calculated using both RME and CTE scenarios.

Equations used to calculate cumulative lifetime risks (cancer risks) and hazards to different age groups (non-cancer risks) are detailed in the BHHRA (MACTEC, 2004b).

EPA's Acceptable Risk Range

The results from the carcinogenic risk assessment are compared to acceptable risk ranges established by the U.S. EPA. The U.S. EPA'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" (U.S. EPA, 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^{-6}, action is generally not warranted. However, U.S. EPA also may decide that a lower level of risk is unacceptable and that action is warranted, if there are extenuating circumstances, such as uncertainties in the risk assessment.

An hazard index (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. U.S. EPA typically considers action if the HI is greater than one.

The incremental cancer and non-cancer risks (the difference between the risks at the site and the upstream background area, Greystone Mill Pond) have been identified for each receptor at each exposure point. The incremental risks (site-related risks) have been compared to the Superfund cancer risk range of 10^{-5} to 10^{-4} and to a non-cancer HI value of 1.

Uncertainty Analysis

The actual fish consumption rates for current and potential future human receptors are uncertain. Reasonably conservative recreational angler consumption rates have been estimated from literature sources and have been used in the BHHRA. In addition, a more conservative, "high-end" assessment of fish consumption by recreational anglers has been included in an appendix to the BHHRA. It is not clear that subsistence angling is currently taking place or will take place in the future. The potential fish consumption rates for subsistence angling also are uncertain. The subsistence angler scenario has been evaluated in an appendix to the BHHRA.

There is currently a fish consumption advisory, issued by the RIDOH, that may not be completely effective in preventing consumption of fish from Allendale Pond, Lyman Mill Pond, Manton Pond, and

Dyerville Pond. However, the advisory may be effective in reducing fish consumption rates in the area. RIDOH and the U.S. EPA also published a pamphlet in 1999 that advised the public to avoid swimming, wading, and bathing in the river and to avoid drinking water from the river ("The Do's and Don'ts of the Woonasquatucket River"). This advice was reinforced with press releases from U.S. EPA and RIDEM in May and August of 2003. The BHHRA has been conducted to evaluate baseline conditions, in the absence of any measures to eliminate or minimize potential exposures. In that context, the BHHRA may overestimate current exposures associated with the river.

One of the contaminants in fish tissue and sediments, HCX, does not have published, peer-reviewed toxicity values. An appendix to the BHHRA evaluates the potential toxicity and risks associated with HCX exposures, and discusses the potential impacts of HCX on the BHHRA results and conclusions. It appears that cancer risks are slightly underestimated due to the absence of published, peer-reviewed toxicity information for HCX.

The concentrations in fish tissue of the predominant risk contributors are directly related to corresponding sediment concentrations. Although direct contact exposures to sediments are not associated with the largest risks at the site, the sediments appear to be associated with the largest risks at the site.

Cancer risks above the Superfund risk range have been identified for skin contact with surface water for the Resident Living Along the River. The cancer risks for this exposure pathway appear to be substantially overestimated. The risks are primarily associated with 2,3,7,8-TCDD and it appears the 2,3,7,8-TCDD is associated with suspended particulate matter in the surface water samples. It is unlikely that the 2,3,7,8-TCDD in the suspended particulate matter could be easily transferred to the dissolved phase in water and then subsequently be absorbed through the skin. Risk estimates associated with the direct contact pathway for surface water are currently being refined.

6.2.5 Major Findings of the BHHRA

Major findings of the BHHRA are detailed in MACTEC (2004b). Non-cancer and cancer risks are summarized in Tables 6-4 and 6-5, respectively. Overall, results from the BHHRA indicate that study areas downstream of the site have higher cancer and non-cancer risks for fish consumption, surface water contact, and sediment contact compared with the background and reference areas. Key findings of the BHHRA, which evaluates cumulative lifetime risks (cancer risks) and hazards to different age groups (non-cancer risks), include:

- Incremental RME and CTE cancer risks (risks above background) from consumption of fish for the current and future Resident Living Along the River and the Visiting Recreational Angler are above the U.S. EPA Superfund risk range at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond.

- Incremental RME cancer risks (risks above background) from exposure to surface water for the current and future Resident Living Along the River and the Visiting Recreational Angler are above the U.S. EPA Superfund risk range at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond. The Incremental CTE cancer risks (risks above background) from exposure to surface water for the current and future Resident Living Along the River at Allendale Pond only are above the U.S. EPA Superfund risk range. These risk estimates are currently being refined in an addendum to the BHHRA.

- Incremental RME and CTE cancer risks (risks above background) for exposure to sediment or bank soil for the current and future Resident Living Along the River and the Visiting Recreational Angler are not (with two exceptions) above the U.S. EPA Superfund risk range

at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond. The incremental RME cancer risks (risks above background) for exposure to sediment for the current and future Resident Living Along the River are above the U.S. EPA Superfund risk range at Allendale Pond and Lyman Mill Pond only.

- Cancer risks from exposure to surface soil at the Fogarty Center are not above the U.S. EPA Superfund risk range.

- Incremental non-cancer risks (hazard index) from consumption of fish for the current and future Resident Living Along the River and the Visiting Recreational Angler are equal to or above (by factors between 1 and 27) the U.S. EPA Superfund benchmark hazard index of one at Allendale Pond, Lyman Mill Pond, Manton Pond (CTE only and Resident Living Along the River only), and Dyerville Pond.

- Chemicals of concern are dioxins and furans (particularly 2,3,7,8-TCDD; coplanar PCBs; Aroclor 1254; Aroclor 1268; 4,4'-DDE; dieldrin; technical chlordane; benzo(a)pyrene; dibenzo(a.h)anthracene; n-nitroso-di-n-propylamine; arsenic; and methylmercury.

- Incremental non-cancer risks (hazard index) from exposure to surface water and sediment for the current and future Resident Living Along the River and the Visiting Recreational Angler are below the U.S. EPA Superfund benchmark HI of one at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond.

- The non-cancer hazard index from exposure to surface soil at the Fogarty Center is below the U.S. EPA Superfund benchmark HI of one.

7.0 SUMMARY AND CONCLUSIONS

This section summarizes the most significant findings of the CMRP RI. The findings are presented in Section 7.1 as an integrated CSM. Principal uncertainties associated with the RI conclusions are presented in Section 7.2.

7.1 Summary and Conceptual Site Model

RI conclusions regarding source identification and control, nature and extent of contamination, fate and transport, exposure pathways, and ecological and human health risks are presented below. Findings are incorporated into an integrated CSM for the site, which is provided in Figure 7-1.

7.1.1 Primary Sources of Contamination

Chemical manufacturing activities took place at the CMRP site from approximately 1940 until the early 1970s. Potential historical sources of contamination at the CMRP source area include improper storage and disposal of chemicals in drums, stockpiles and surface impoundments. These activities appear to have been concentrated in the central and southern parts of the source area.

Trichlorophenols were shipped to the site, where it is believed that hexachlorophene was manufactured in approximately 1965. HCX and dioxin were byproducts of this process. The building where this process is believed to have taken place was located on the east bank of the Woonasquatucket River, in what is now the Brook Village parking lot. Other chemical processes also occurred and could be the source of other contaminants at the site. Chemicals that were potentially used on site were identified based on drum labels and included caustics, halogenated solvents, PCBs, and inks.

The New England Container Company, Inc. operated an incinerator-based drum reconditioning facility on a portion of the site from 1952 until the early 1970s. Chemical residues were dumped or burned prior to drum reconditioning. Residues and combustion products associated with drum reconditioning operations also may have been a source of dioxin and other chemicals at the site.

Some residual waste material may remain buried in the source area. Geophysical surveys indicate that the largest concentration of buried bulk metallic materials appears to be at the south end of the Centredale Manor south parking lot (Roy F. Weston, 1999b). This area has the greatest potential for containing residual waste material from former site operations. However, the primary sources of contamination to the CMRP site are no longer active.

7.1.2 Primary Release and Transport Mechanisms

Chemicals were apparently released directly to the ground, buried, and possibly discharged directly to the Woonasquatucket River. Direct infiltration of chemicals and leaching through the ground surface led to the contamination of surface and subsurface soils in the source area, primarily in the areas that are currently beneath Caps #1 and #2. Leaching has led to localized groundwater contamination, particularly on the west side of the Brook Village parking lot adjacent to the Woonasquatucket River. Discharge of chemicals directly into the river, overland flow of chemicals, and erosion and transport of contaminated source area soils by surface runoff resulted in contamination of surface water and sediment in the adjacent river and ponds and tailrace on the east side of the site.

The spatial distributions and concentrations of dioxin (primarily 2,3,7,8-TCDD) and HCX in soil and sediment suggest that these contaminants may have been released to the Woonasquatucket River via the direct discharge of dioxin-bearing waste (see Section 7.1.3). Dioxins/furans, PCBs, pesticides and other

chemicals also probably migrated to the river and Allendale Pond via surface runoff and erosion of contaminated soils from the source area. Discharge of VOC-contaminated groundwater to the river on the west side of the Brook Village parking lot also may contribute to the contamination of surface water and sediment by dioxin if in fact the groundwater discharge contains dioxin. The zone of VOC discharge has been delineated, although it is not currently known whether the dioxin is also discharging to the river, or being attenuated by adsorption to soil particles prior to discharge.

Contaminated sediments have accumulated in fine-grained depositional areas of the Woonasquatucket River, primarily in the impoundments behind the Allendale and Lyman Mill Dams. Contaminants are generally not present in the coarser-grained channel sediments immediately upstream of each pond. Sediments may have been eroded and redistributed by high river flows, and deposited on the river banks and in the adjacent floodplain during flood events. The breach of the Allendale Dam in 1991 and again in 2001 may have resulted in the downstream transport of contaminated sediment from Allendale Pond to Lyman Mill Pond, and left the Allendale Pond bottom sediments exposed as floodplain soils. Allendale Pond was restored to its original level in early 2002.

7.1.3 Nature and Extent of Contamination

A variety of contaminants have been detected in source area soils, including dioxins, VOCs, PCBs, SVOCs, pesticides, and inorganic constituents such as lead. The vast majority of the contaminated soils are in areas that are paved or capped. 2,3,7,8-TCDD occurs in high concentrations at the CMRP site relative to other dioxin and furan congeners. The mean dioxin TEQ concentration in source area soil samples from all sampled depths is approximately 118 ng/kg. The highest concentrations are found in surface soils beneath Caps #1 and #2. Dioxin concentrations decrease with increasing depth below the surface, with only localized contamination found at depths of greater than 5 ft bgs.

Localized VOC contamination in source area soils is found primarily beneath the north end of Cap #2, the Centredale Manor north parking lot, and the Brook Village parking lot (Figure 4-7). Six solvent- and fuel-related VOCs have been measured at concentrations exceeding RIDEM direct exposure criteria for residential use soils. PCB concentrations are highest in the central and southern parts of the source area, and in the upper 2 ft of soil. The mean total PCB concentration in source area soils is approximately 0.29 mg/kg. Aroclor 1254 is the most frequently detected PCB formulation. Other detected contaminants were measured at lower levels or were not as widely distributed as dioxin and PCBs.

Residential and recreational use soils along the eastern bank of Allendale and Lyman Mill Ponds were addressed in a NTCRA in 2002-2003. Soils that were found to pose an unacceptable human health risk were excavated and transported off site for disposal, and the remediated areas were restored.

Groundwater contamination at the CMRP site does not appear to be pervasive. Concentrations of VOCs were below RIDEM GB groundwater criteria except for TCE and PCE in one well in the Brook Village parking lot next to the Woonasquatucket River, and PCE in two other wells. VOC concentrations generally decreased from 2001 to 2002. Trace levels of other contaminants (e.g. phenols and dioxin) have been detected in some groundwater samples. Dioxin has been detected at high concentrations (>1,000 pg/L) in the well with the elevated PCE and TCE concentrations in the Brook Village parking lot; the dioxin appears to have been mobilized by the solvents. A vapor-to-water diffusion survey indicated that this plume of VOCs discharges into the Woonasquatucket River along approximately 50 ft of its east bank (USGS, 2000a). It is not known whether dioxin is discharging to the river in the plume. The lateral extent of the plume is well defined in shallow groundwater, but not at depth. Groundwater discharging to Allendale Pond at the south end of Cap #1 contains low levels of VOCs; however, the BERA indicated no ecological risk from exposure to VOCs in surface water.

The mean dioxin TEQ concentrations in Allendale and Lyman Mill Pond sediments were approximately 972 ng/kg and 491ng/kg respectively. The mean TEQ concentration in Allendale Pond is higher than the mean concentration in source area soils. TEQ concentrations in all reaches of the river adjacent to and downstream of the CMRP site were significantly higher than upstream (background) concentrations. 2,3,7,8-TCDD was detected at high concentrations in sediment samples relative to other dioxin congeners. Sediment dioxin concentrations decrease in a downstream direction. In Allendale and Lyman Mill Ponds, mean dioxin concentrations are highest in the uppermost 1 ft of sediment. Subsurface sediment data are not available for other reaches of the river. Concentrations of other chemicals of concern in sediment (i.e., those that contribute to human health and ecological risk) were not significantly higher than upstream (background) concentrations except for Aroclor 1254 in Allendale Pond.

Radiometric age dating results indicate that no significant dioxin contamination is found in sediments deposited prior to 1940, and maximum concentrations generally correspond to sediments deposited between about 1950 and 1970. This period corresponds with the time when hexachlorophene was manufactured on the site (i.e., 1965). The most recently deposited sediments still show evidence of dioxin contamination, which may reflect the fact that upland sources were not completely controlled (i.e., most of the contaminated soils in the source area were not capped) until approximately 2000. Additionally, post-depositional processes such as bioturbation and sediment resuspension will mix surface sediment with more highly-contaminated subsurface sediment. Dioxin TEQ concentration and TOC content are not well correlated; therefore, organic content cannot be used as a reliable predictor of dioxin contamination. Although dioxin TEQ concentration and grain size were not well correlated, dioxin concentrations are lowest in samples with less than 20% silt+clay and less than 3% TOC.

An environmental forensics review of sediment chemistry data for chlorinated organic compounds suggests that different contaminants may have had different release histories and transport mechanisms. Dioxin (primarily 2,3,7,8-TCDD) and HCX contamination in sediment extended from the source area downstream to approximately half of the sampling locations downstream of Manton Dam. As previously noted, the mean concentration in Allendale Pond sediment was higher than the mean concentration in source area soils. Elevated concentrations of PCBs and pesticides in sediment do not appear to extend as far downstream as dioxin and HCX, and concentrations were generally not significantly higher below Allendale Dam than in upstream (background) sediments. These differences could arise from differences in timing, location, and magnitude of the original releases, and in subsequent transport mechanisms.

HCX and dioxin are believed to be primarily derived from a hexachlorophene manufacturing process, which took place on the CMRP site for a relatively short period of time in the mid-1960s. If these byproducts were contained in waste that was directly discharged to the Woonasquatucket River, then dioxin and HCX could have been carried downstream in the water column in dissolved phase and adsorbed to suspended sediment particles. Source area contaminants (e.g. dioxins, HCX, PCBs and pesticides) also probably entered the river via surface runoff and erosion and transport of contaminated soils from the source area. These transport mechanisms would have operated for a longer period of time (throughout the duration of waste-related activities on the CMRP site, until contaminated source area soils were capped). Persistent organic contaminants entering the river via surface runoff and erosion are expected to be more readily attenuated by fine-grained sediment particles and organic matter in Allendale Pond.

7.1.4 Secondary Release and Transport Mechanisms

The most important potential transport mechanism currently affecting the CMRP source area is leaching of contaminants from soil to groundwater. Volatilization of VOCs from vadose zone soils is not likely to be significant pathway given the localized nature of VOC contamination, apparent lack of VOC migration into the Centredale Manor and Brook Village buildings, and presence of soil caps or pavement over the

majority of the site. The soil caps and paved surfaces also currently prevent the erosion and runoff of contaminated soils. A leachability evaluation indicated that except in the vicinity of the Brook Village parking lot, leaching does not appear to be a major pathway of concern. However, PCE and TCE in soil and groundwater beneath the Brook Village parking lot adjacent to the Woonasquatucket River may be mobilizing dioxin. VOC-contaminated groundwater is discharging to the river over a distance of about 50 ft, although it is not clear if dioxins also are discharging to river. Additional investigation is in progress to determine whether this is a significant transport pathway for dioxin.

Because of the hydrophobic and persistent nature of the primary COCs (i.e., dioxin and PCBs), sediment resuspension and downstream transport are likely to be the most important potential transport pathways in the Woonasquatucket River. A sediment stability evaluation of Allendale and Lyman Mill Ponds indicated that during a rare flood (i.e., 100-year return period), significant scour (i.e., more than about 1 cm of erosion) will occur over less than 5 percent of the bed area in Allendale Pond. Erosion will generally occur in the northern portion of the pond, near the upstream inlet. Significant scour will occur over a larger area in Lyman Mill Pond, with up to 10 to 15 percent of the Lyman Mill Pond bed experiencing significant scour. Scour would generally occur in the northern portion of Lyman Mill Pond, with maximum erosion near the upstream inlet. Sediment eroded in the upstream portion of each pond during a flood will be transported downstream by river currents. A portion of the eroded sediment is likely to be redeposited within each pond where current velocities tend to decrease. Additional data collection is in progress to reduce uncertainty and refine the sediment stability study conclusions.

Analysis of surface water data from 1999 suggests that minimal net export of dioxin from the two ponds occurs during low-flow, non-resuspending conditions. The water column load of dioxin entering the study area (i.e., the background load) is approximately equal to the load over Lyman Mill Dam during low-flow periods. Additional data collection is in progress to verify this hypothesis.

Bioaccumulation is a significant transport pathway for transfer of contaminants from lower trophic level organisms into upper trophic level organisms. Compounds with a tendency to bioaccumulate are taken up by biota and are transferred through aquatic food webs. Wildlife species that consume these lower trophic level organisms are also exposed to site-related contaminants. Humans also are exposed to the contaminants through ingestion of fish and other aquatic organisms.

Vertical dioxin profiles in sediment cores indicate that natural recovery (i.e., burial of contaminated sediment by cleaner sediment) may be occurring in some areas of the ponds, but not in others. A natural recovery trend is not expected to be apparent in the ponds at this point in time because contaminated soils in the source area were not completely capped until 2004, and post-depositional processes will continue to mix surface and subsurface sediments. Radiometric age dating results indicate that the average sediment accumulation rate in Allendale Pond is approximately 0.5-0.8 cm/year. Results from a single core from Lyman Mill Pond indicate an average sediment accumulation rate of about 0.3 cm/year.

7.1.5 Ecological and Human Health Risks

The main conclusions of the BERA and BHHRA are summarized below.

7.1.5.1 Ecological Risk

Overall, findings from the BERA indicate that the greatest ecological risks at the site are associated with exposure to sediments, which pose a bioaccumulation hazard. Sediments in Allendale and Lyman Mill Ponds pose a greater risk than those downstream of Lyman Mill Dam. The primary exposure pathway to ecological receptors is ingestion of contaminated prey. The benthic macroinvertebrate communities that reside in impoundments upstream of dams and fish populations are at substantial risk of harm due to

exposure to site-related contaminants in surface water, sediment, and tissue. Mammal and bird populations may be at substantial risk of harm due to exposure to site-related contaminants in surface water, sediment, floodplain soil (insect-eating mammals and birds only), and prey. Consumption of contaminated prey by mammal and bird populations may result in elevated tissue residues in these receptors, thereby resulting in adverse reproductive effects (i.e., bioaccumulation hazard).

Discharge of VOC-contaminated groundwater into the reach of the Woonasquatucket River adjacent to the site does not appear to have adversely affected the benthic macroinvertebrate community in riffle/run habitats. The soil invertebrate community that resides within the Woonasquatucket River floodplain does not appear to be at substantial risk of harm due to exposure to site-related contaminants in floodplain soil or tissue. Omnivorous mammal and bird populations that forage within the study area are not at substantial risk of harm due to exposure to site-related contaminants in surface water, floodplain soil, and terrestrial prey items.

Chemicals that appear to contribute to ecological risk include dioxins and furans (particularly 2,3,7,8-TCDD); coplanar PCBs; Aroclor 1254; total Aroclors; 4,4'-DDD; 4,4'-DDE; technical chlordane; aluminum; barium; cadmium; selenium; vanadium; and zinc.

The concentrations of the predominant risk contributors (e.g., dioxin) in tissue are directly related to corresponding sediment concentrations. Although ingestion of contaminated prey rather than direct contact with sediments is associated the largest risks at the site, the greatest risks at the site appear to be associated with the sediments.

7.1.5.2 Human Health Risk

Overall, results from the BHHRA indicate that study areas downstream of the CMRP site have higher cumulative lifetime risks (i.e., cancer risks) and hazards (i.e., non-cancer risks) compared with the background and reference areas. Human health risks associated with exposure to aquatic biota, surface water, and sediment are higher in Allendale and Lyman Mill Ponds than in areas downstream of Lyman Mill Dam. Cancer and non-cancer risks from exposure to surface soil at the Fogarty Center on the southeast side of Lyman Mill Pond are below U.S. EPA levels of concern. Risk estimates associated with direct exposure to surface water will be refined in an addendum to the BHHRA.

Incremental cancer risks (i.e., risks above background) for current and future residents and visiting recreational anglers from the consumption of fish are above the U.S. EPA Superfund risk range at Allendale Pond, Lyman Mill Pond, Manton Pond, and Dyerville Pond (RME and CTE). Incremental cancer risks from exposure to surface water also exceeded the U.S. EPA Superfund risk range in all four exposure areas (RME in all areas and CTE for Allendale residents only). Incremental cancer risks from direct exposure to sediment exceeded the U.S. EPA Superfund risk range for Allendale residents only (RME only).

Incremental non-cancer risks for residents and visiting recreational anglers from the consumption of fish are above the U.S. EPA Superfund HI benchmark of one at Allendale Pond, Lyman Mill Pond, and Dyerville Pond (RME and CTE). Non-cancer risks from fish consumption exceeded the U.S. EPA Superfund benchmark value for residents in the Manton Pond area (CTE only). Non-cancer risks associated with exposure to surface water and sediment were below the U.S. EPA Superfund benchmark value.

Human health chemicals of concern include dioxins and furans (particularly 2,3,7,8-TCDD); coplanar PCBs; Aroclor 1254; Aroclor 1268; 4,4'-DDE; dieldrin; technical chlordane; benzo(a)pyrene; dibenzo(a,h)anthracene; n-nitroso-di-n-propylamine; arsenic; and methylmercury.

7.2 Uncertainties

Important uncertainties associated with the RI of the CMRP site are summarized below, and the potential effects of the uncertainties on the RI conclusions are described. Additional data collection is in progress in some cases to address these uncertainties.

7.2.1 Source Identification and Control

The exact location and nature of residual waste in the CMRP source area is not known. Geophysical surveys identified an area at the south end of the Centredale Manor south parking lot and under Cap #1 as having the greatest likelihood of containing bulk metallic materials. If drums containing waste materials are still buried on the site, future degradation could lead to a secondary subsurface release of contaminants. However, additional characterization of residual waste material would require invasive techniques that could pose a significant health risk to residents and workers, and is not recommended.

It is not known whether the solvent-contaminated groundwater that is discharging to the Woonasquatucket River adjacent to the Brook Village parking lot contains dioxin. Although the VOCs are not posing an ecological or human health risk, the discharge could be an active source of dioxin to the river. Additional data collection is in progress to determine whether dioxin is discharging to the river in this area.

7.2.2 Nature and Extent of Contamination

More chemistry data are available for dioxin than for other contaminants in source area soils; therefore, the horizontal and vertical distribution of other COCs is less certain. However, the available data are sufficient for characterizing contaminant fate and transport in the source area and developing remedial alternatives for evaluation in the FS.

A plume of VOC-contaminated groundwater (PCE and TCE) has been identified near the west side of the Brook Village parking lot. The plume originates in the area of the former chemical manufacturing building. The horizontal extent of the plume in shallow groundwater is well defined; however, the vertical extent is not known.

One VOC (PCE) is above the GB groundwater criterion of 150 µg/L in a deep overburden well on the southeast edge of the source area. The source of this PCE contamination is uncertain. The PCE concentration in samples from this well decreased from 340 µg/L in 2001 to 220 µg/L in 2002. The contamination currently poses no threat to surface water, and is migrating downgradient in a GB aquifer. It is possible that the PCE concentration will decrease below the GB groundwater criteria in the absence of an ongoing source.

More chemistry data are available for dioxin than for other contaminants in Woonasquatucket River sediments; therefore, the magnitudes and distributions of other COCs are less certain. Radiometric age dating results for Allendale Pond sediments were used to identify the 1940 time horizon, which corresponds well with the detection of dioxin. Therefore, other site-related COCs in Allendale Pond are not expected to occur below this time horizon.

The spatial coverage for sediment samples in Lyman Mill Pond is insufficient for mapping the horizontal and vertical distribution of dioxin and other COCs with sufficient resolution for developing remedial alternatives. Additional data collection is in progress to address this data gap. The number of samples downstream of Lyman Mill Dam also is relatively small; however, existing data indicate that chemical

concentrations in sediments are lower below Lyman Mill Dam than above it. Additional data may be collected below Lyman Mill Dam in a future phase of the project.

7.2.3 Contaminant Fate and Transport

The locations and absolute magnitudes of predicted mass of sediment eroded in various flood events has not been reliably determined. The sediment stability evaluation provides reliable estimates of relative magnitude of erosion in Allendale and Lyman Mill Ponds, but the absolute values are probably accurate only within an order of magnitude. Additional data collection is in progress to refine the sediment stability modeling predictions.

The fate of any sediment eroded from Allendale and Lyman Mill Ponds during flood events is not known. Some of the sediment would be deposited behind each dam, some would be carried over each dam as suspended sediment, and some would be deposited on the floodplain; however, existing data are not sufficient for developing a reliable mass balance. The need to collect additional data to further refine the mass balance will be evaluated after the sediment stability modeling predictions are refined.

Initial estimates of potential downstream transport of dioxin under non-resuspending conditions were based on a relatively small data set. Additional data collection is in progress to confirm the initial flux predictions.

7.2.4 Ecological and Human Health Risk

For the BERA, the primary uncertainties are those associated with estimating exposures and effects (e.g., development of exposure parameters, selection of appropriate receptors, and estimation of biota-sediment/soil accumulation factors [BSAFs]). When site-specific data were unavailable, conservative assumptions were used to select exposure parameters. BSAFs were developed using organic cabon and lipid-normalized site-specific sediment/soil and tissue data. The inclusion of several field studies focusing on community or population level effects (i.e., tree swallow, benthic macroinvertebrate community, and ELS studies) supported the interpretation of modeled results.

Another uncertainty associated with the BERA is associated with the breaching of the Allendale Dam in early summer 2001. Some of the fish tissue samples were collected prior to the breach, and some were collected after. The sediment data used to estimate exposure point concentrations were collected before the breach, but contaminated sediments could have been transported from Allendale Pond to Lyman Mill Pond during the breach. Consequently, exposures associated with Allendale Pond may be over-estimated and those for Lyman Mill Pond may be underestimated. The effects of the breach (an unstable condition) were recently evaluated.

For the BHHRA, it was not possible to determine actual fish consumption rates for recreational anglers who consume their catch. However, fish consumption rates for adults were estimated using New England regional information from the Maine Angler Survey. Another uncertainty is associated with the use of the most recent risk assessment approach for evaluating dioxins and furans. The oral cancer slope factor (CSF) for dioxin was taken from U.S. EPA (1997a). U.S. EPA's reassessment of 2,3,7,8-TCDD and related compounds (September 2000) identifies another, more conservative CSF for dioxin. This alternative oral CSF was used to recalculate potential risks for some scenarios to evaluate this uncertainty. This evaluation indicated that the overall cancer risk estimates would increase by a factor of approximately seven if the alternative CSF were used (MACTEC, 2004b). No additional data collection currently is planned to reduce specific uncertainties associated with the BERA and BHHRA.

7.3 Data Gaps

The most important data gaps that will be addressed prior to developing remedial alternatives for the CMRP site are as follows:

- Further investigation of the discharge of VOCs and possibly dioxin into the Woonasquatucket River near the Brook Village parking lot to determine whether or not a significant ongoing source of dioxin to the river exists. This investigation will be completed in 2005.

- Additional data to better define the nature and extent of dioxin and other chemicals of concern in Lyman Mill Pond and downstream of Lyman Mill Dam. Additional data were collected from Lyman Mill and Manton Ponds in early 2005; further additional data may be collected downstream as needed in a future phase of the project.

- Additional data collection will be collected in 2005 to reduce uncertainty associated with sediment stability model predictions, including measurement of site-specific sediment erosion properties; bed type on Allendale and Lyman Mill Ponds; and stage height and current velocity data to calibrate the hydrodynamic model.

- Additional surface water sample data were collected in late 2004 to verify that no net downstream transport of dioxin is occurring under non-resuspending conditions.

- The nature of the hard layer underlying soft sediment in Allendale and Lyman Mill Ponds (i.e., gravel deposits or bedrock) will need to be determined if on-site contained aquatic disposal is to be considered in the FS.

- The ownership and condition of the Allendale, Lyman Mill, and Manton Dams should be determined if the dams are to be incorporated as an element of the remedial alternatives for sediments.

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FIGURES

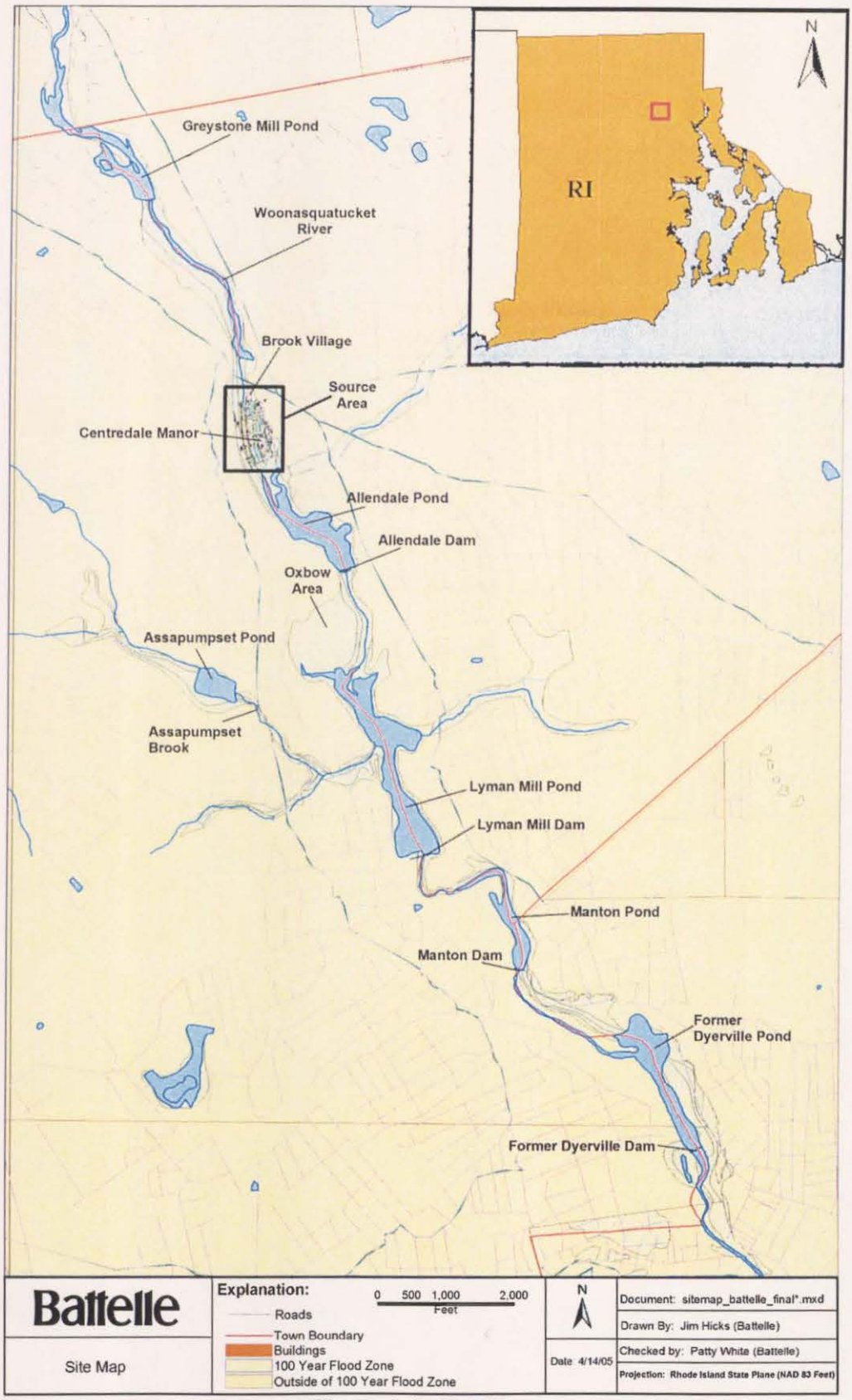


Figure 1-1. Site Map

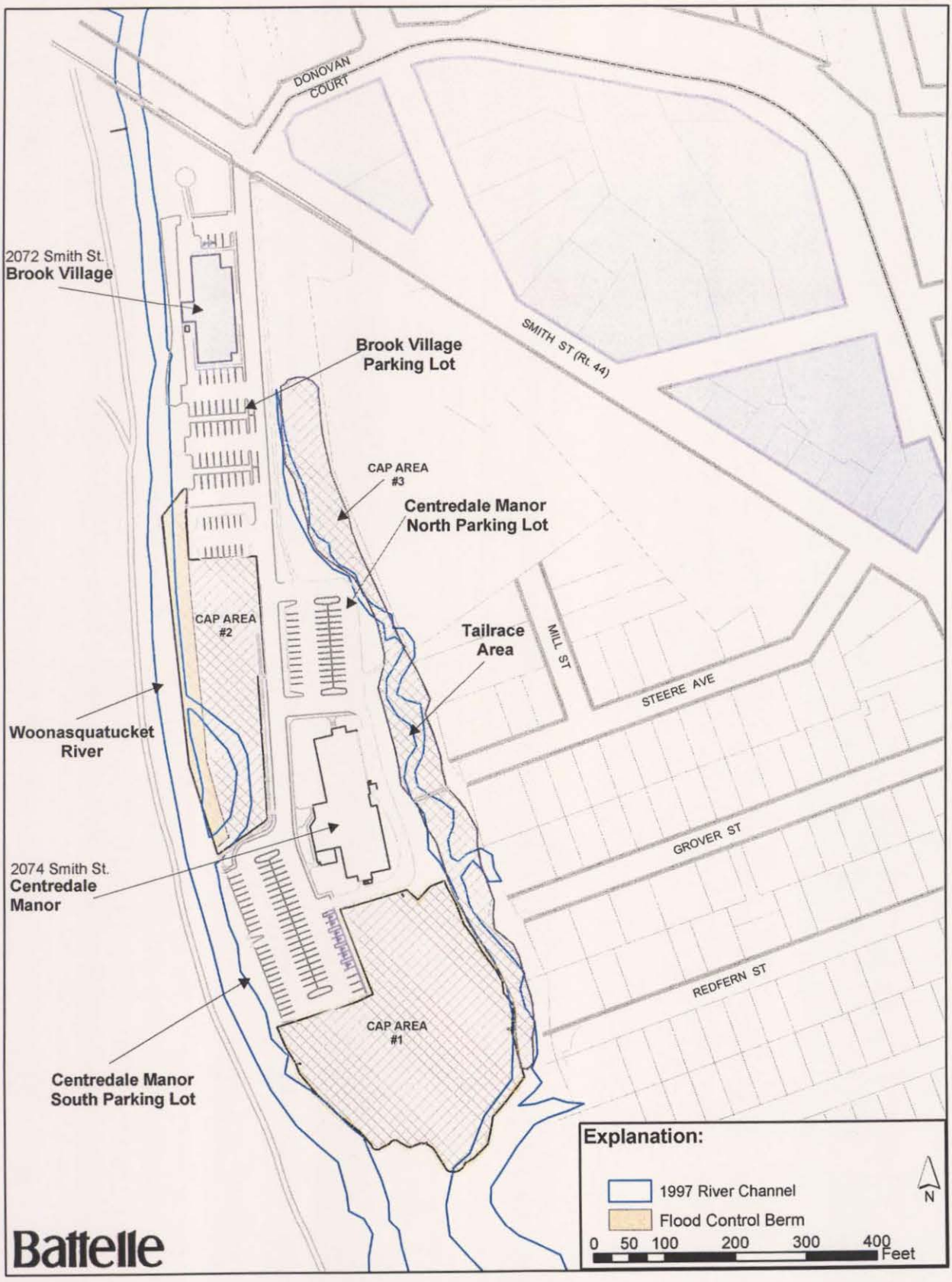


Figure 1-2. Source Area Features

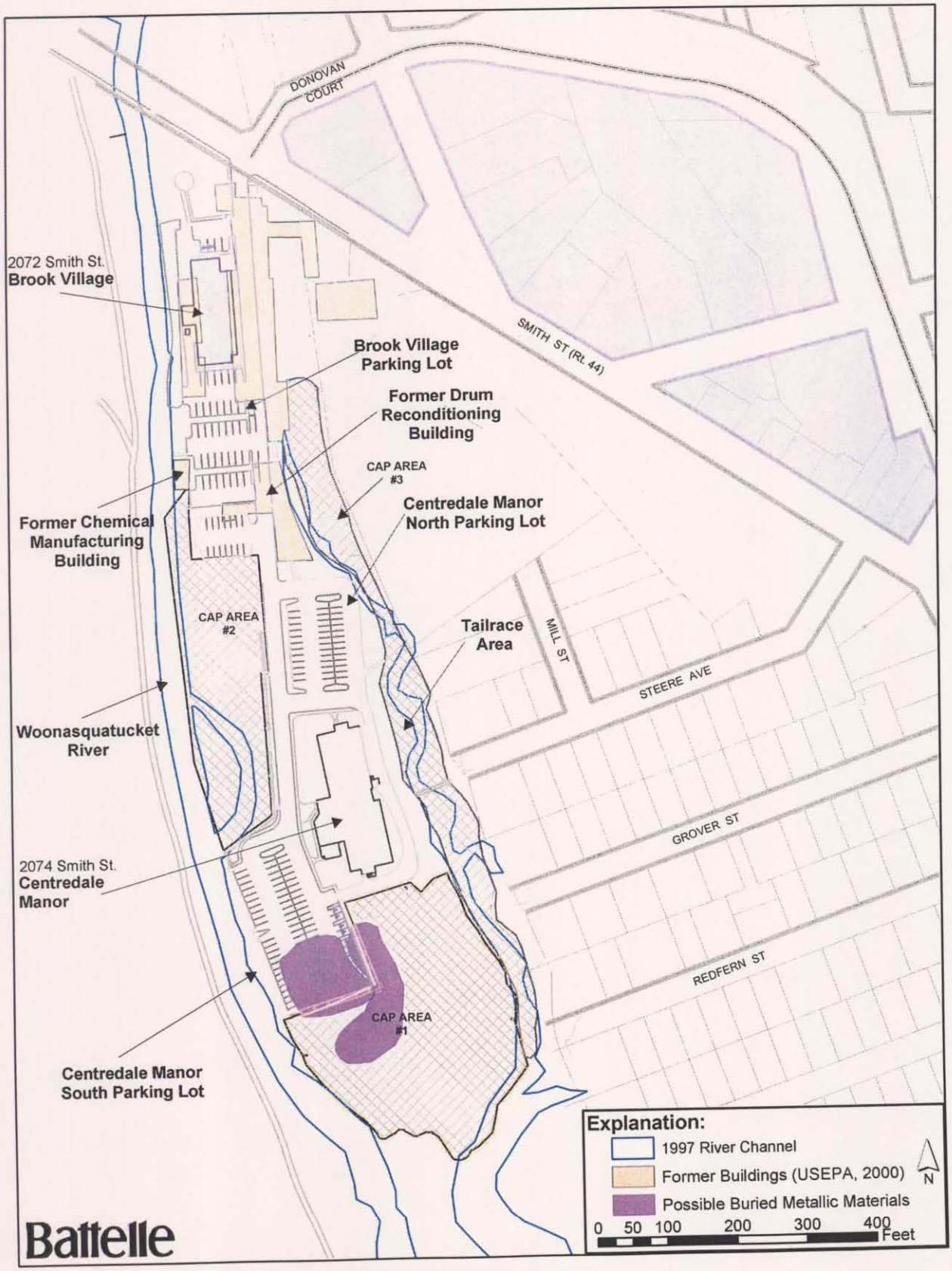


Figure 1-3. Historical Features in Source Area



From U.S. EPA (2000).

INTERPRETATION CODE

———	SITE BOUNDARY	LT	LIGHT-TONED
←— — —	DRAINAGE	M	MATERIAL
←———	FLOW	MM	MOUNDED MATERIAL
= = = =	VEHICLE ACCESS	OF	OUTFALL
x x x x x x	FENCE	SL	STANDING LIQUID
	MOUNDED MATERIAL (EXTENSIVE)	ST	STAIN
BA	BARE AREA	SW	SOLID WASTE
DG	DISTURBED GROUND	URO	UNIDENTIFIED RECTILINEAR OBJECTS
DR	DRUMS	VT	VERTICAL TANK
DT	DARK-TONED	WDA	WASTE DISPOSAL AREA
EX	EXCAVATION	WL	WETLAND
FL	FILL	*	COLLATERAL DATA
HT	HORIZONTAL TANK		
IM	IMPOUNDMENT		

Figure 1-4. Annotated 1965 Aerial Photograph of CMRP Site

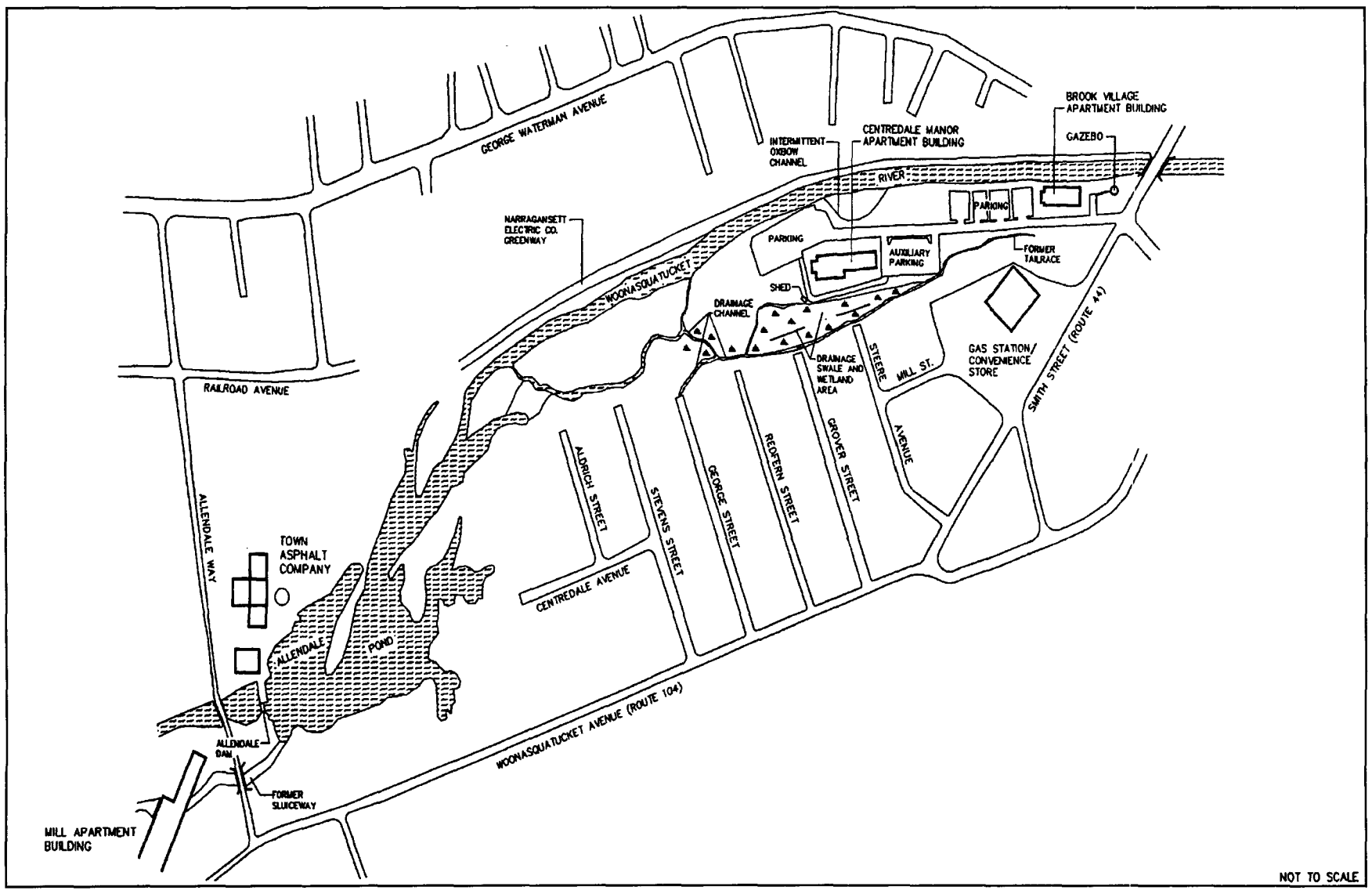


From USEPA (2000).

INTERPRETATION CODE

———	SITE BOUNDARY	LT	LIGHT-TONED
←— — —	DRAINAGE	M	MATERIAL
←———	FLOW	MM	MOUNDED MATERIAL
====	VEHICLE ACCESS	OF	OUTFALL
x x x x x x	FENCE	SL	STANDING LIQUID
	MOUNDED MATERIAL (EXTENSIVE)	ST	STAIN
BA	BARE AREA	SW	SOLID WASTE
DG	DISTURBED GROUND	URO	UNIDENTIFIED RECTILINEAR OBJECTS
DR	DRUMS	VT	VERTICAL TANK
DT	DARK-TONED	WDA	WASTE DISPOSAL AREA
EX	EXCAVATION	WL	WETLAND
FL	FILL	*	COLLATERAL DATA
HT	HORIZONTAL TANK		
IM	IMPOUNDMENT		

Figure 1-5. Annotated 1970 Aerial Photograph of CMRP Site



Modified from Weston (2000)

Figure 1-6. Maps showing Pre- and Post-TCRA Conditions, 1999-2000



View to north. Protective fencing in foreground. Cap Area #2 and embankment rip rap to north of fencing. Brook Village apartment in background.

Figure 1-7. Photo of Cap Area #2 and Woonasquatucket River



View to west across Woonasquatucket River at Allendale Dam.

Figure 1-8. Photo of Restored Allendale Dam

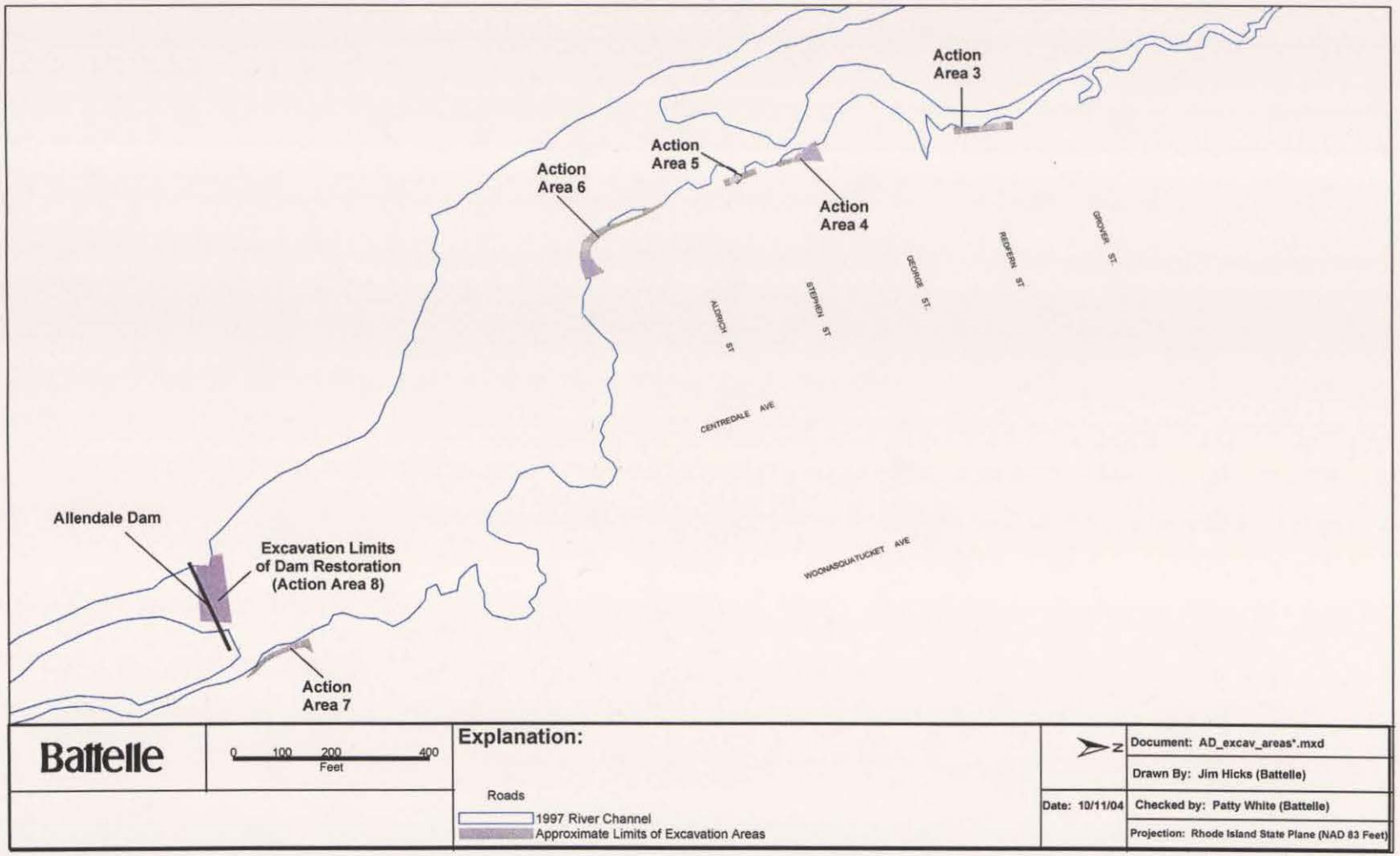


Figure 1-9. NTCRA Excavation Areas, Allendale

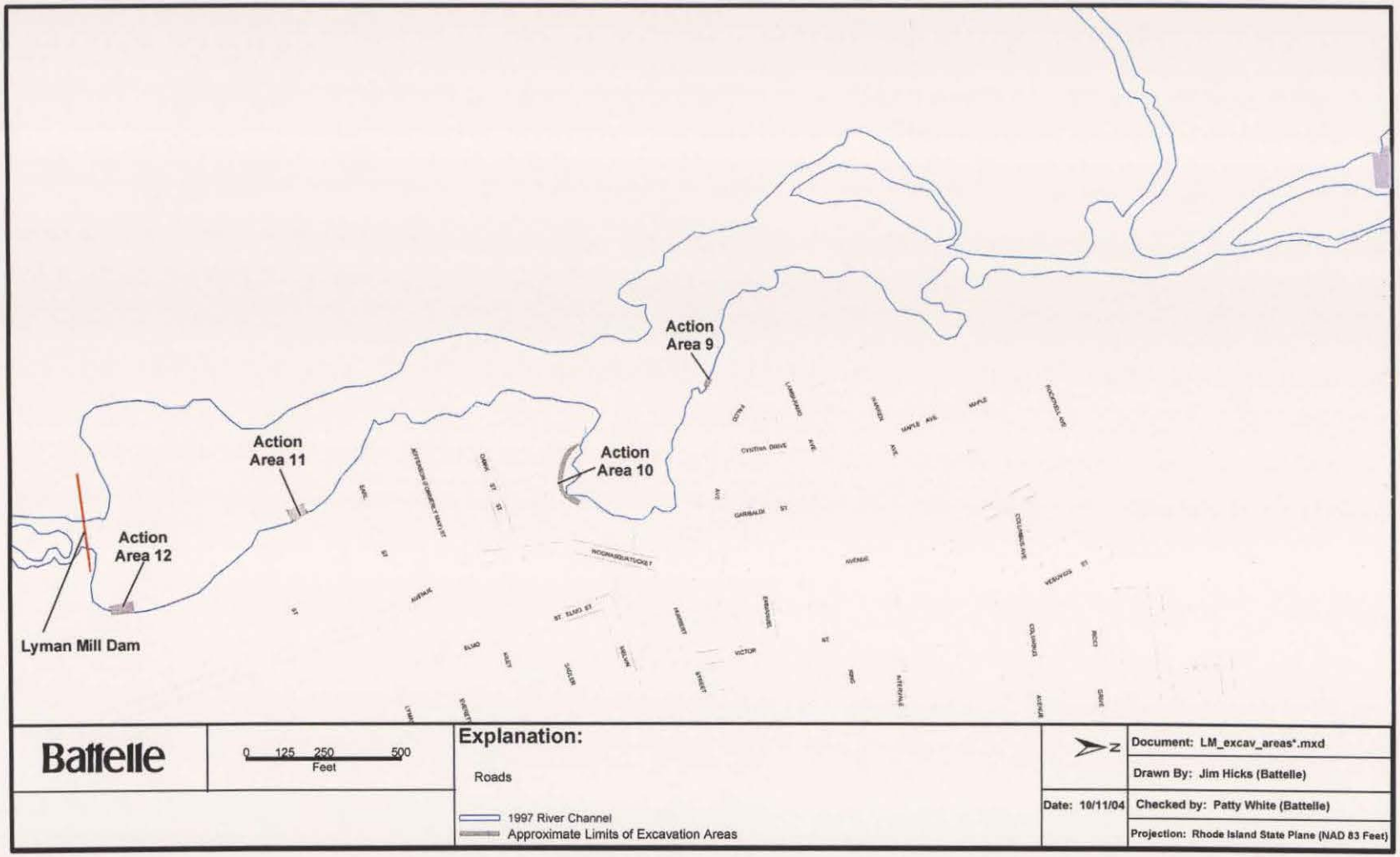


Figure 1-10. NTCRA Excavation Areas, Lyman Mill Reach

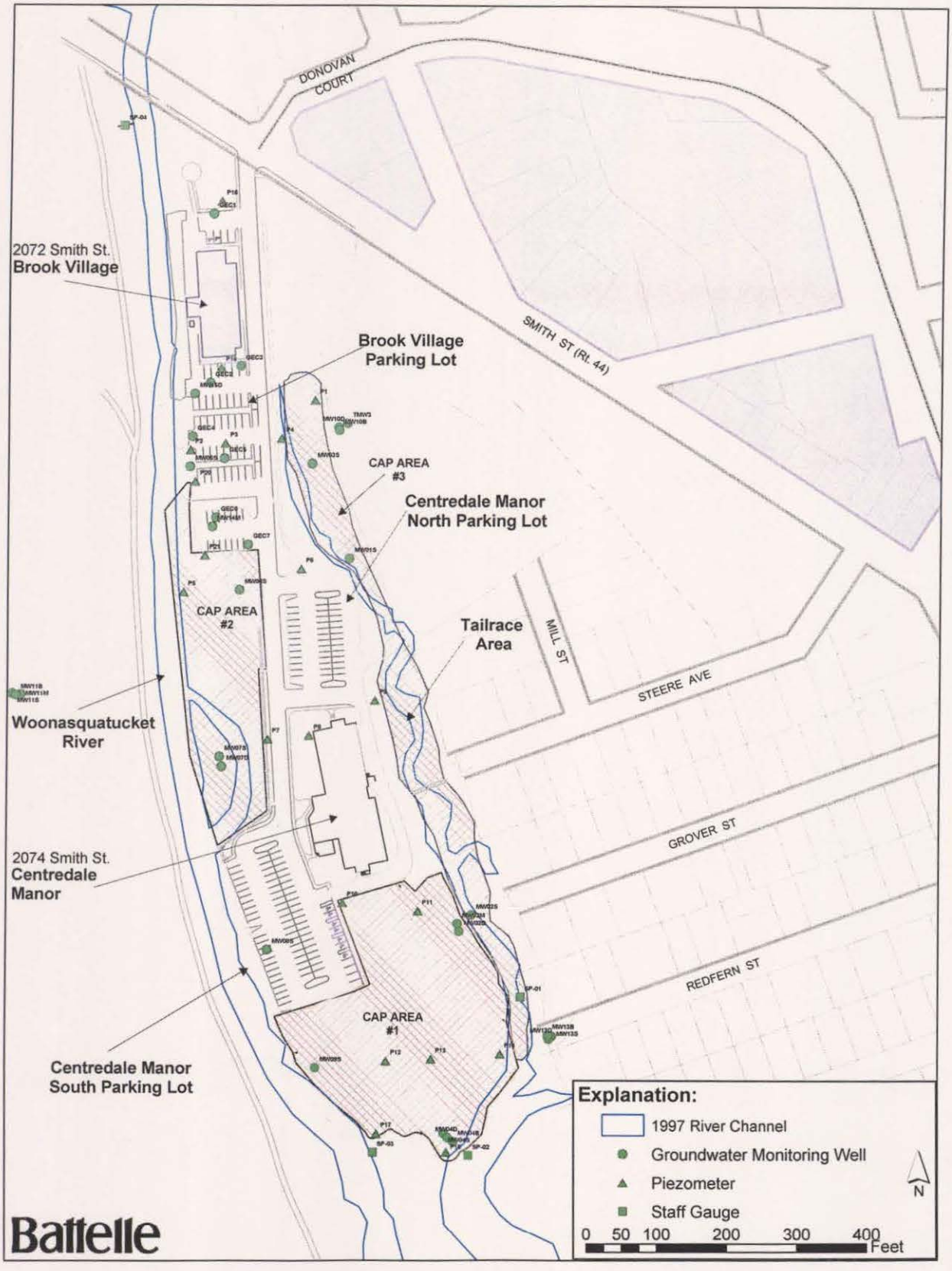


Figure 2-1. Monitoring Well, Piezometer, and Staff Gauge Locations

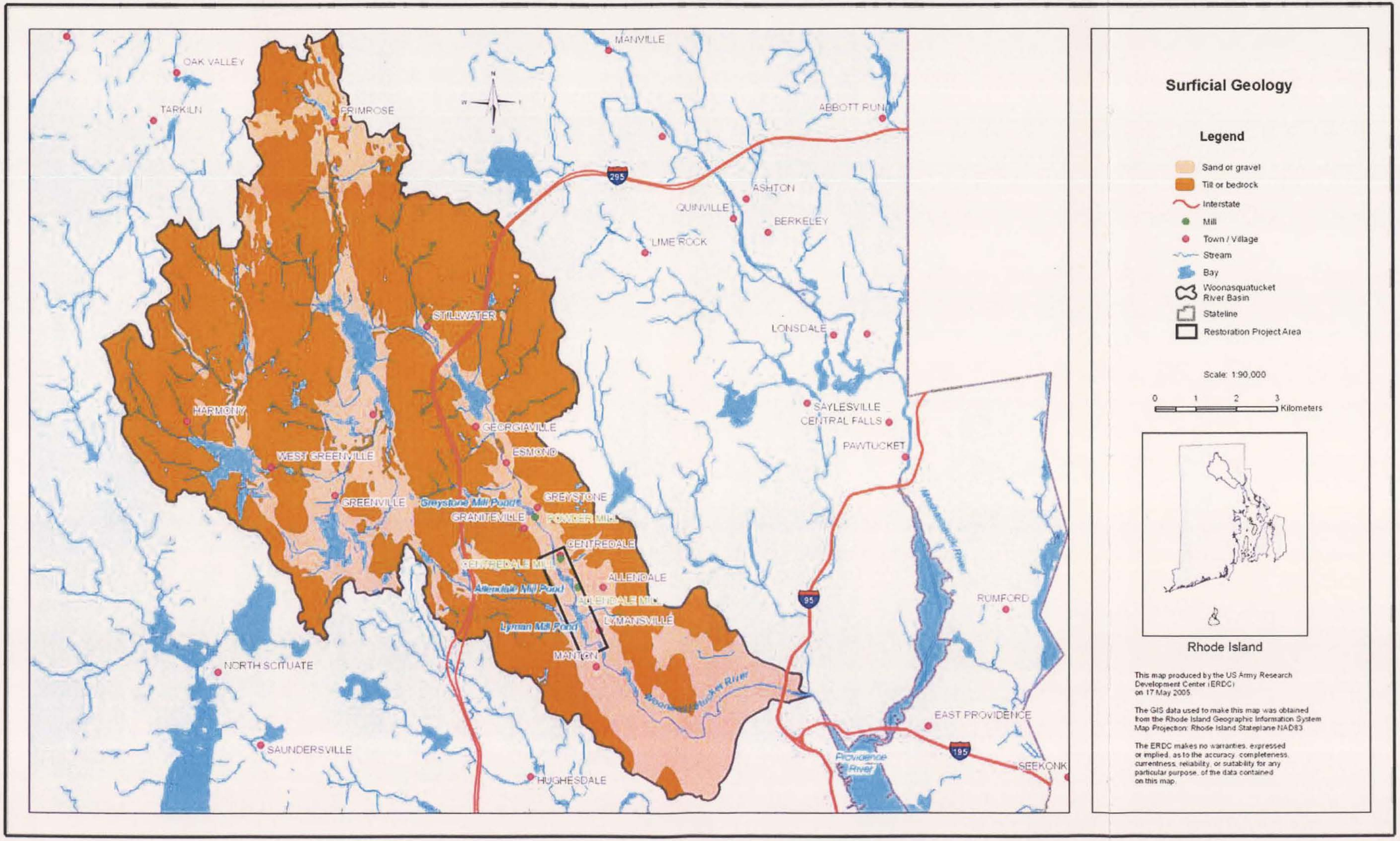


Figure 3-1. Surficial Geology of the Woonasquatucket River Watershed

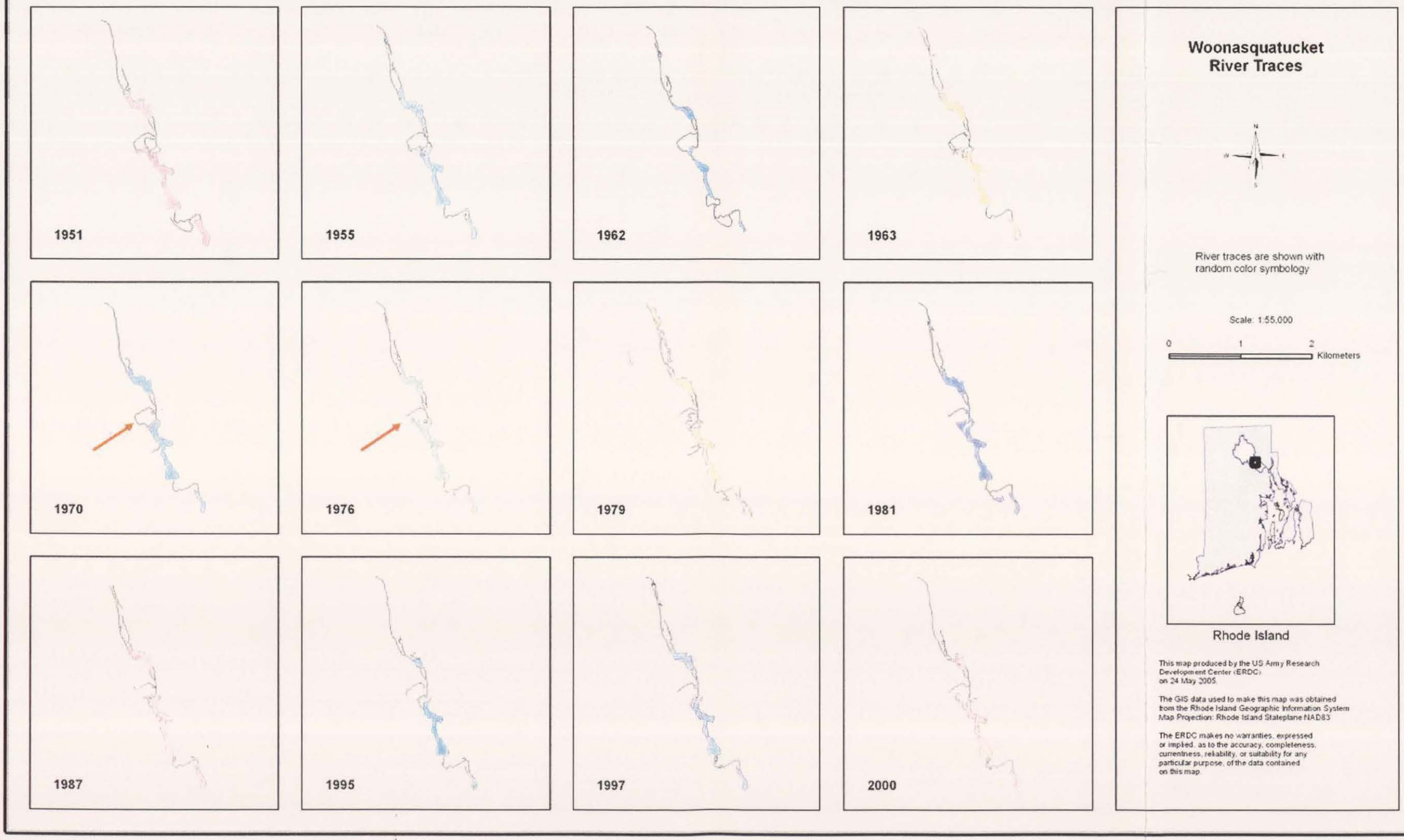


Figure 3-2. Woonasquatucket River Channel from 1951 to 2000

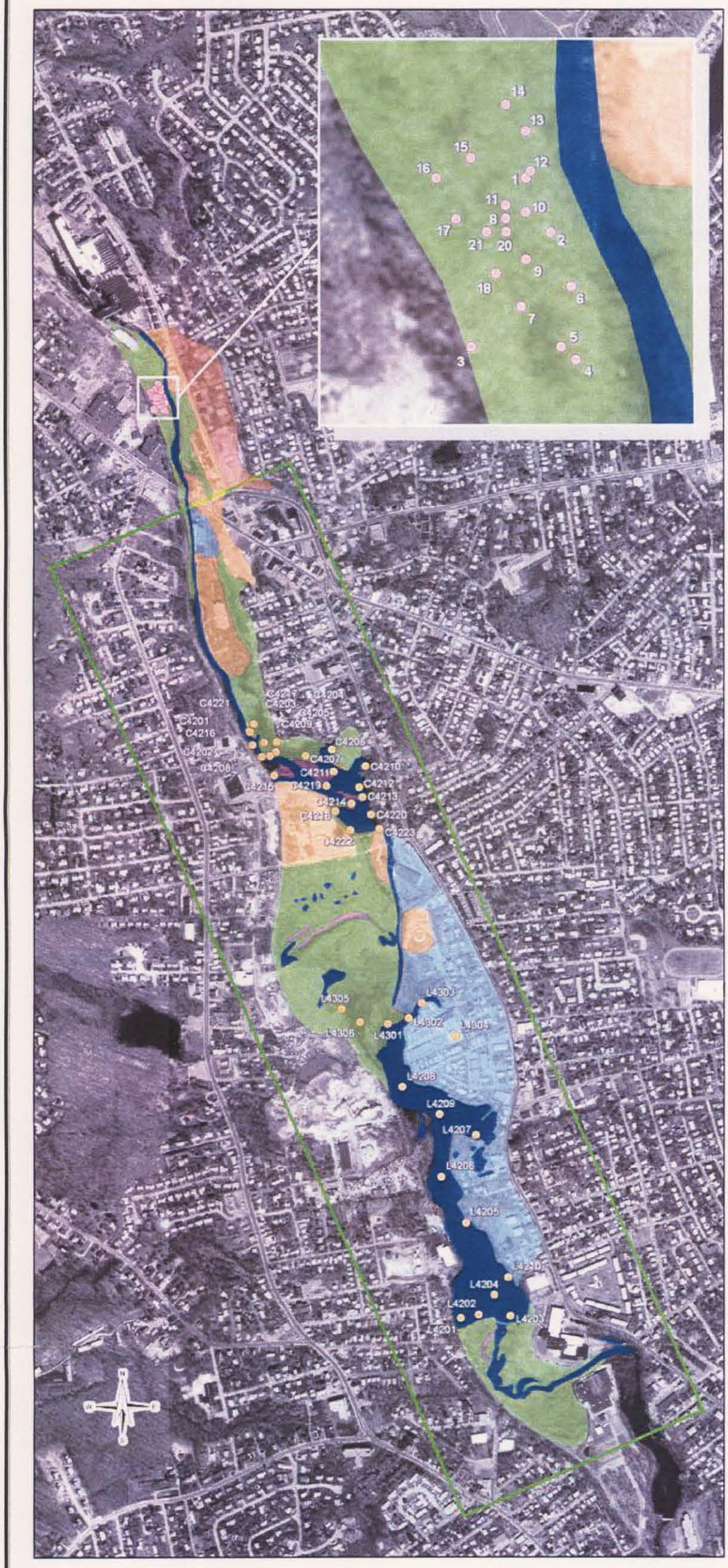


Figure provided by USACE/ERDC. Powder mill cores not included in the CMRP RI.

Figure 3-3. Geomorphic Deposits (2000)



Figure 3-4. Allendale Pond in 1987 (top) and 2000 (bottom)

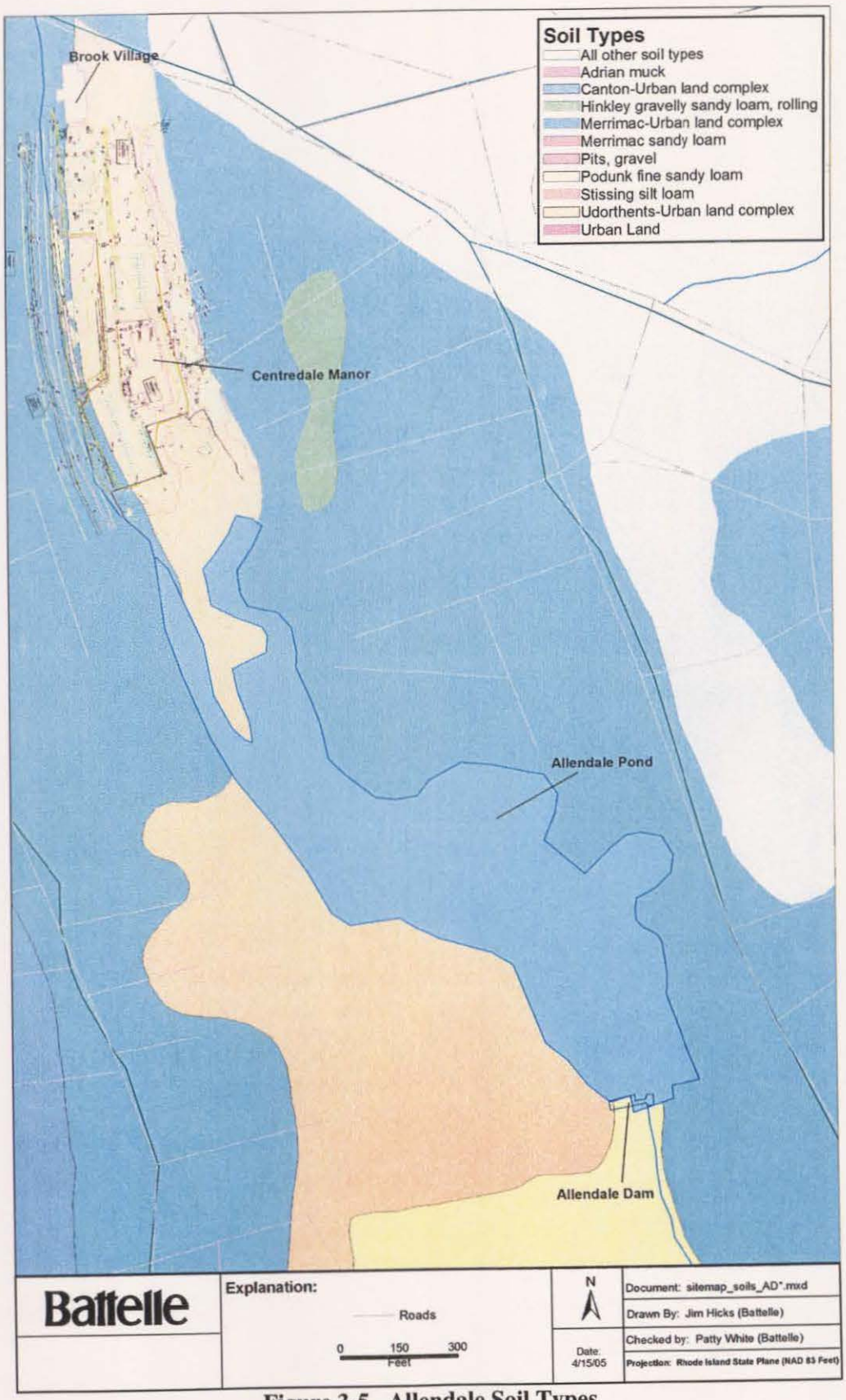


Figure 3-5. Allendale Soil Types

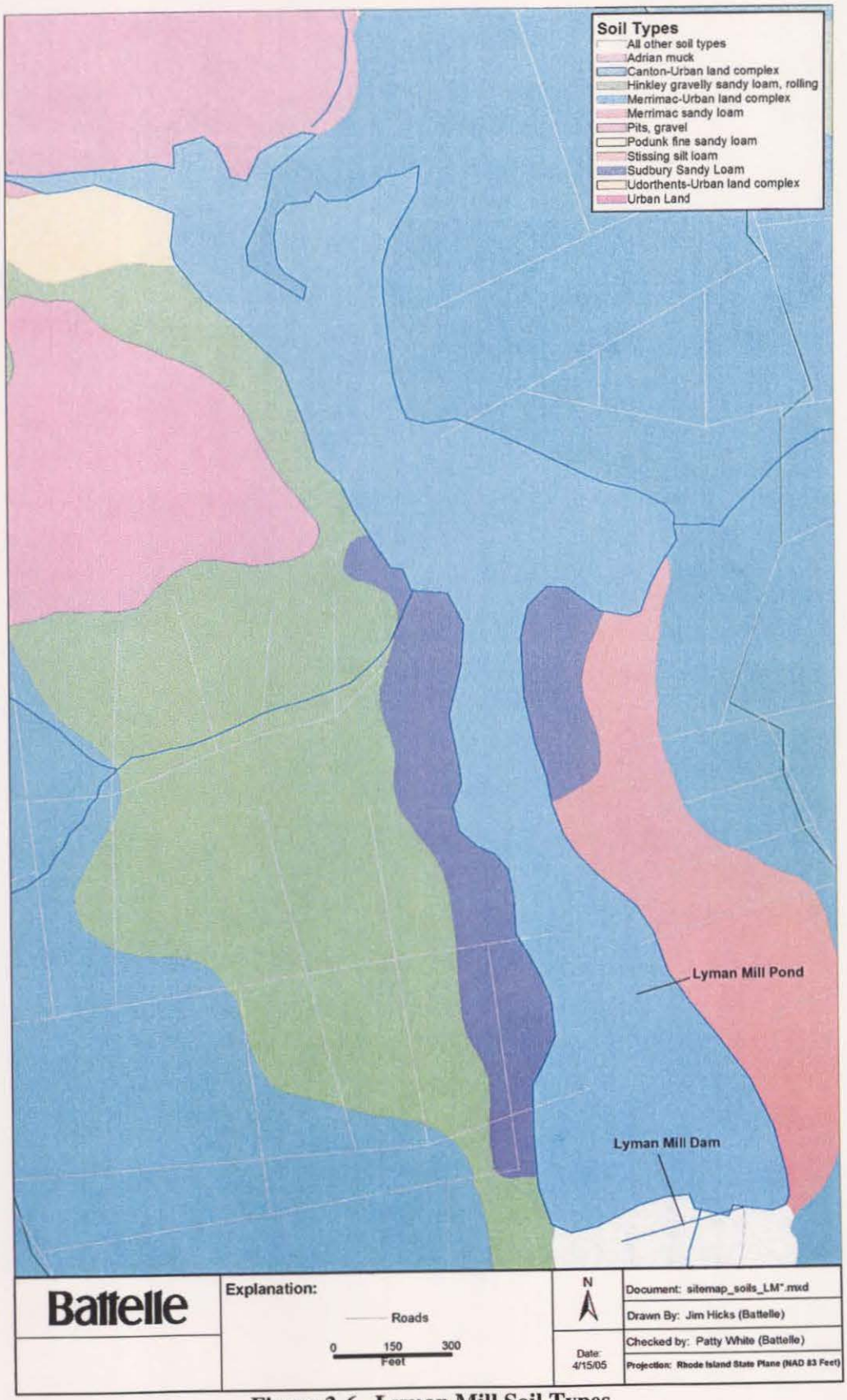


Figure 3-6. Lyman Mill Soil Types

Original includes color coding.

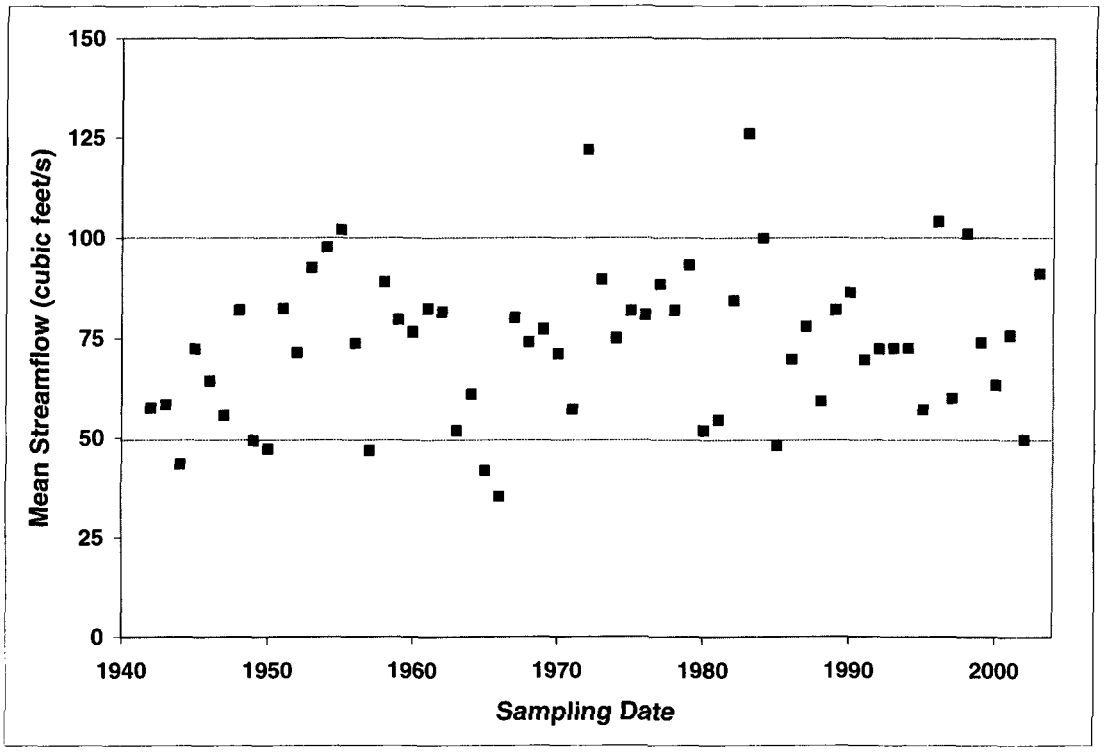


Figure 3-7. Annual Mean Streamflow at the Woonasquatucket River from 1942 to 2003

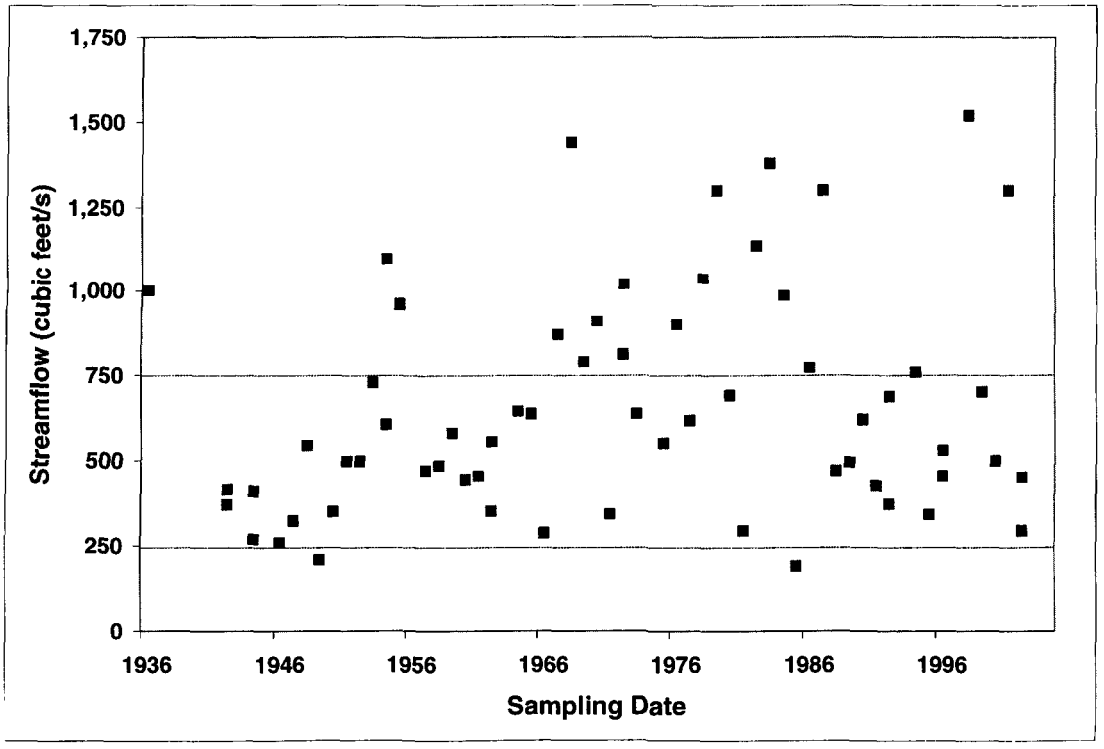


Figure 3-8. Peak Streamflow at the Woonasquatucket River from 1936 to 2002



NOTES AND REFERENCE:

1. FENCES, PARKING AREAS, BUILDINGS, ROADWAYS, RIVER, AND RESIDENTIAL LOTS TAKEN FROM PLAN ENTITLED "CENTREDALE MANOR RESTORATION SITE WOONASQUTUCKET RIVER NORTH PROVIDENCE AND JOHNSTON, R. I. INUNDATION 100 YEAR FLOOD SITE PLAN 'A'', 'B', AND 'C', WHICH PLAN WAS PROVIDED BY CLIENT.

2. HORIZONTAL DATUM TAKEN FROM THE ABOVE MENTION PLAN. VERTICAL DATUM = NGVD 1929. ALSO TAKEN FROM ABOVE REFERENCED PLAN.

3. ELEVATION FOR BENCHMARK TOP OF DRILL HOLE IN CONCRETE CURB WAS OBSERVED TO BE DIFFERENT FROM PLAN REFERENCED IN NOTE #1.

4. BASEMAP: LOUIS FEDERICI & ASSOCIATES

5. TOPOGRAPHY OF BEDROCK PROVIDED BY HAGER GEOSCIENCE, INC., OCTOBER, 2001.

GRAPHIC SCALE
0' 200' 400'
1 INCH = 200 FEET

SOURCE: TTNUS (2002)

DESIGNED BY PW	Battelle	
DRAWN BY DS	Bedrock Topography, May 4, 2001	
CHECKED BY TW	CENTREDALE MANOR – NORTH PROVIDENCE, RI	
G487002-RI111	FIGURE4-3.CDR	10/04

Figure 3-9. Bedrock Topography

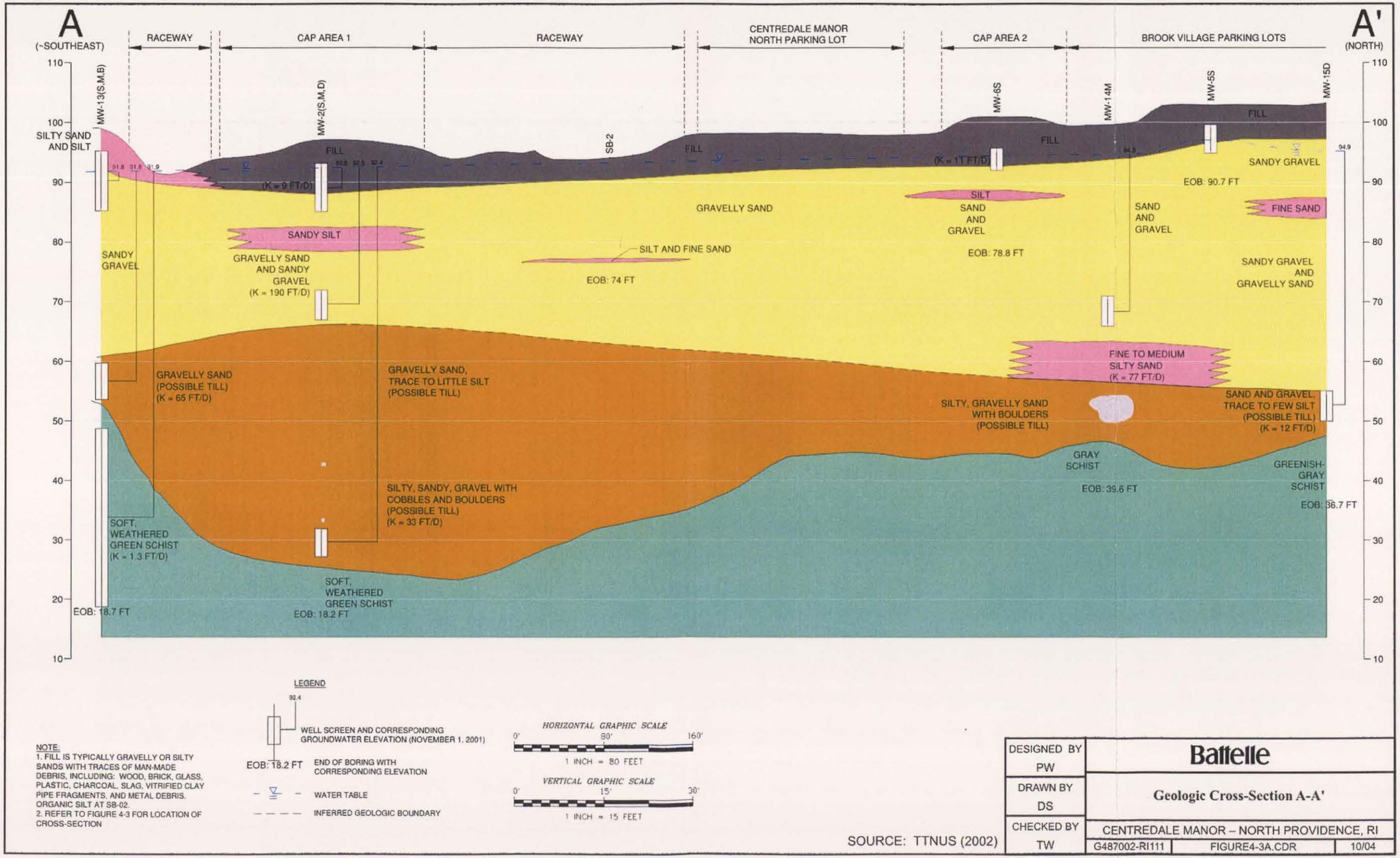
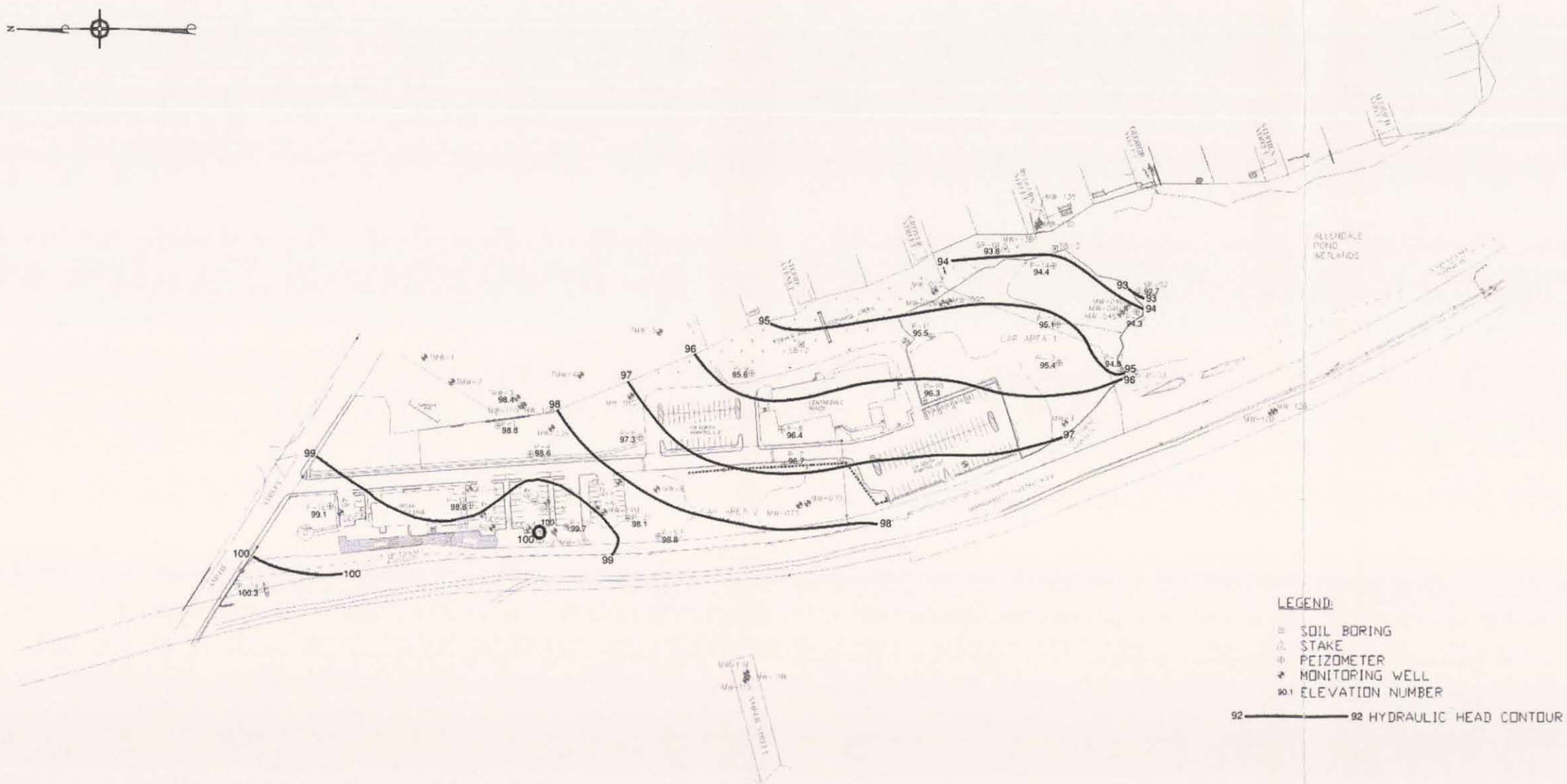


Figure 3-10. Source Area Stratigraphy


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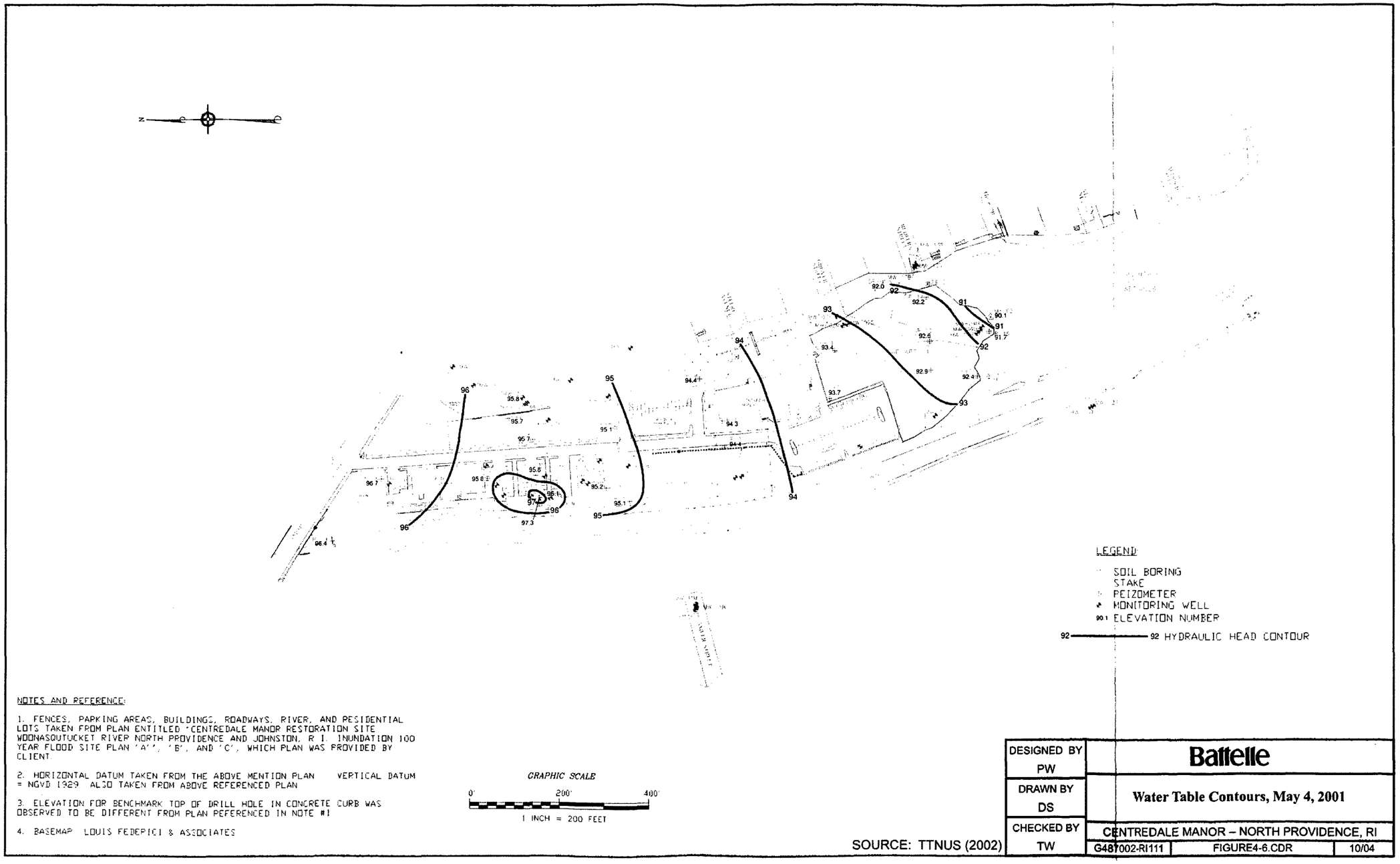
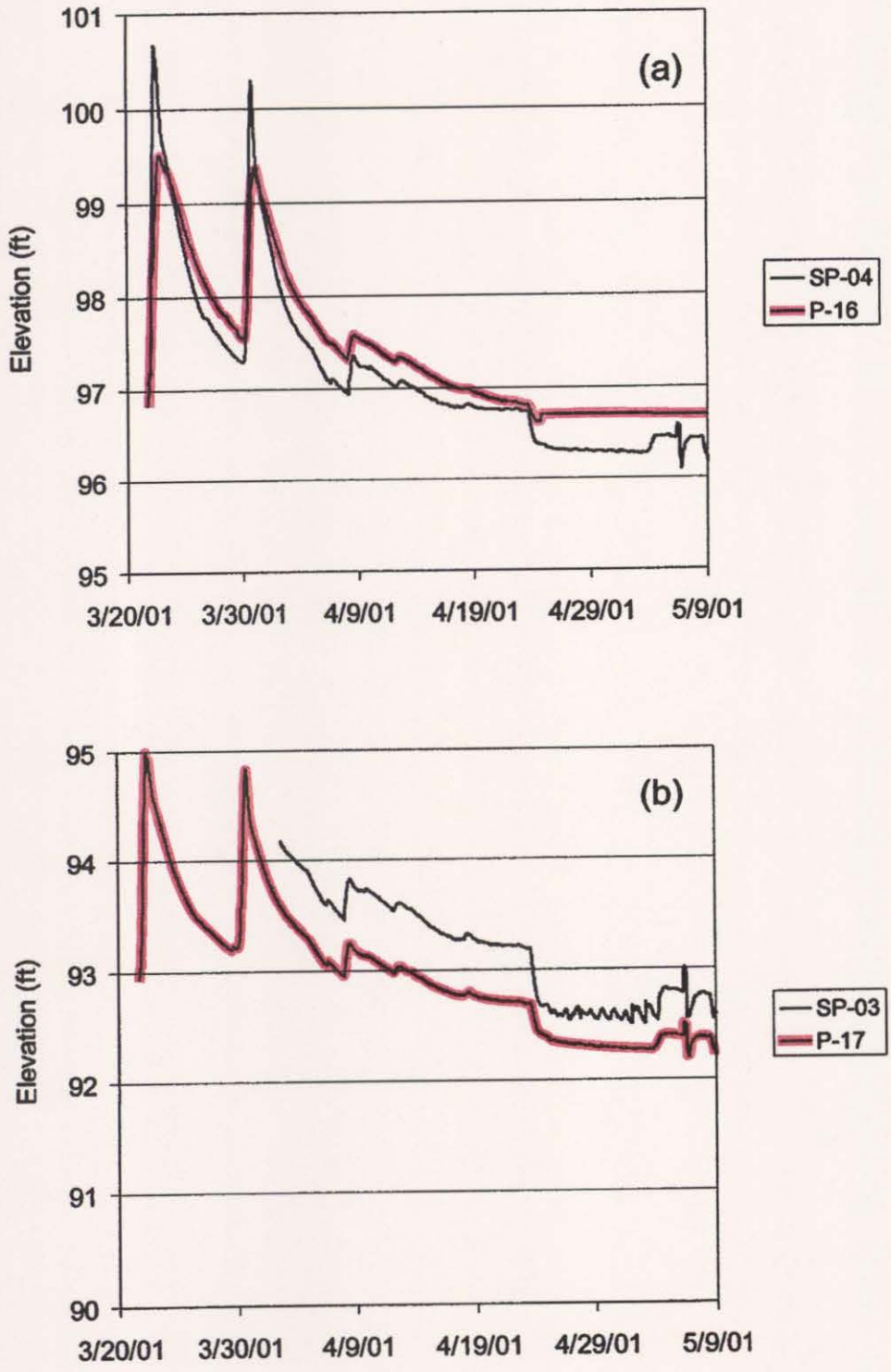


Figure 3-12. Water Table Contours, May 4, 2001



From TTNUS (2002).

Figure 3-13. Water Table Elevations in Woonasquatucket River Staff Gauges and Adjacent Piezometers

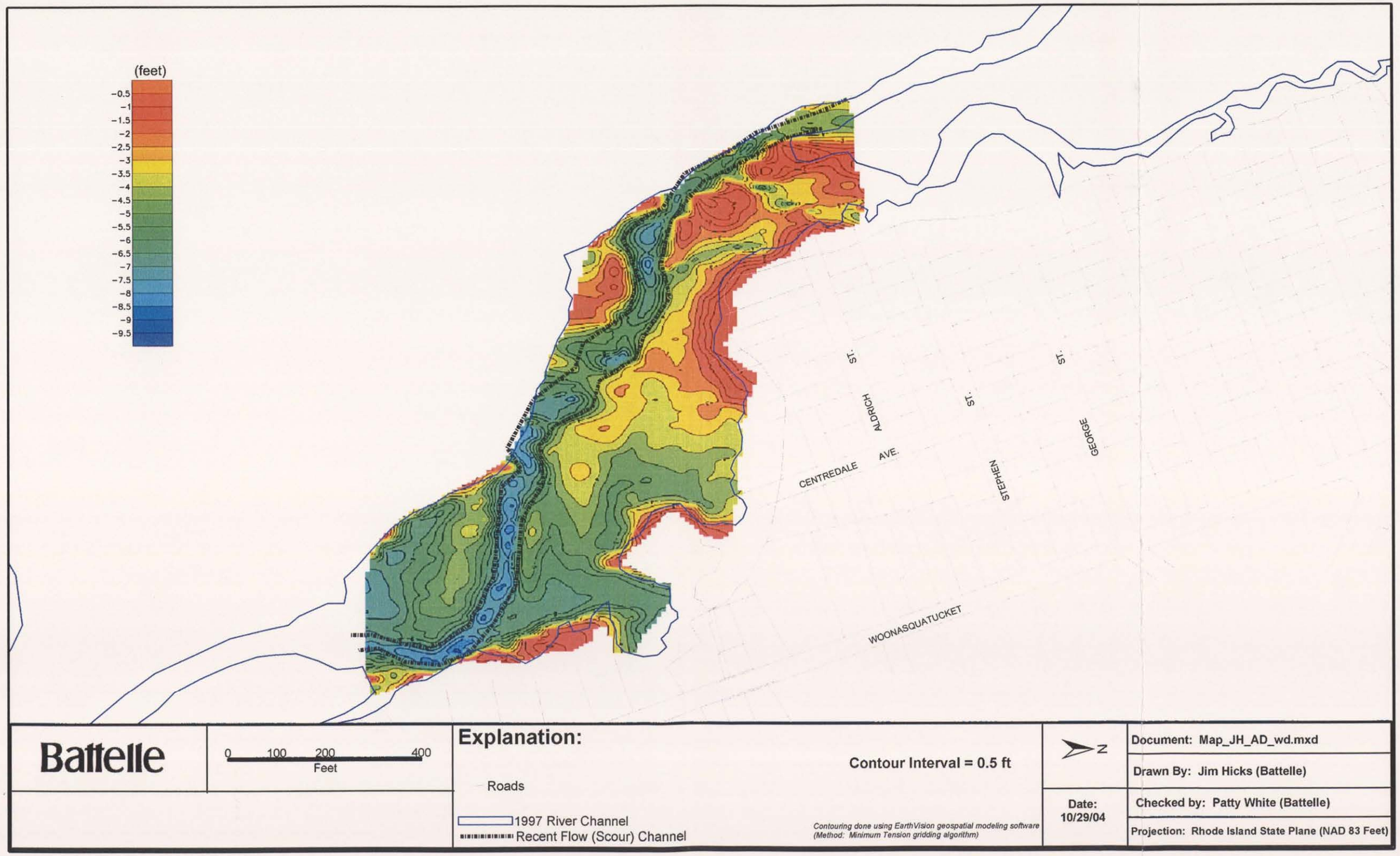


Figure 3-14. Water Depth in Allendale Pond

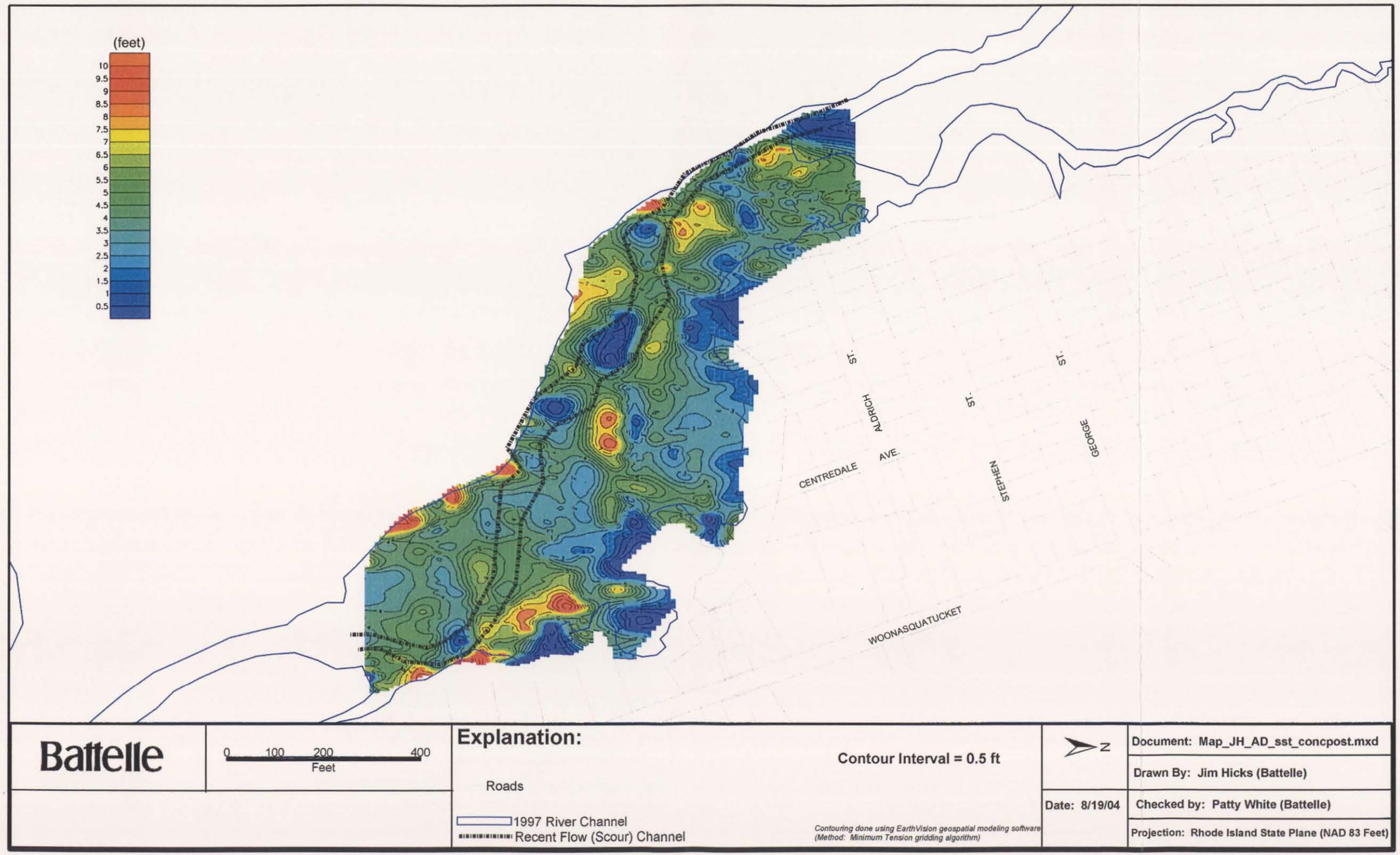


Figure 3-15. Apparent Soft Sediment Thickness in Allendale Pond

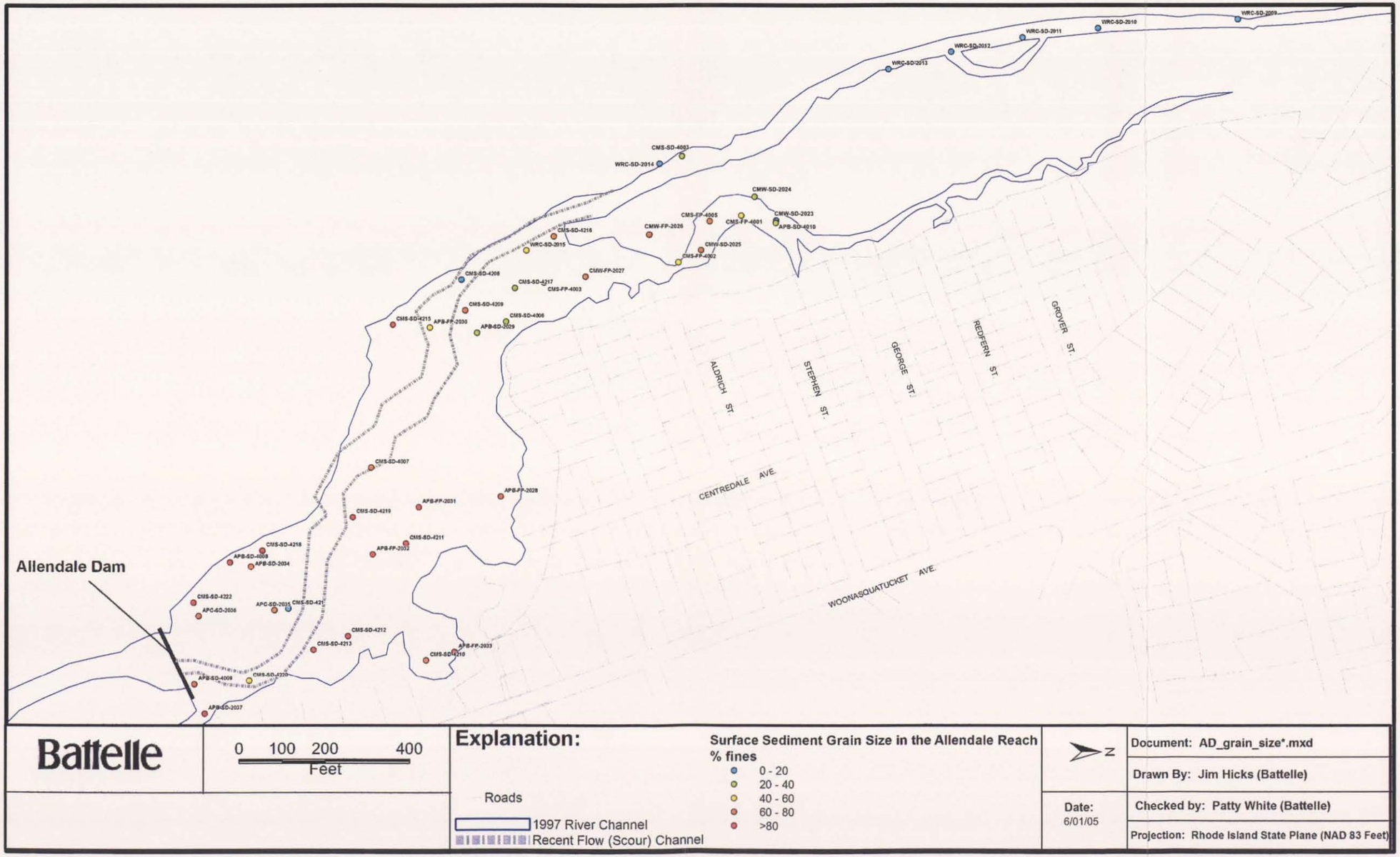


Figure 3-16. Grain-Size Distribution in Allendale Pond

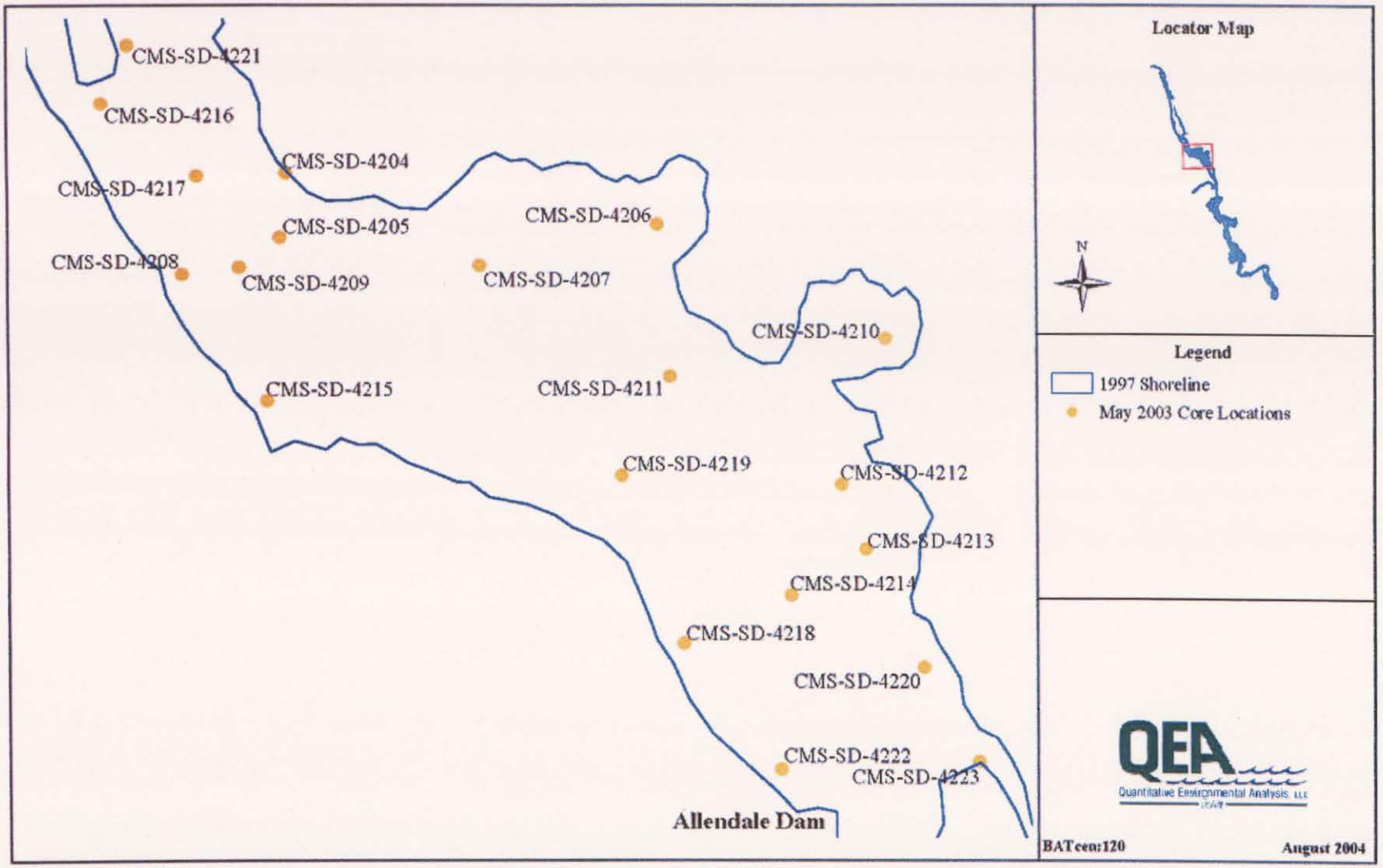
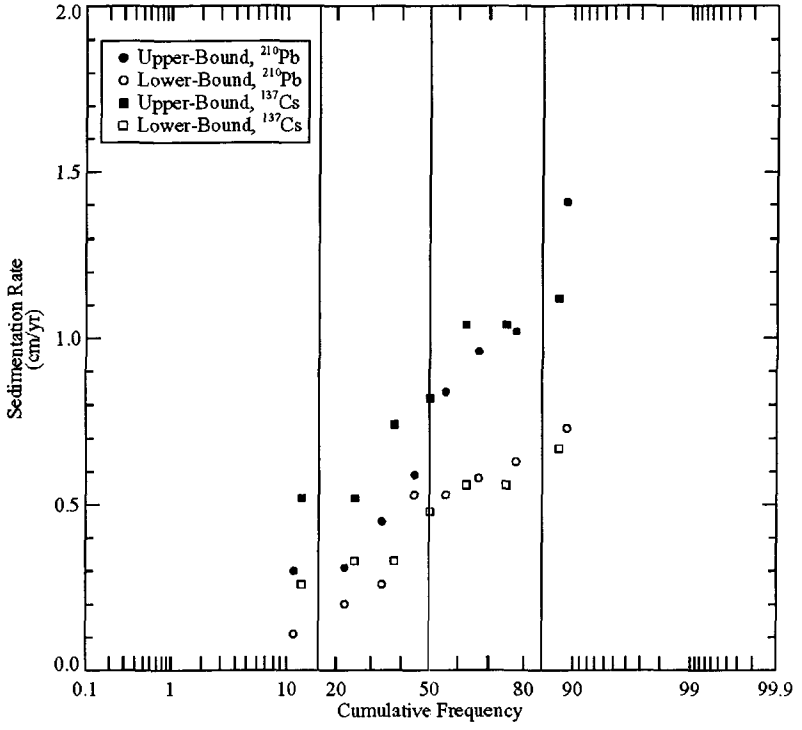


Figure 3-17. May 2003 Core Locations in Allendale Pond



From QEA (2004a).

Figure 3-18. Frequency Distribution of Upper and Lower Bound Estimates of Allendale Pond Sedimentation Rates

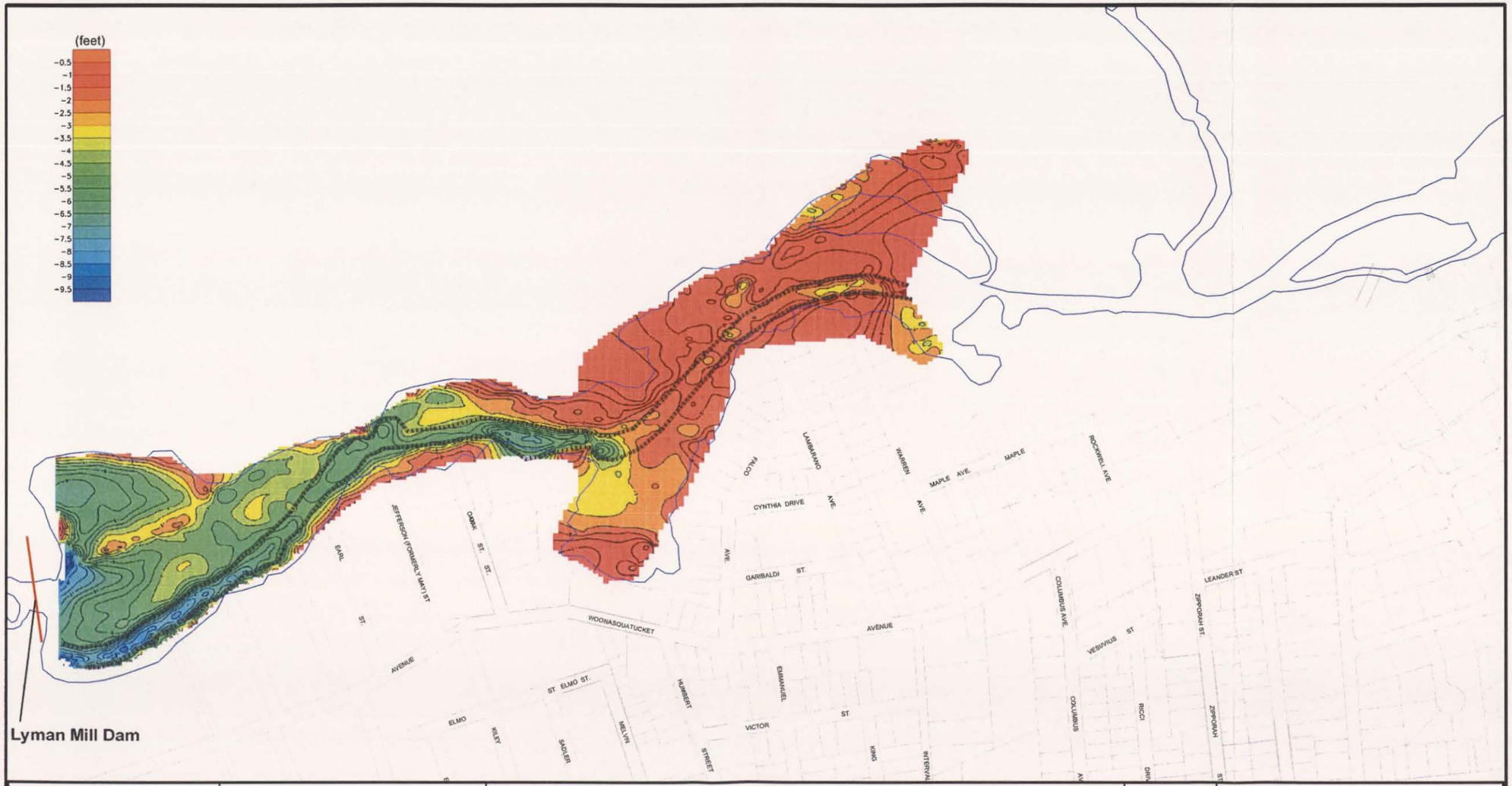


Figure 3-19. Water Depth in Lyman Mill Pond

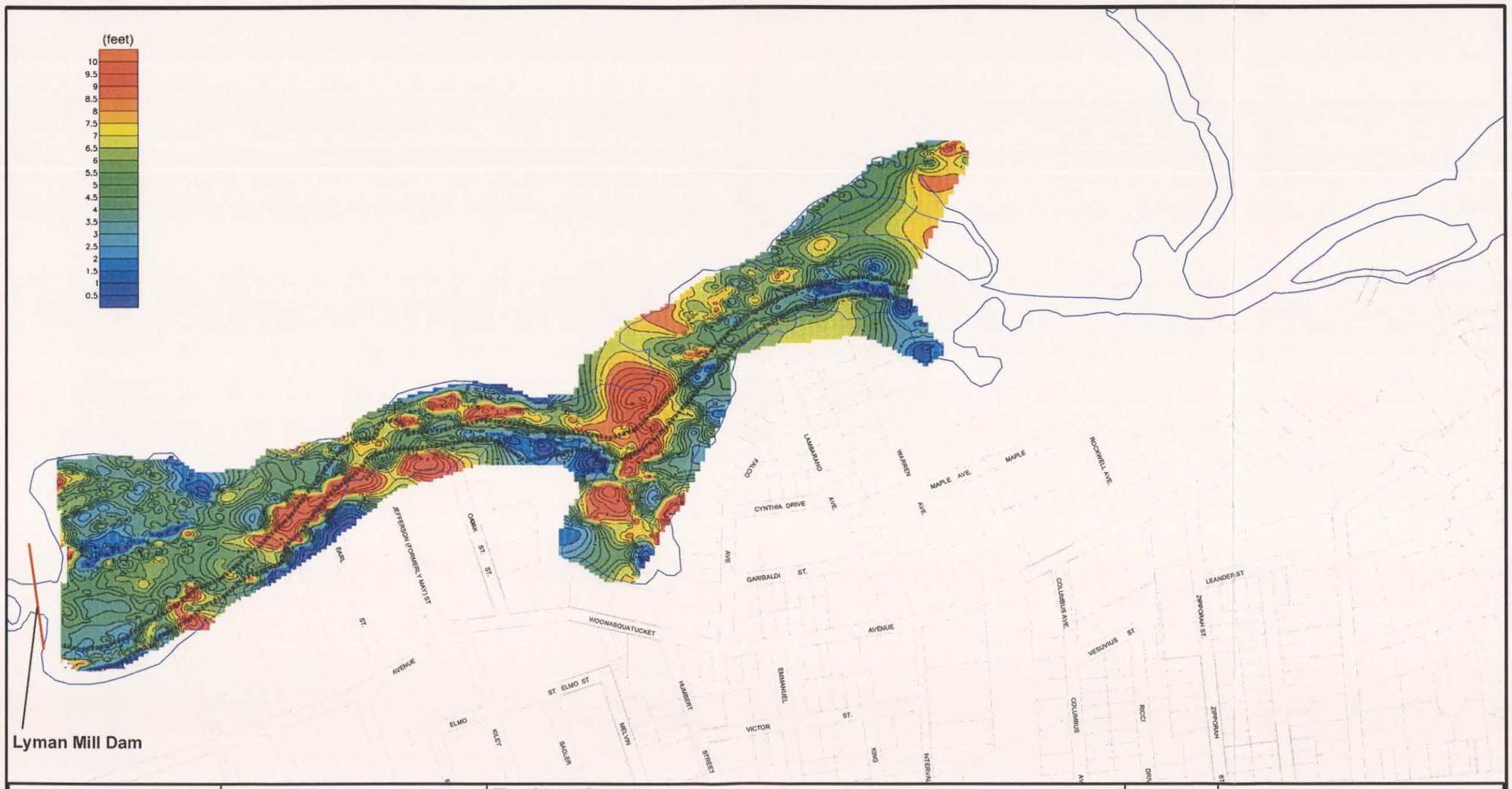


Figure 3-20. Apparent Soft Sediment Thickness in Lyman Mill Pond

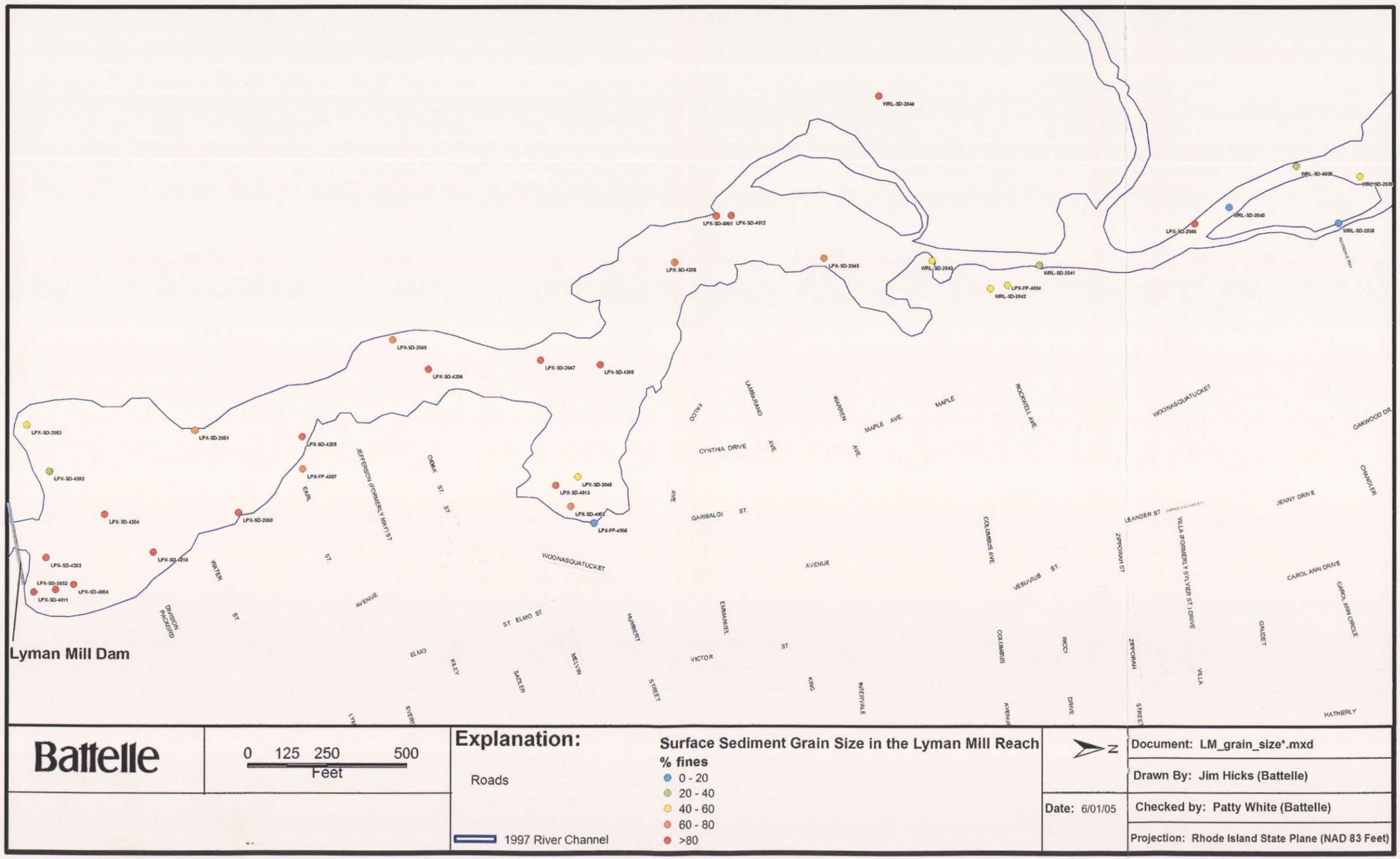


Figure 3-21. Grain-Size Distribution in Lyman Mill Pond

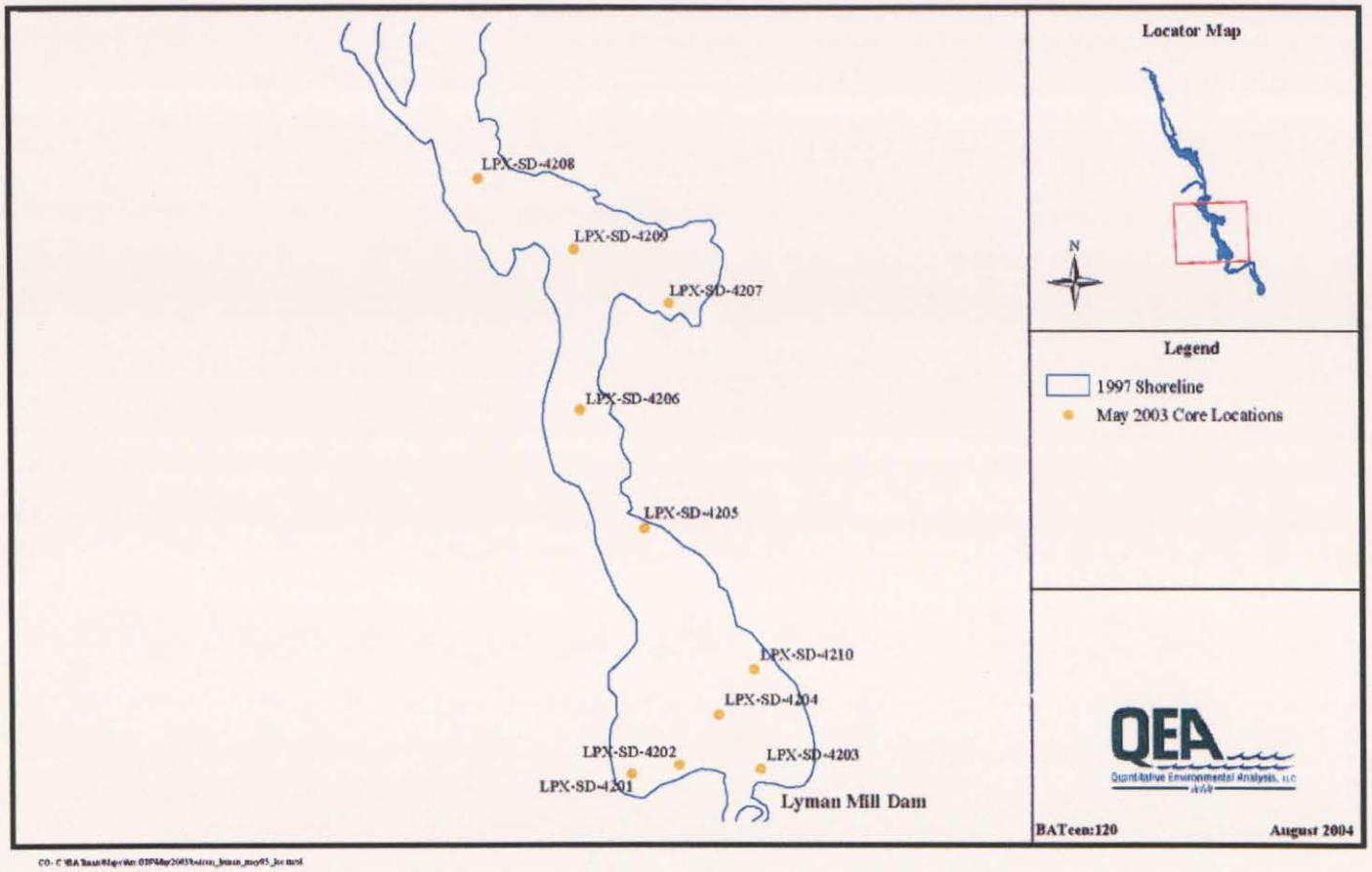


Figure 3-22. May 2003 Core Locations in Lyman Mill Pond

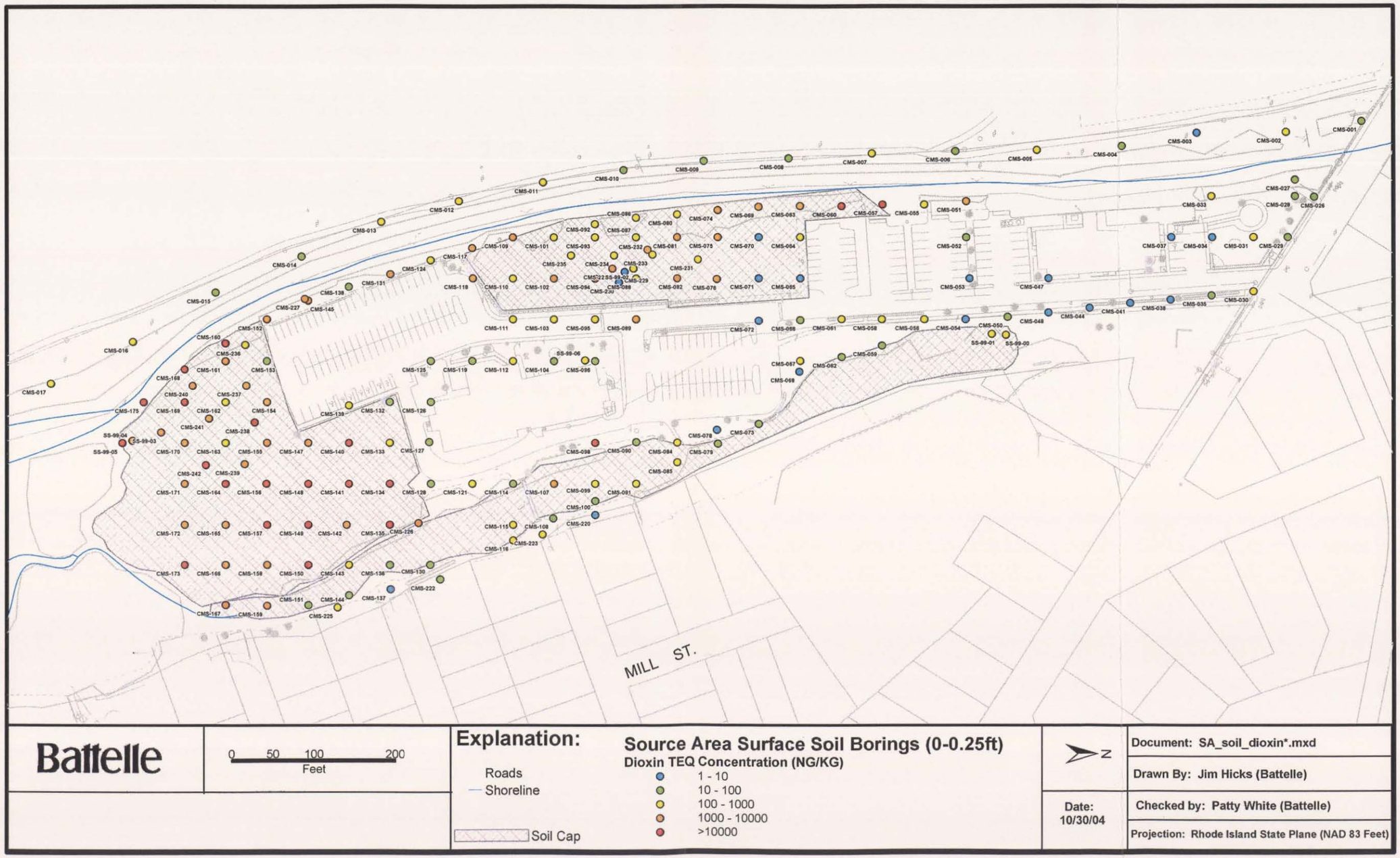
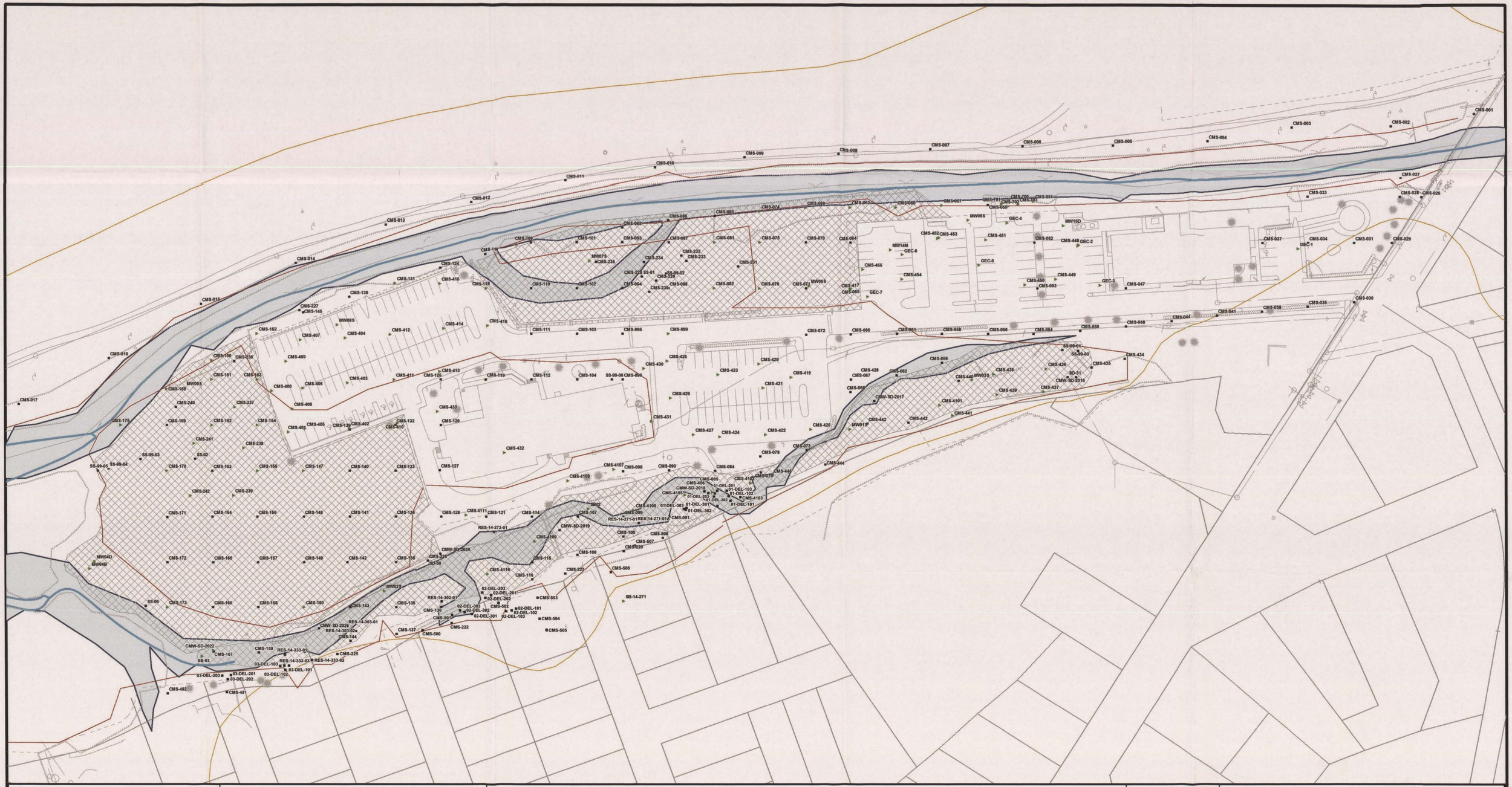
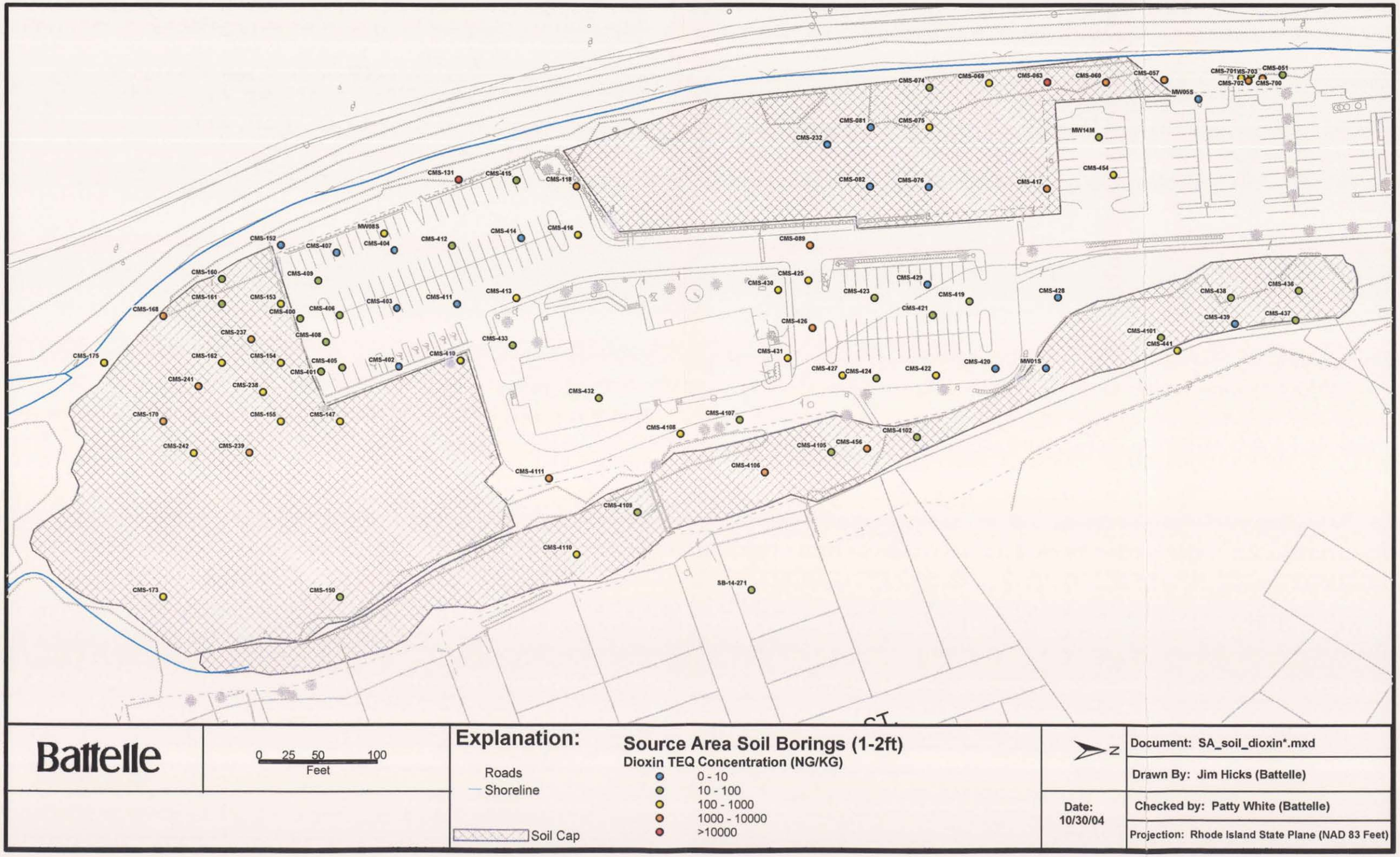


Figure 4-2. Dioxin TEQ Concentration in Source Area Soils (0-0.25 ft)


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Battelle

0 25 50 100
Feet

Explanation:

Roads
Shoreline
Soil Cap

Source Area Soil Borings (1-2ft)
Dioxin TEQ Concentration (NG/KG)

- 0 - 10
- 10 - 100
- 100 - 1000
- 1000 - 10000
- >10000

N

Date: 10/30/04

Document: SA_soil_dioxin*.mxd
Drawn By: Jim Hicks (Battelle)
Checked by: Patty White (Battelle)
Projection: Rhode Island State Plane (NAD 83 Feet)

Figure 4-3. Dioxin TEQ Concentration in Source Area Soils (1-2 ft)

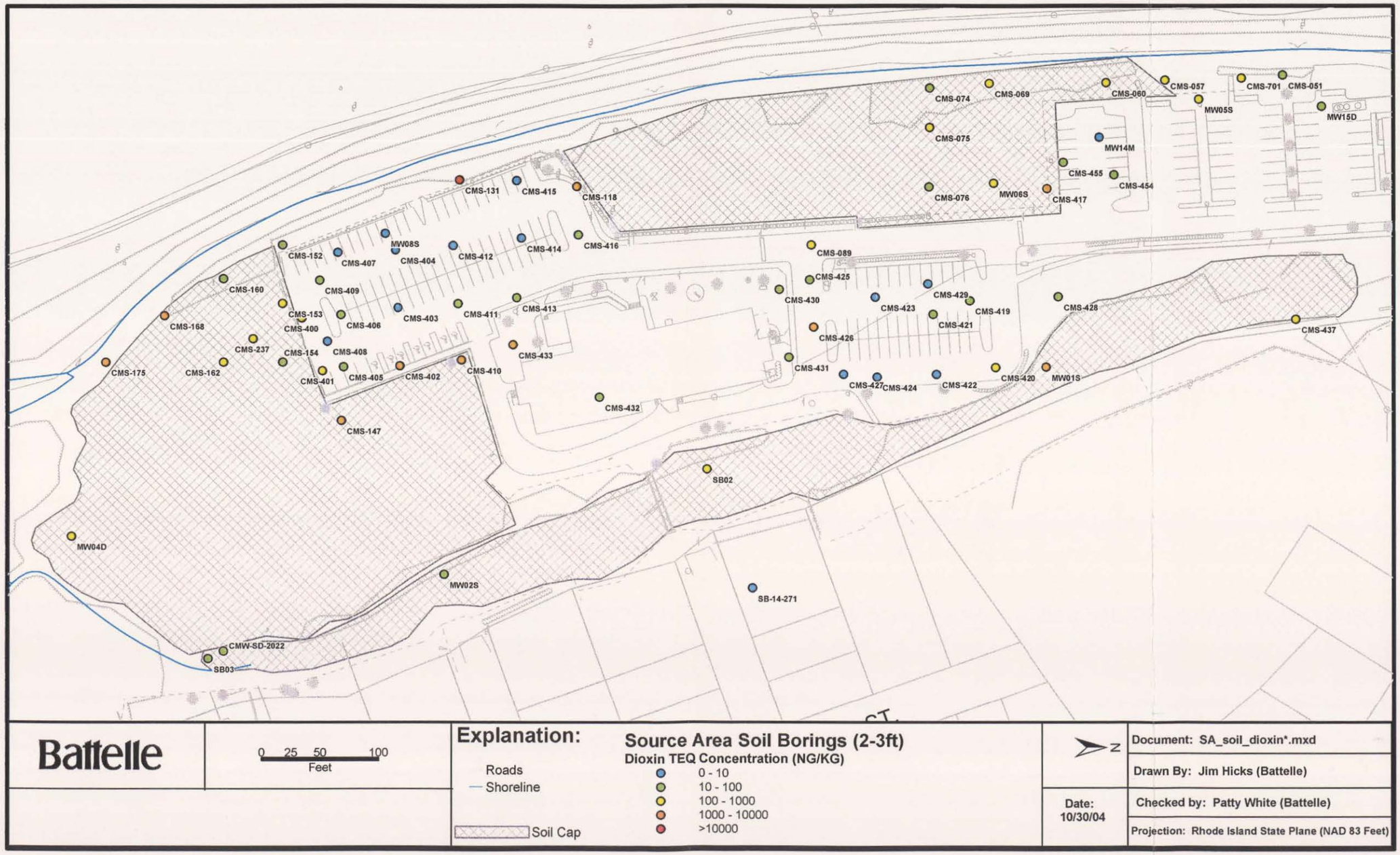


Figure 4-4. Dioxin TEQ Concentration in Source Area Soils (2-3 ft)

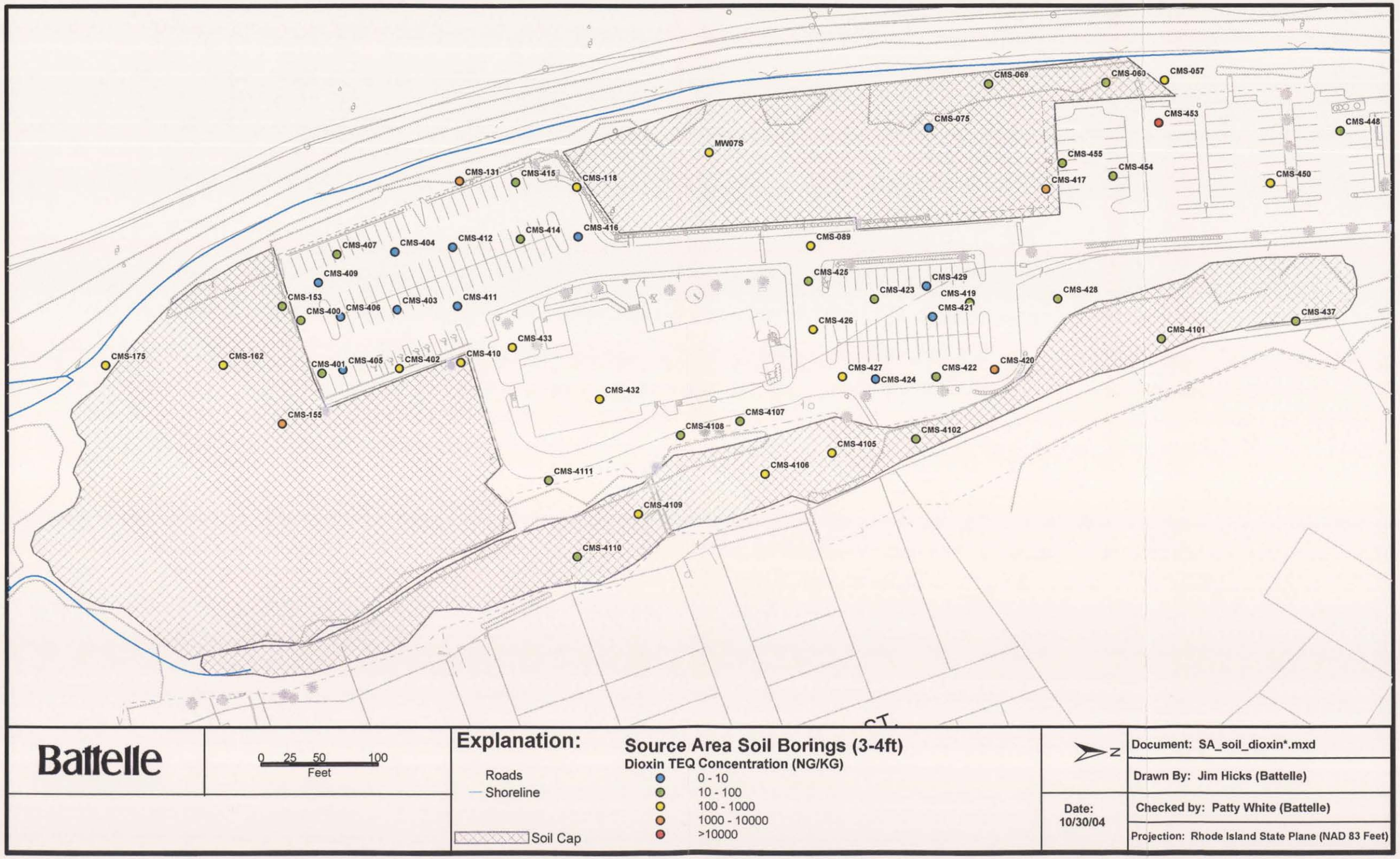


Figure 4-5. Dioxin TEQ Concentration in Source Area Soils (3-4 ft)

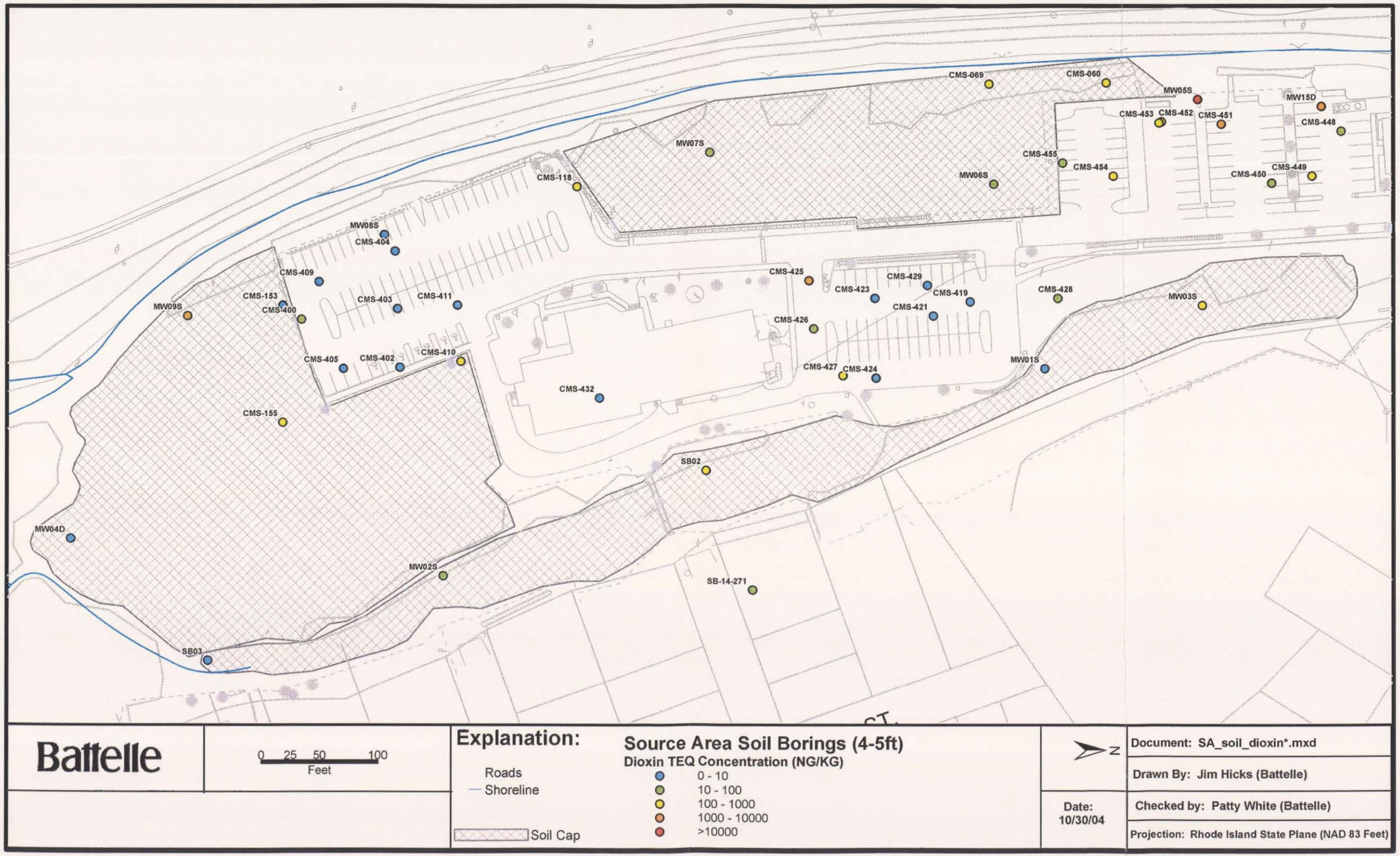


Figure 4-6. Dioxin TEQ Concentration in Source Area Soils (4-5 ft)

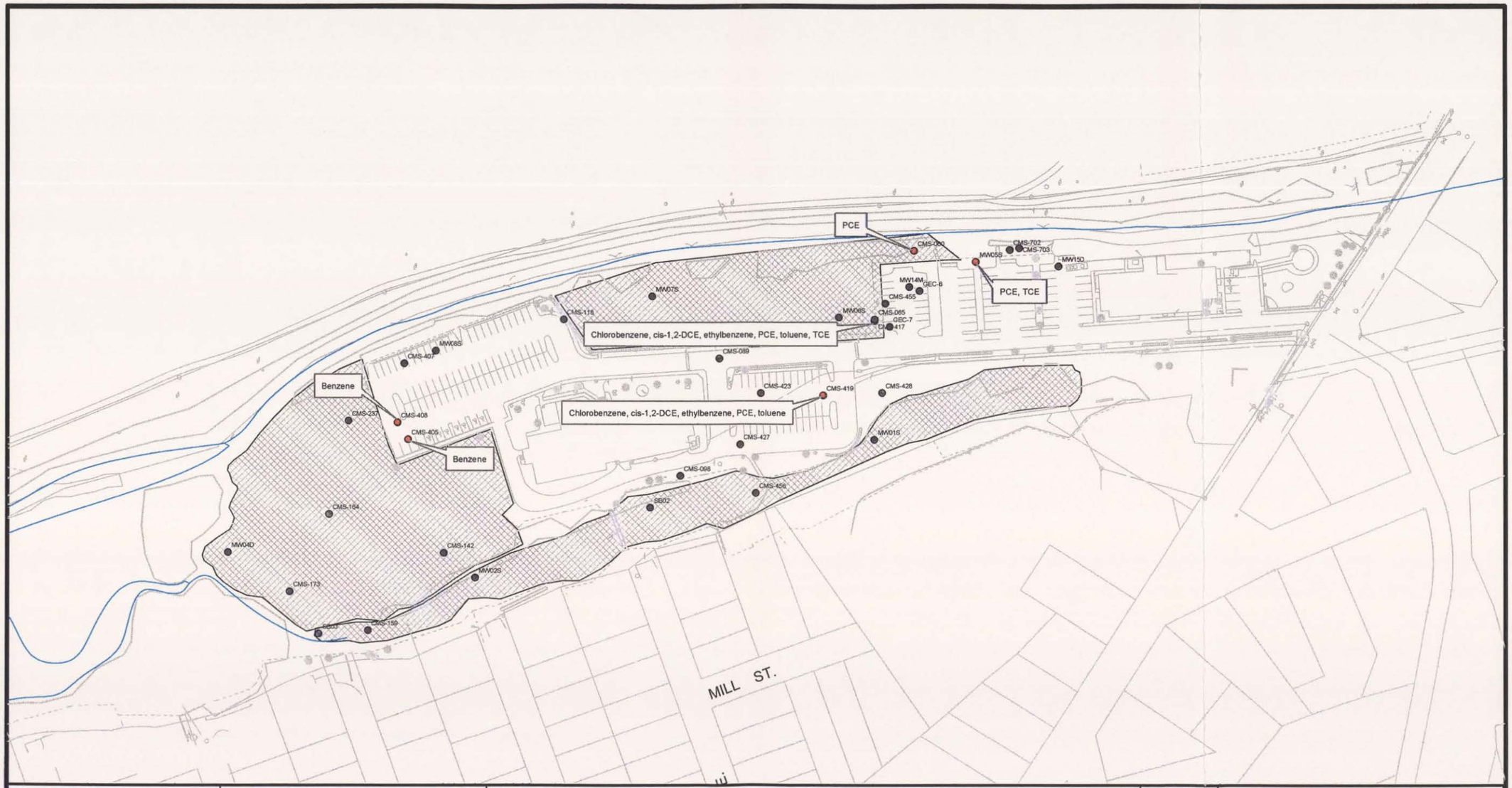


Figure 4-7. Soil Boring Locations where VOCs in Vadose Zone Exceed GB Leachability Criteria

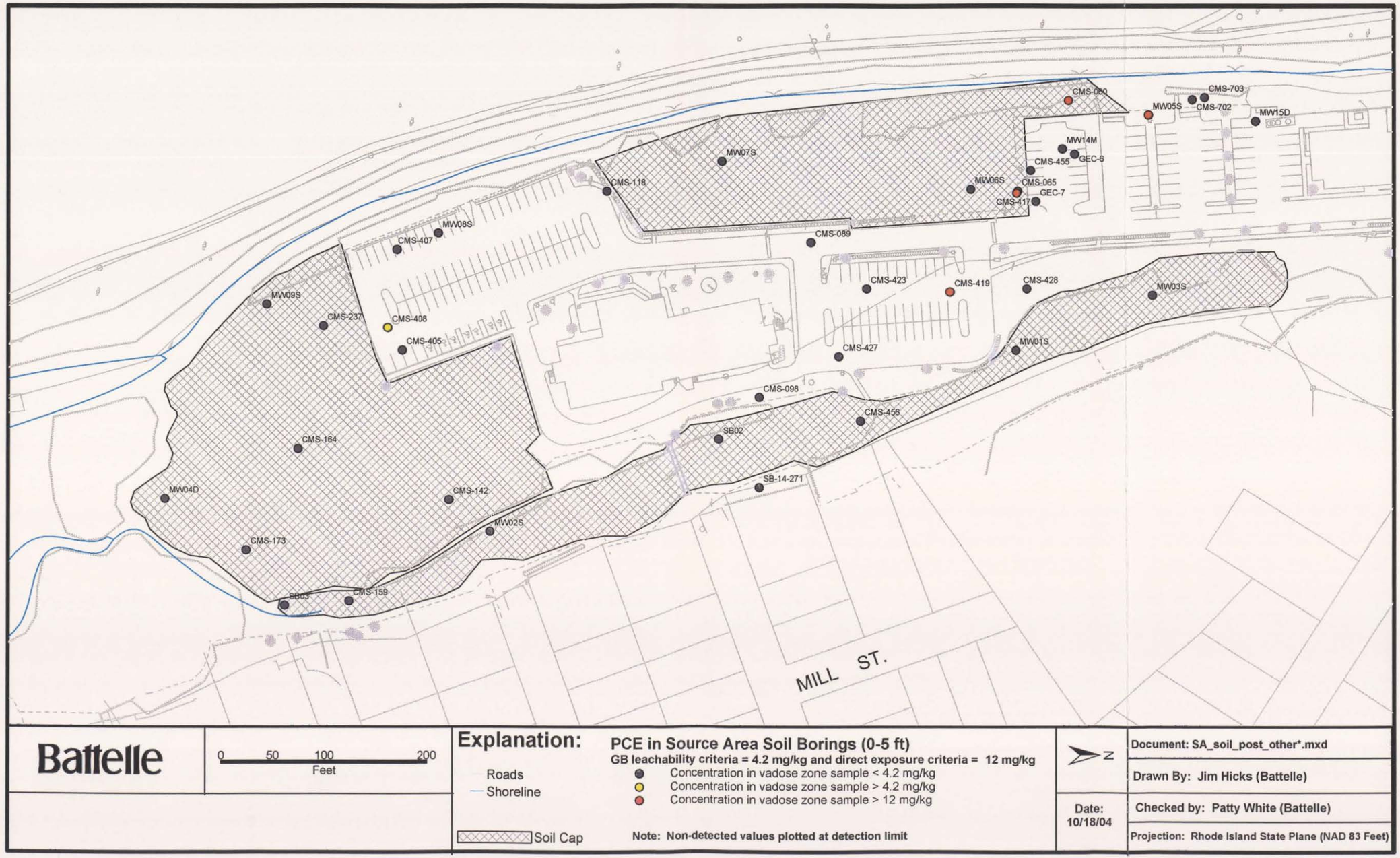


Figure 4-8. PCE in Source Area Soil Borings (0-5 ft)

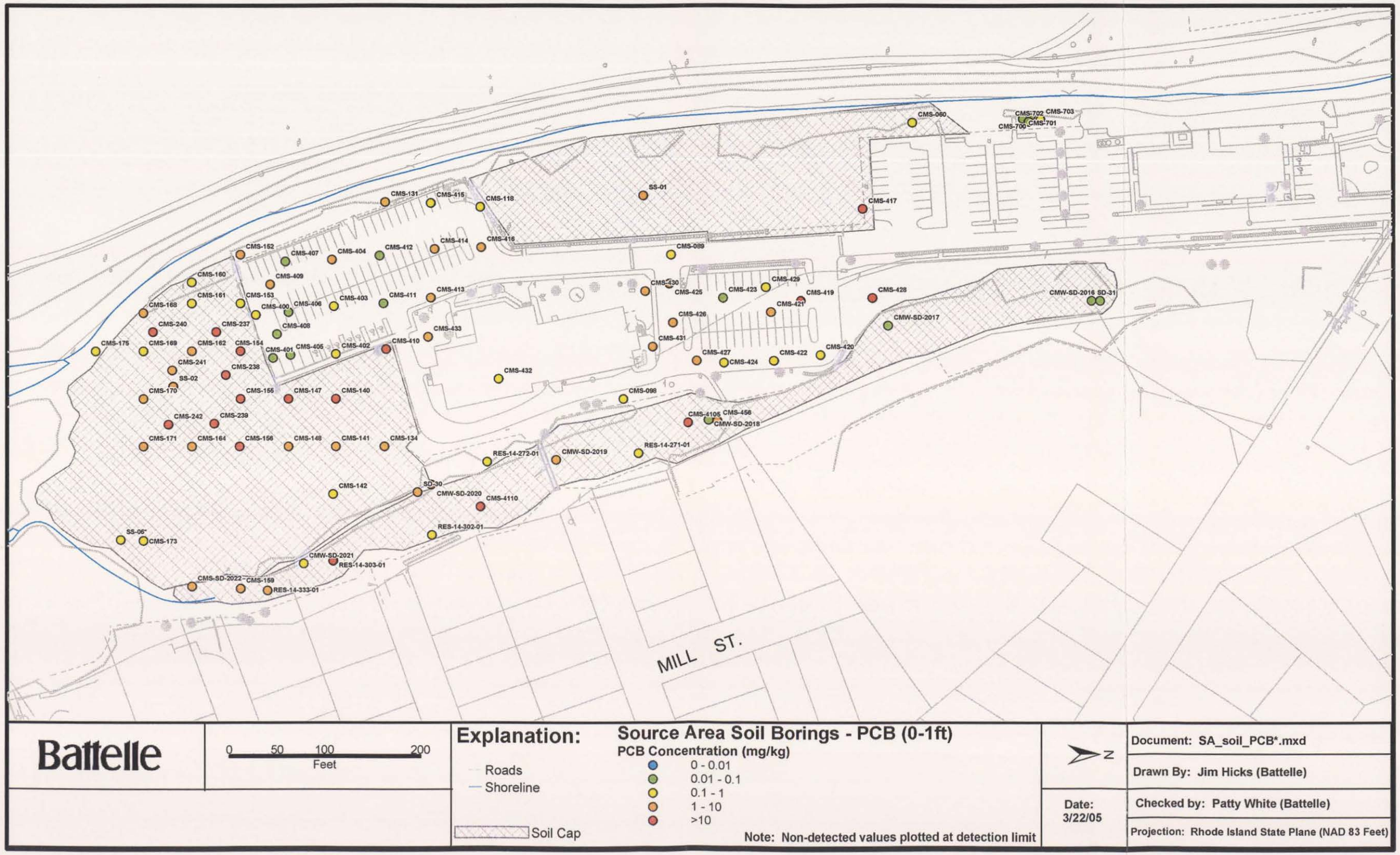


Figure 4-9. Total PCB Concentrations in Source Area Soils (0-1 ft)

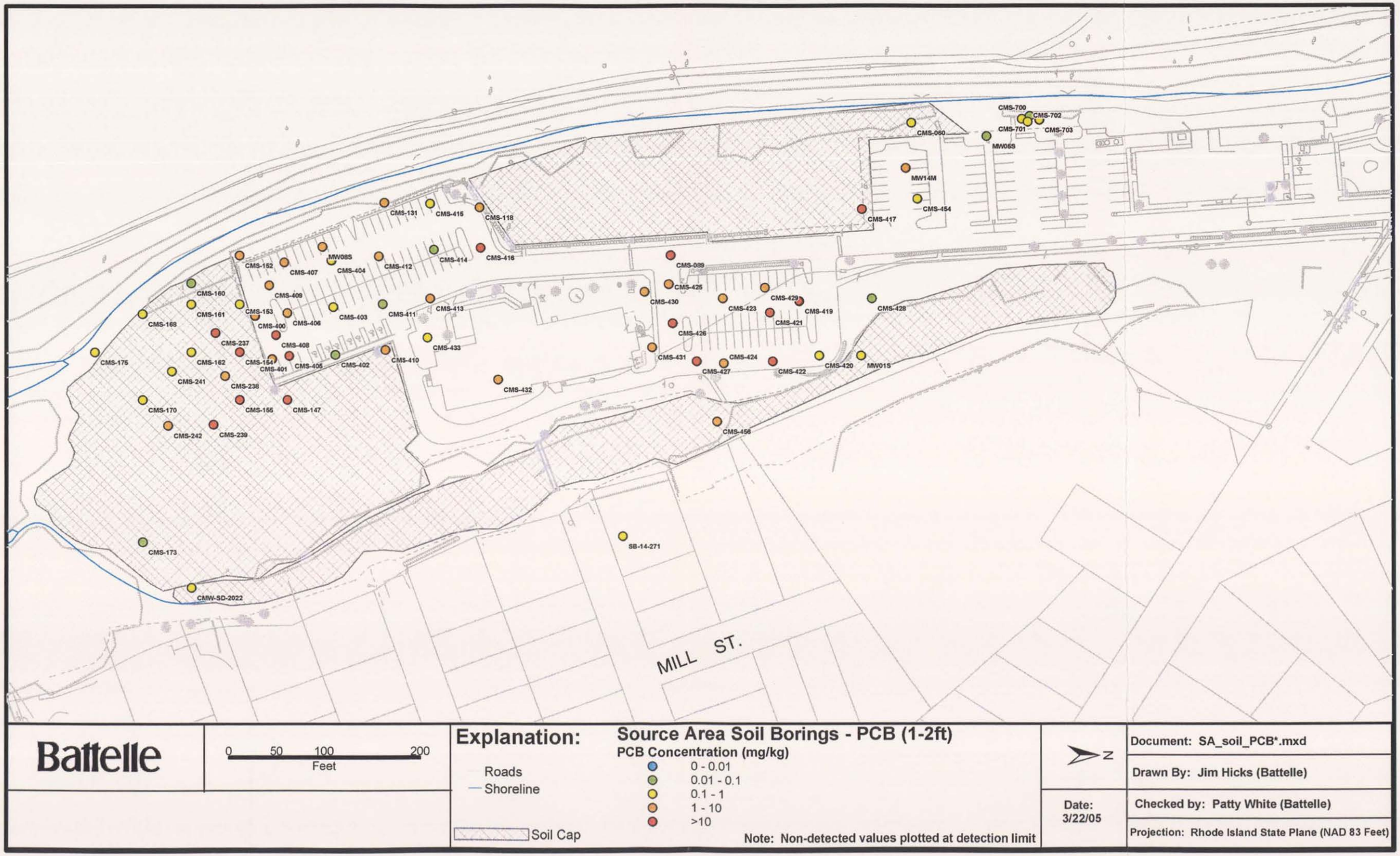


Figure 4-10. Total PCB Concentrations in Source Area Surface Soils (1-2 ft)

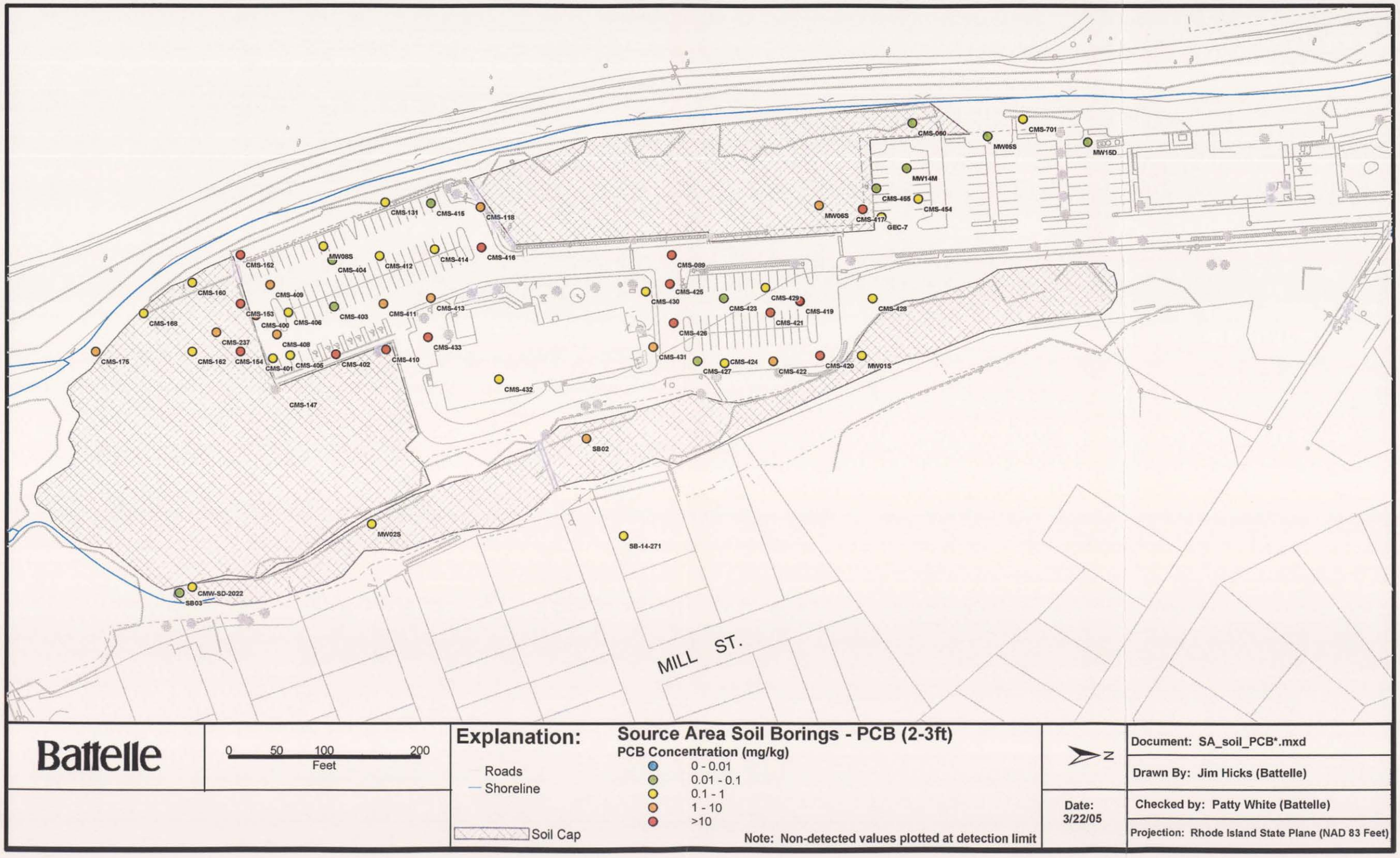


Figure 4-11. Total PCB Concentrations in Source Area Surface Soils (2-3 ft)

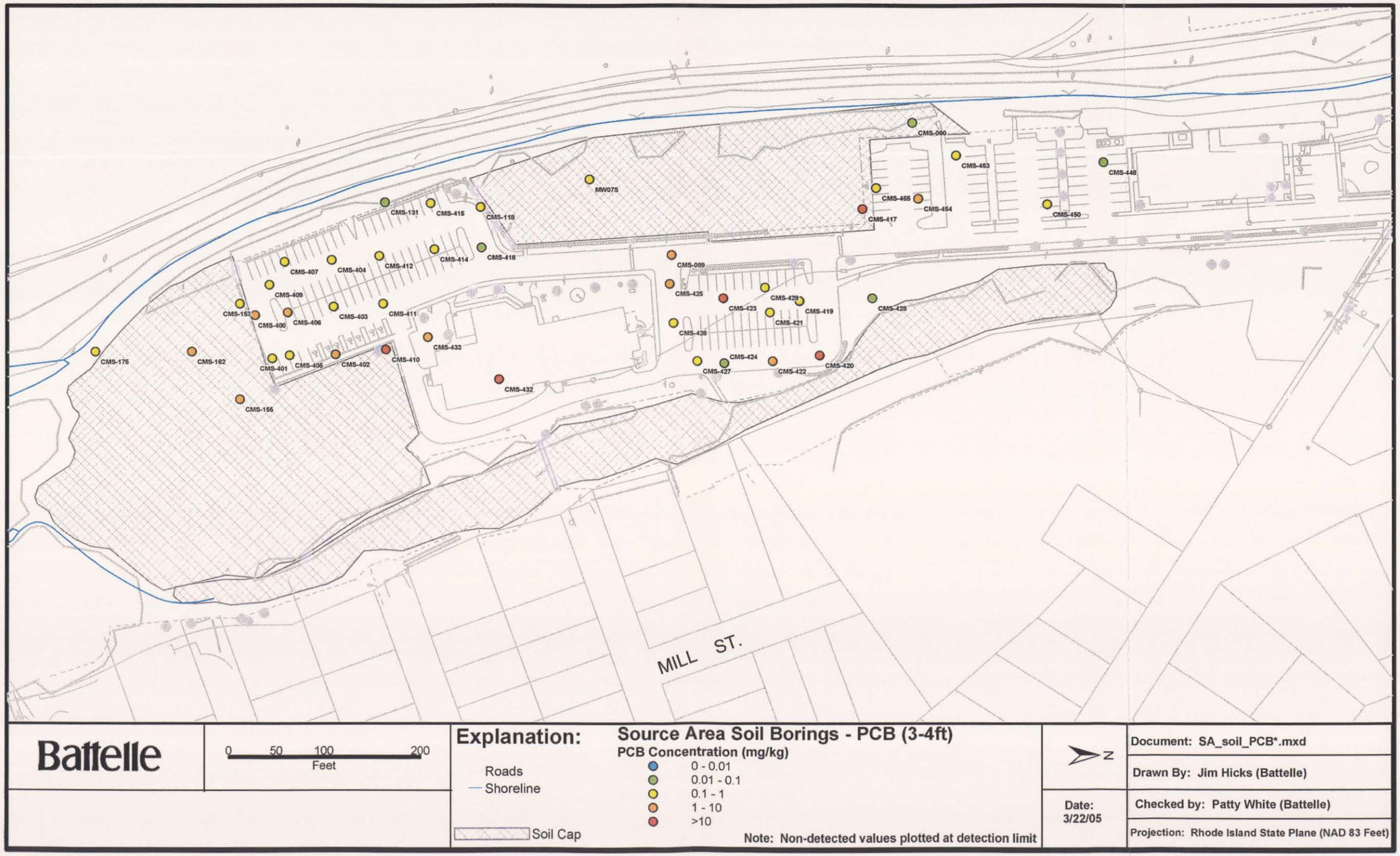


Figure 4-12. Total PCB Concentrations in Source Area Surface Soils (3-4 ft)

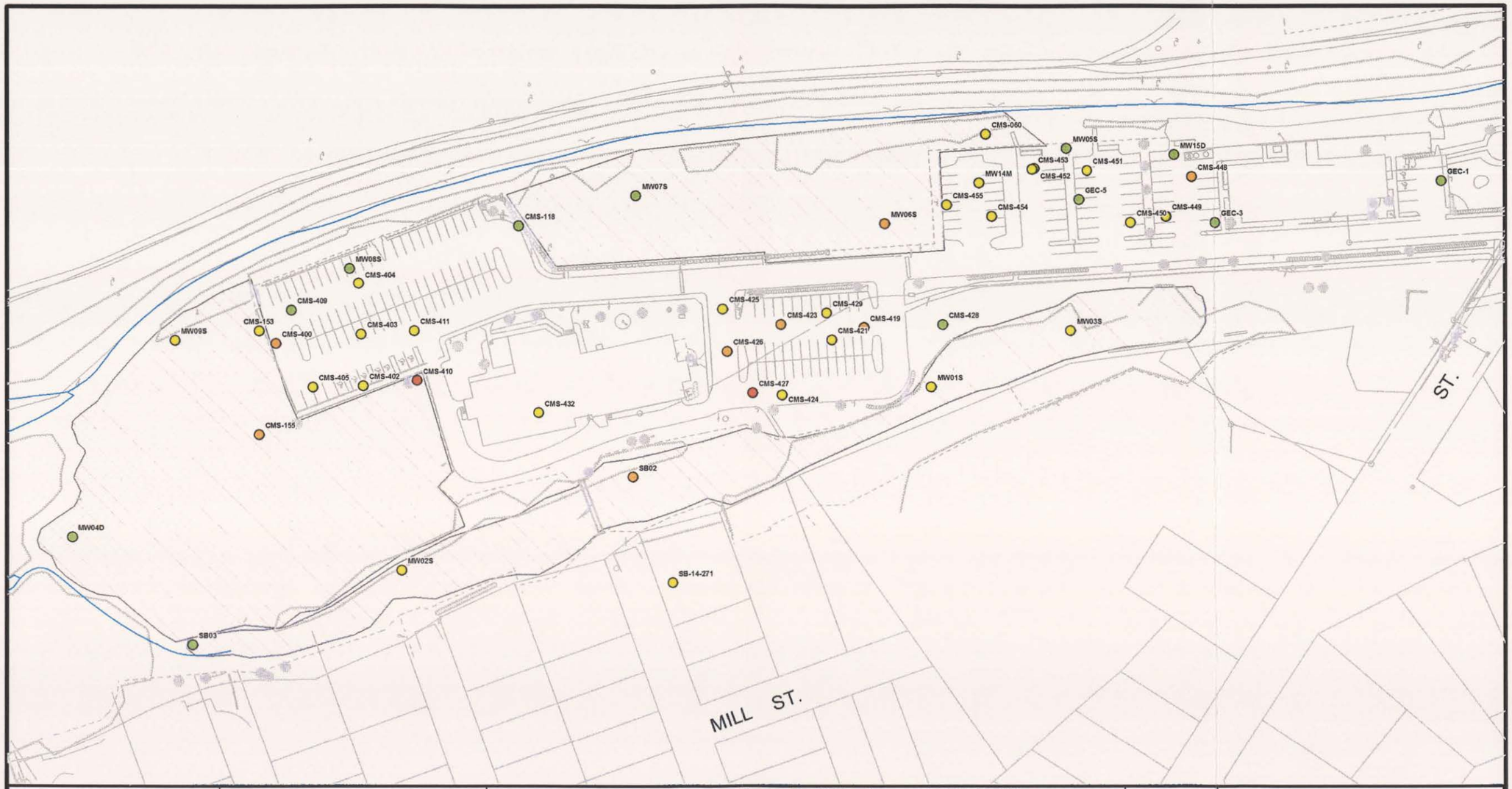


Figure 4-13. Total PCB Concentrations in Source Area Surface Soils (>4 ft)

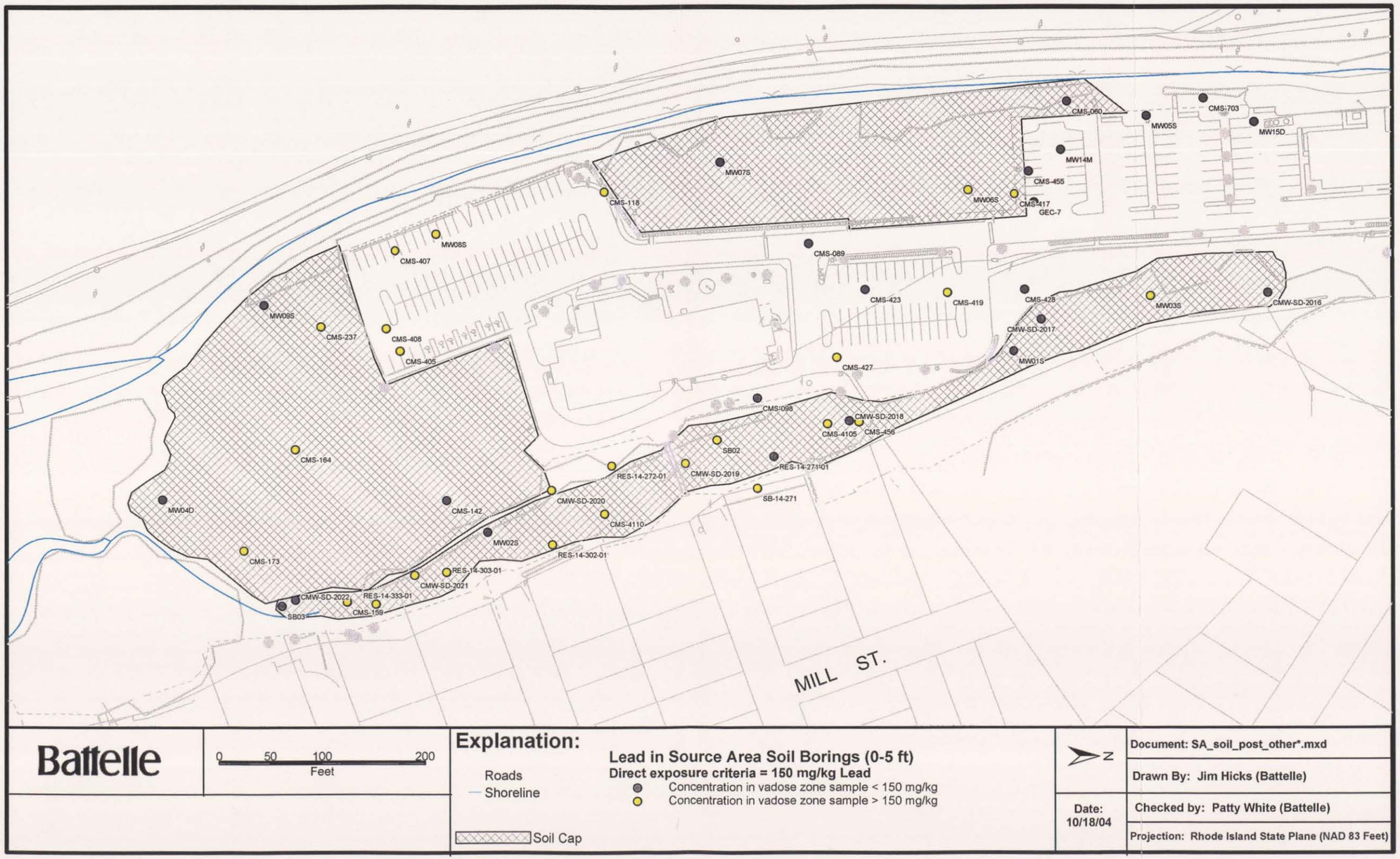
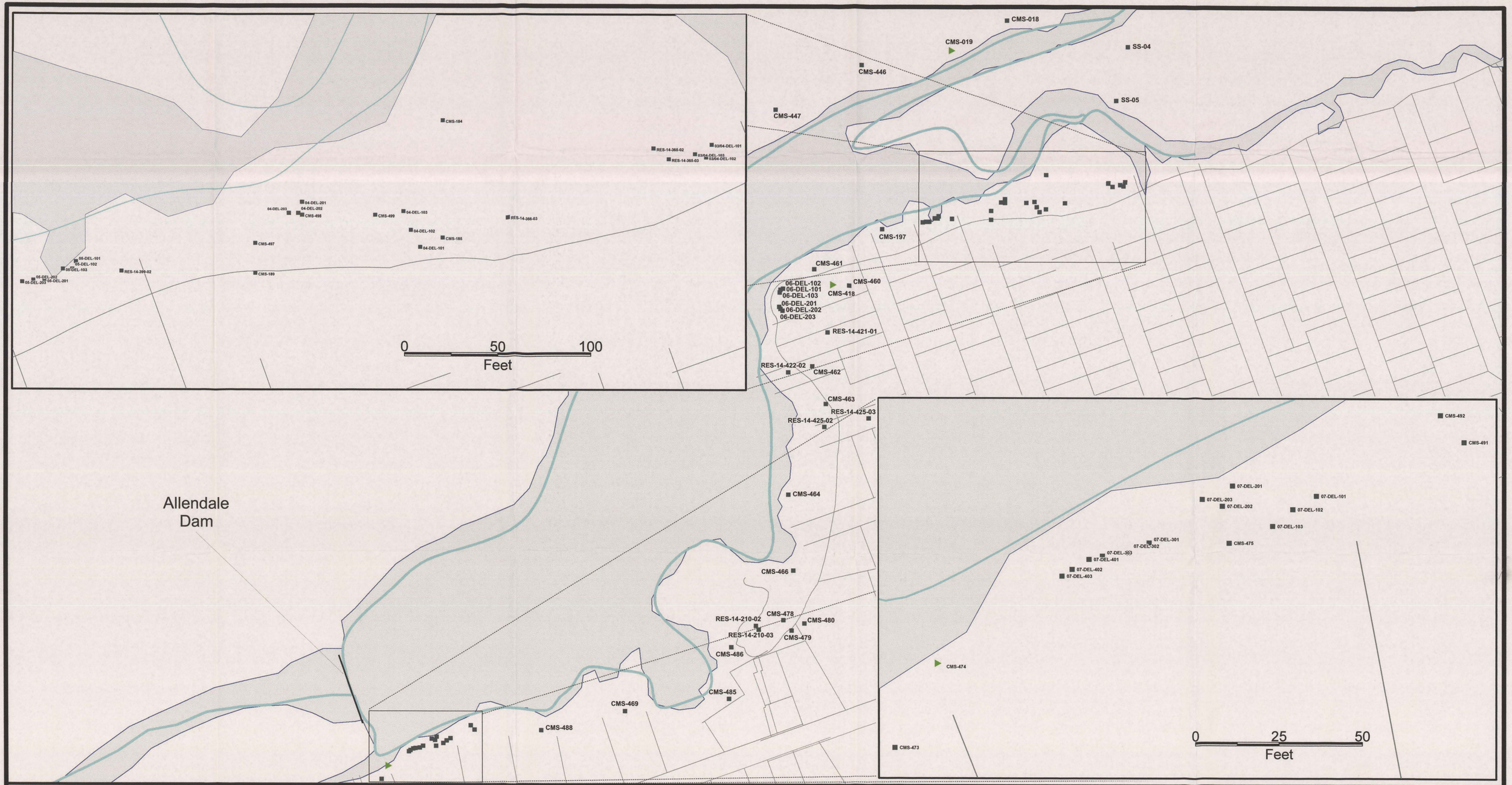


Figure 4-14. Lead in Source Area Soil Borings (0-5 ft)



Battelle

0 100 200 400
Feet

Explanation:

- Surface Sample
- Surface and Subsurface Sample
- Roads
- 1997 River Channel

Map_JH_AD_soilgroup*.mxd

N

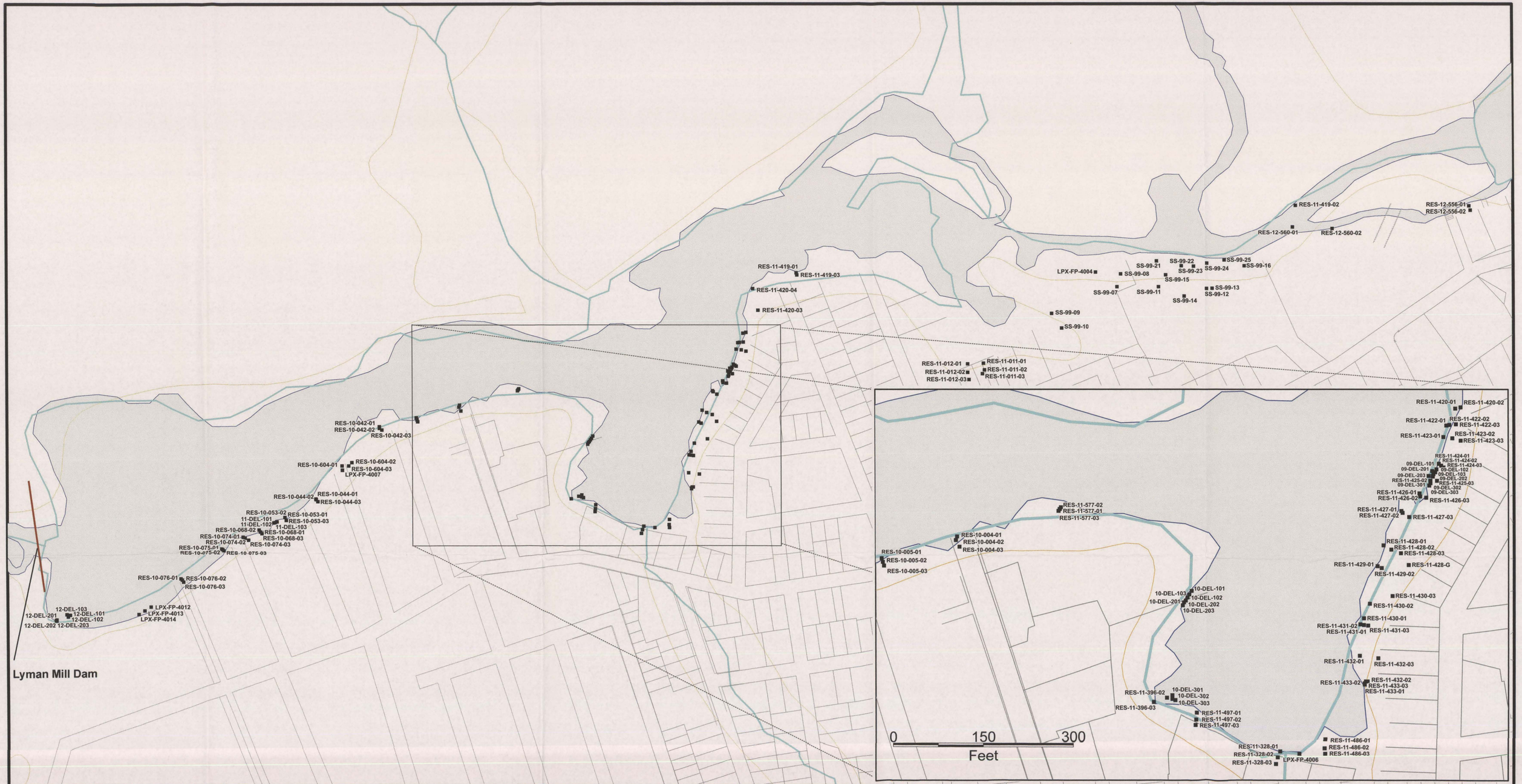
Date: 4/20/05

Figure 4-15. Allendale Soil Sample Locations

Drawn By: Jim Hicks (Battelle)

Checked by: Patty White (Battelle)

Projection: Rhode Island State Plane (NAD 83 Feet)



Battelle

0 125 250 500
Feet

Explanation:

- Surface Sample
- Roads
- 1997 River Channel
- 100 Year Flood Zone (FEMA)

Map_JH_LM_soilgr*.mxd

N

Figure 4-16. Lyman Mill Soil Sample Locations

Drawn By: Jim Hicks (Battelle)

Date: 4/20/05

Checked by: Patty White (Battelle)

Projection: Rhode Island State Plane (NAD 83 Feet)

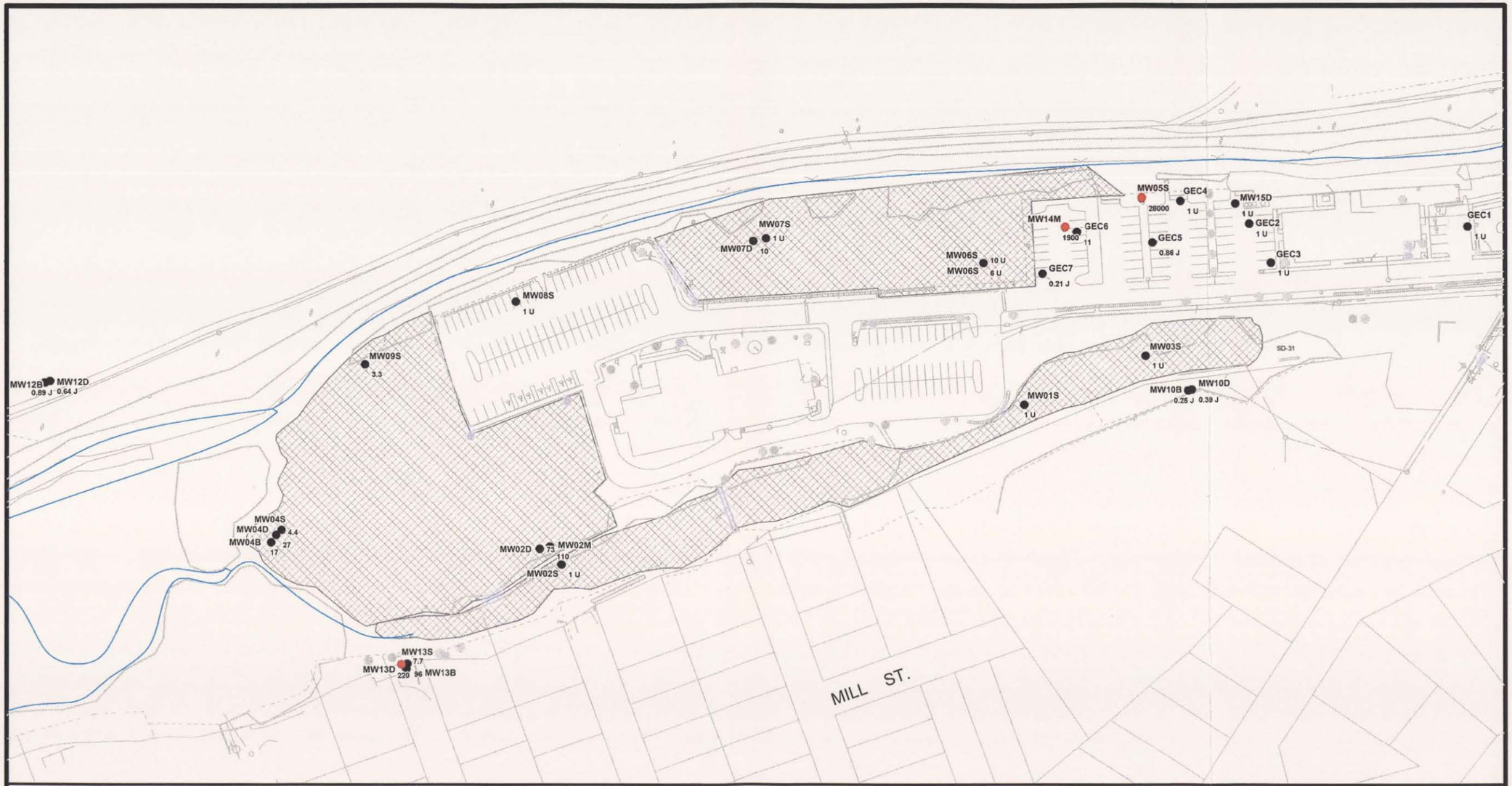


Figure 4-17. PCE Concentrations in Groundwater, 2002

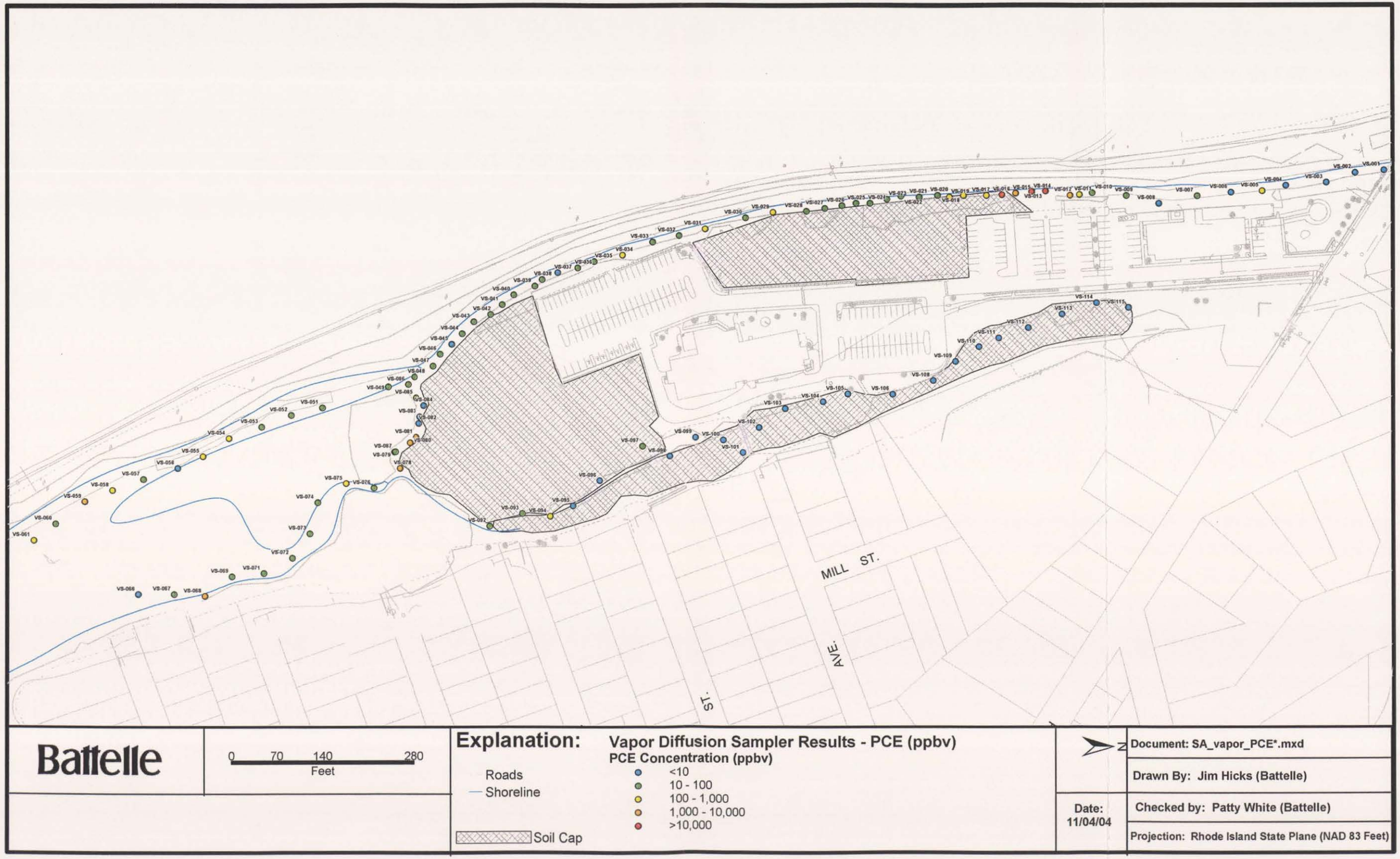


Figure 4-18. USGS Vapor-to-Water Diffusion Survey Results for PCE

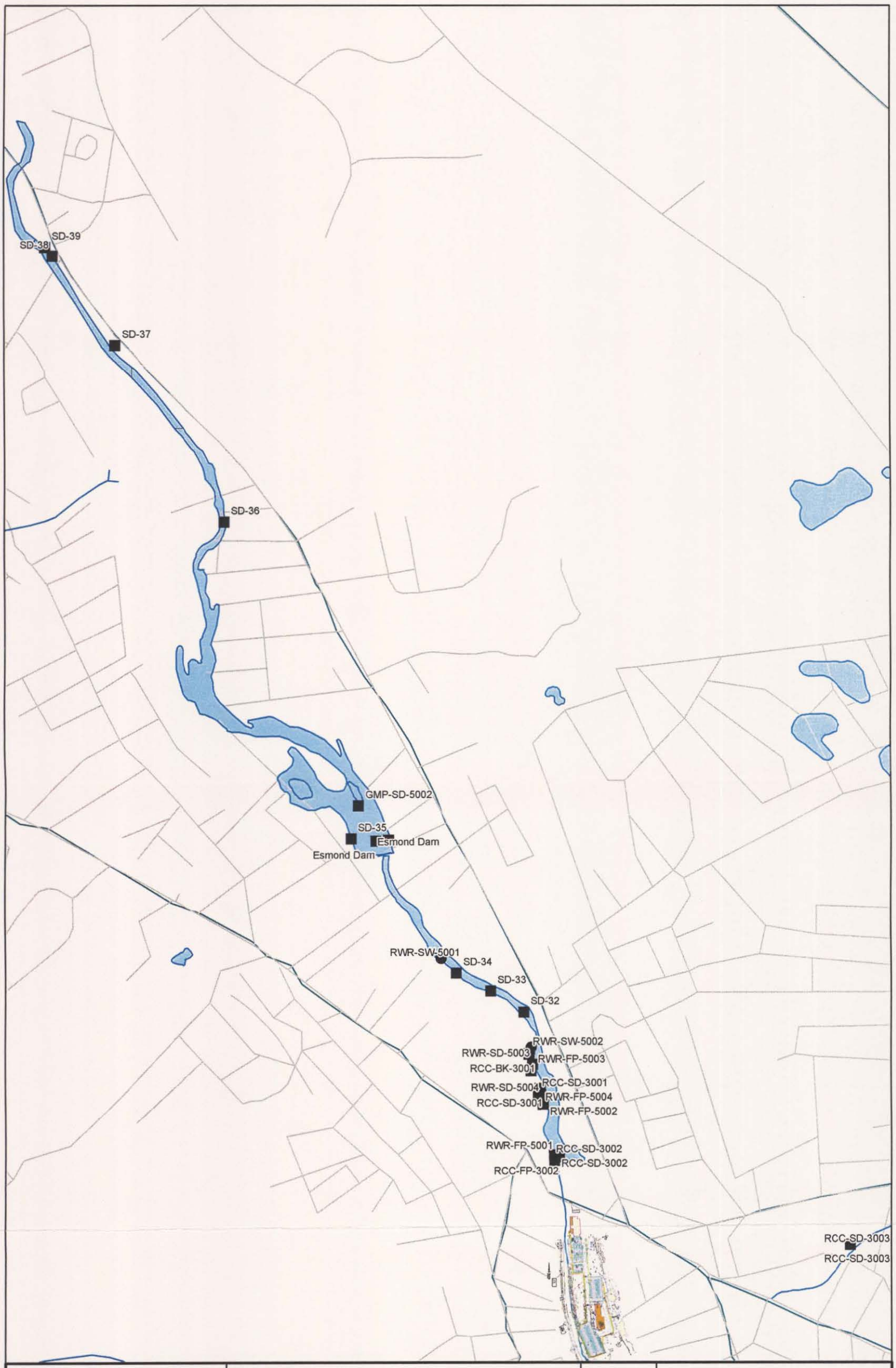


Figure 4-19. Upstream Surface Water and Sediment Sample Locations

Allendale Dam

0 112.5 225 450
Feet

Explanation:

- Surface Sample
- Surface and Subsurface Sample
- Roads
- 1997 River Channel
- Soil Cap

Document: Map_JH_AD_sedgroup*.mxd

N

Date: 5/02/05

Figure 4-20. Allendale Reach Sediment Sample Locations

Drawn By: Jim Hicks (Battelle)

Checked by: Patty White (Battelle)

Projection: Rhode Island State Plane (NAD 83 Feet)

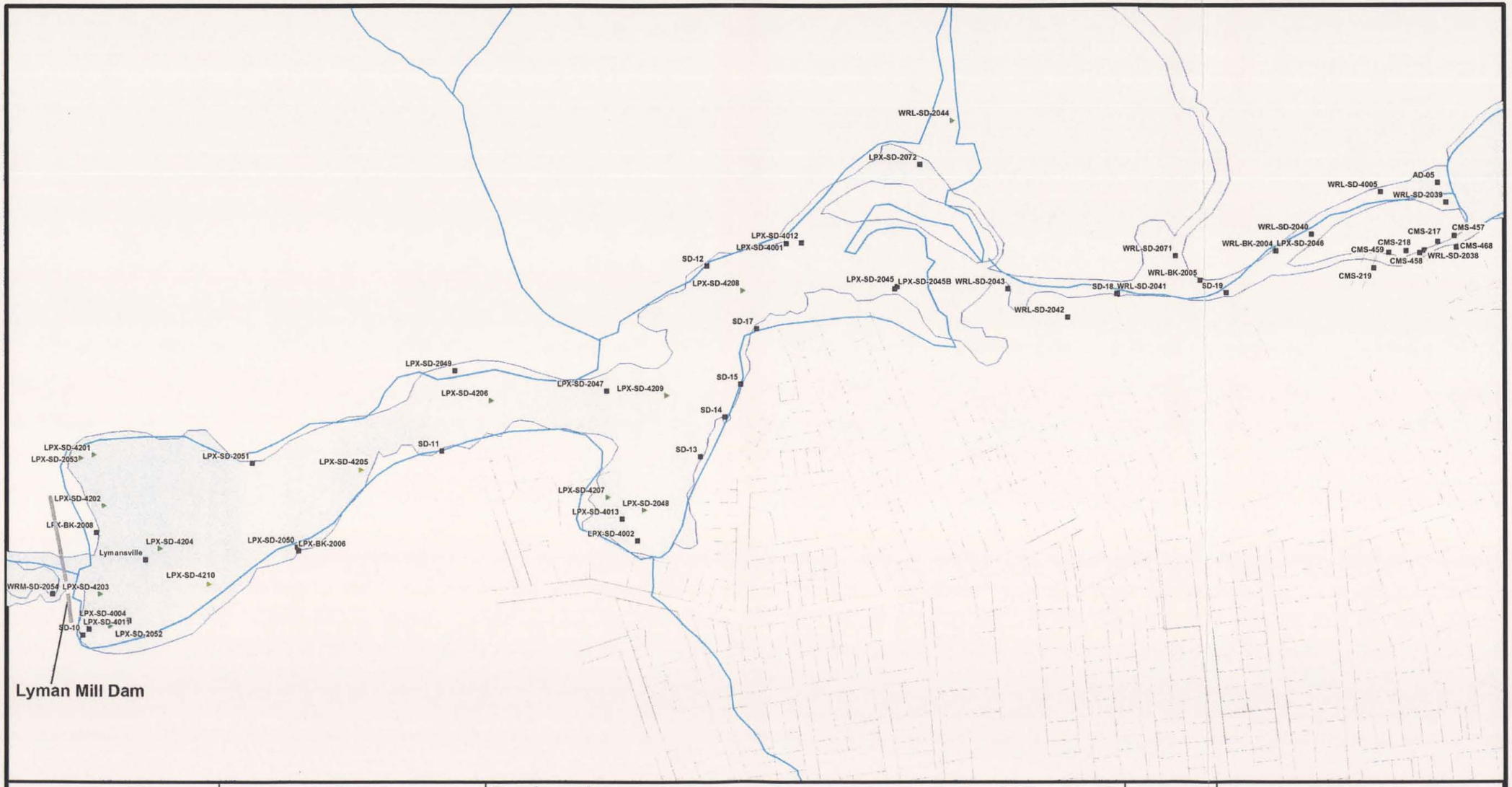


Figure 4-21. Lyman Mill Reach Sediment Sample Locations

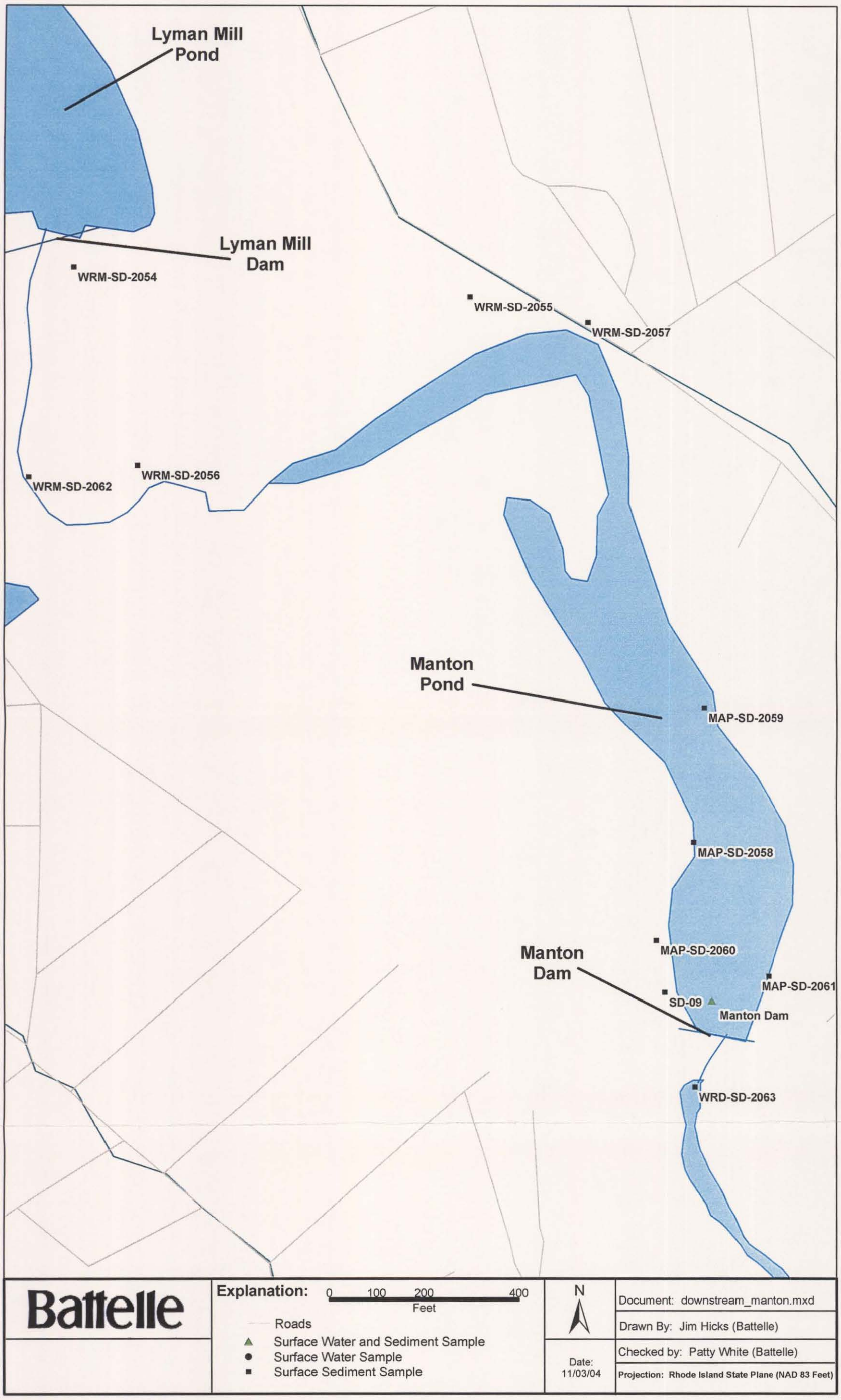


Figure 4-22. Manton Reach Sediment and Surface Water Sample Locations

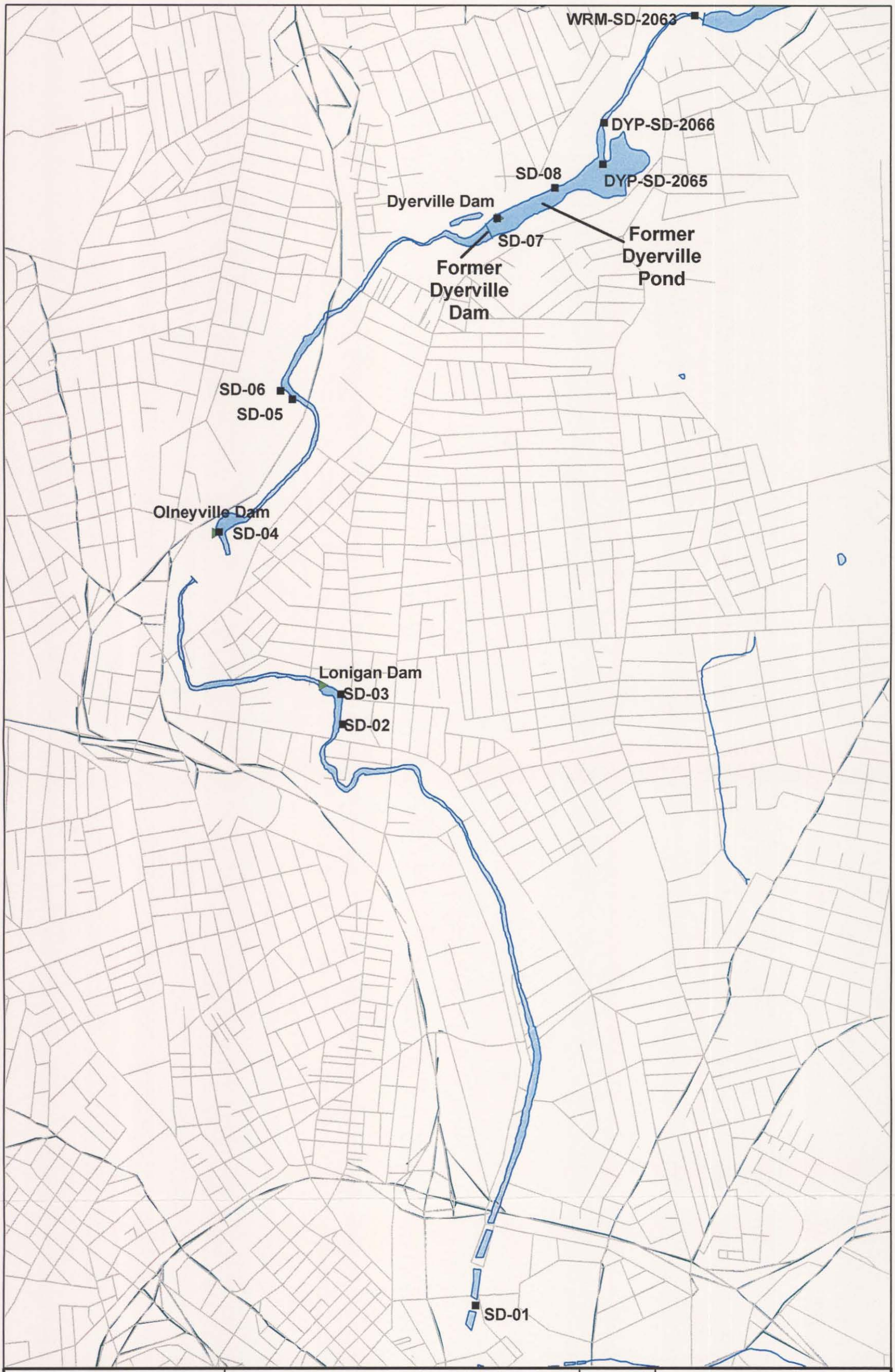


Figure 4-23. Sediment and Surface Water Sample Locations Downstream of Manton Dam

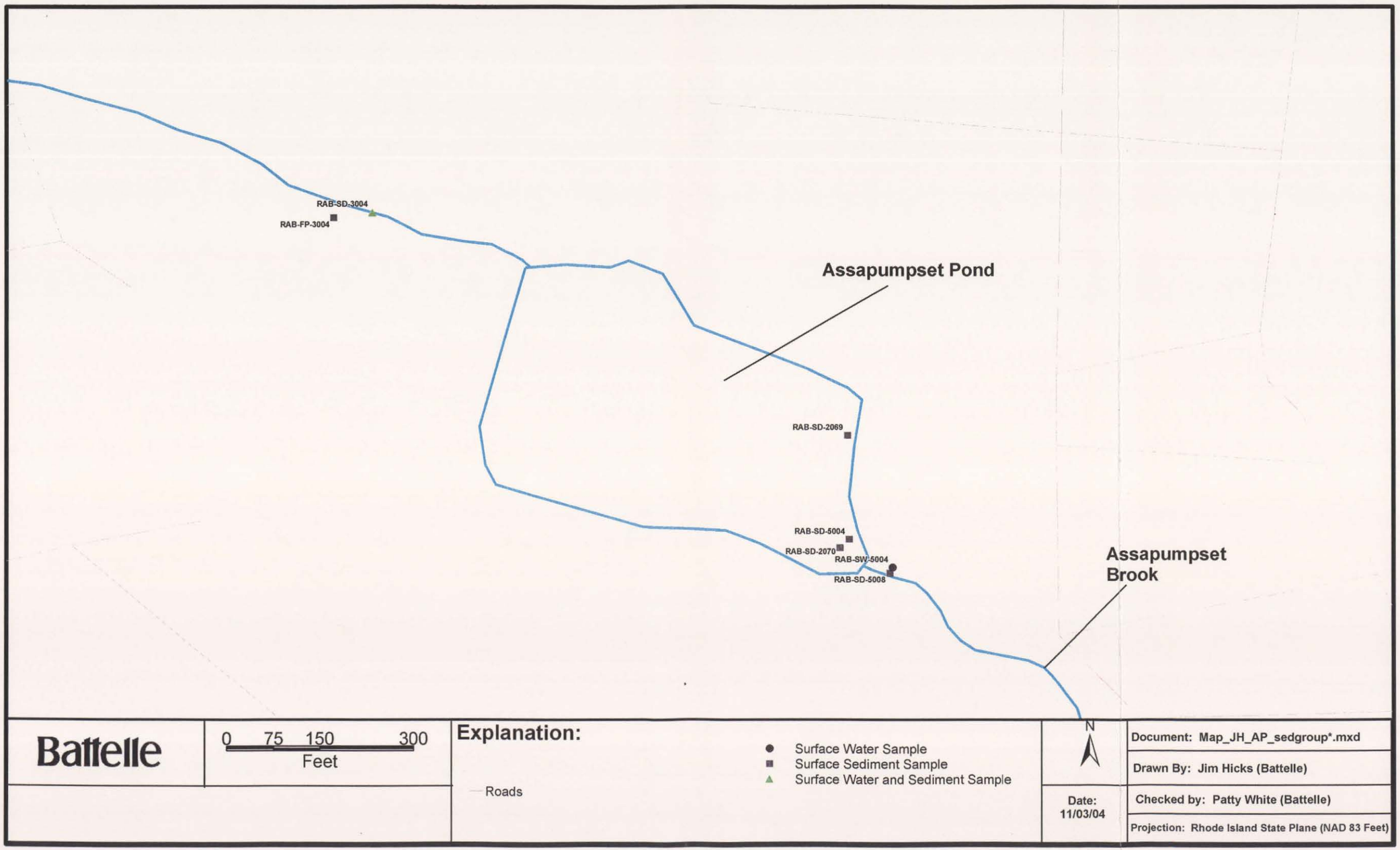


Figure 4-24. Assapumpset Pond and Brook Sediment and Surface Water Sample Locations

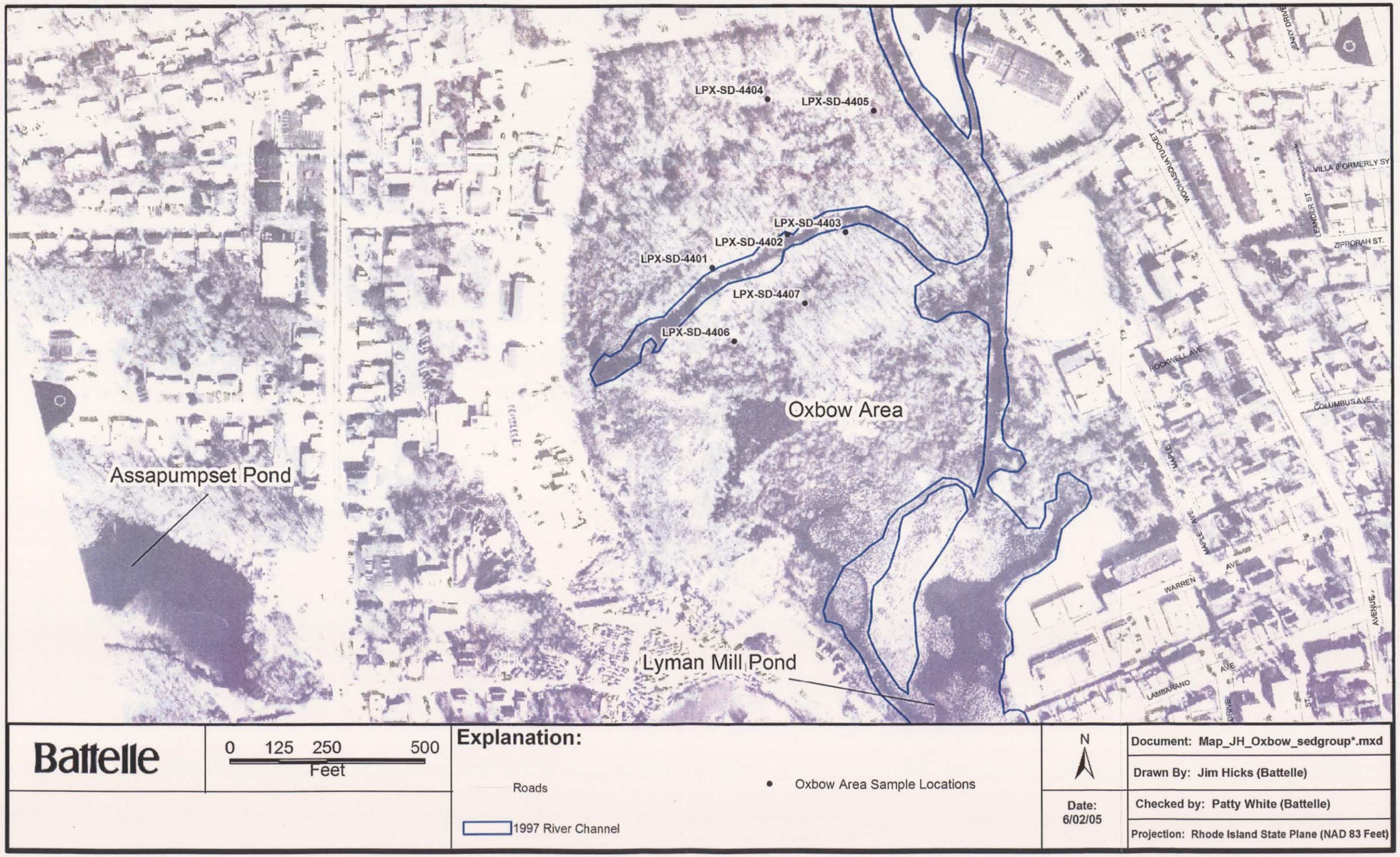


Figure 4-25. 2004 Sample Locations in Oxbow Area

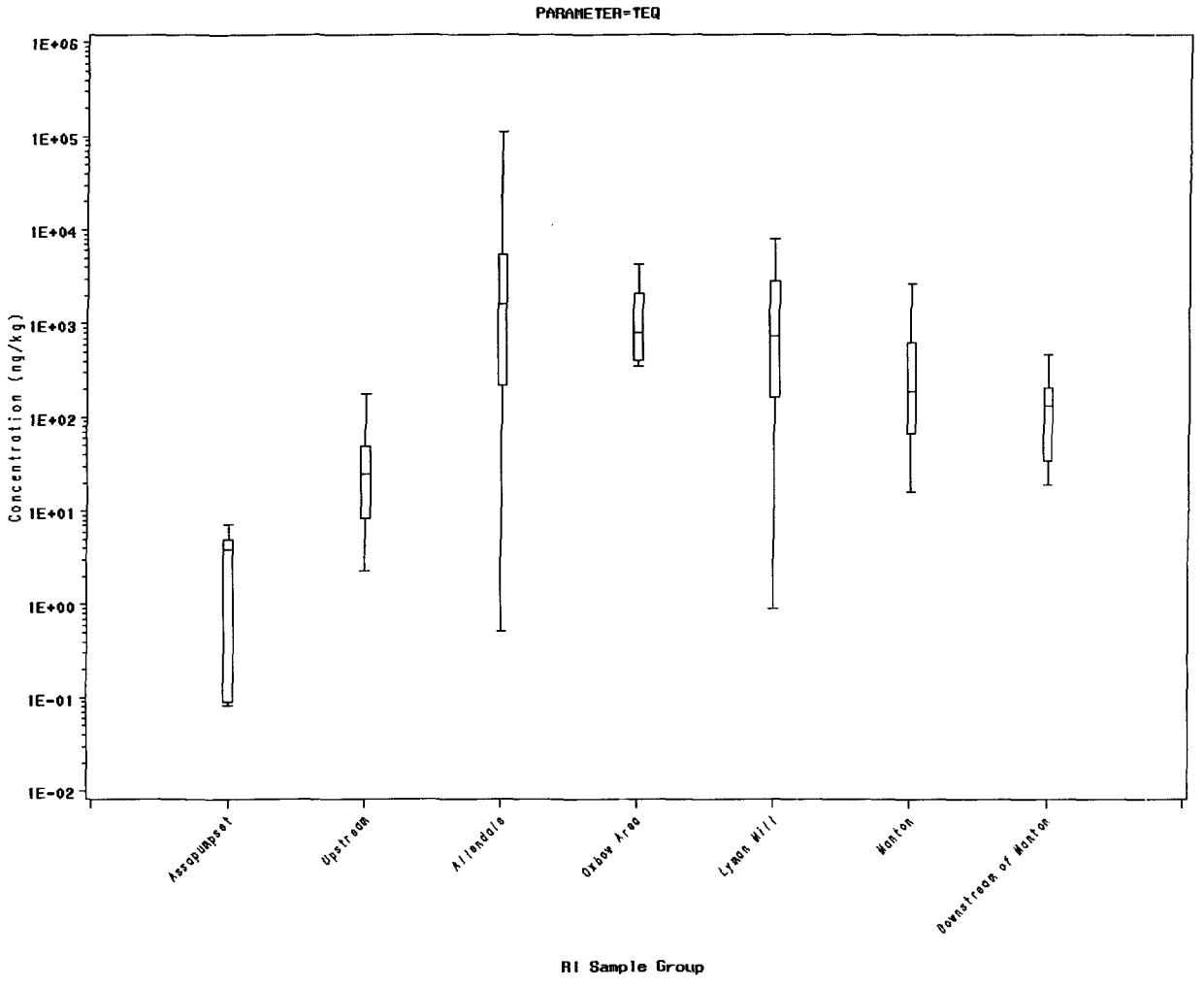


Figure 4-26. Boxplot of Dioxin TEQ in Sediment Samples

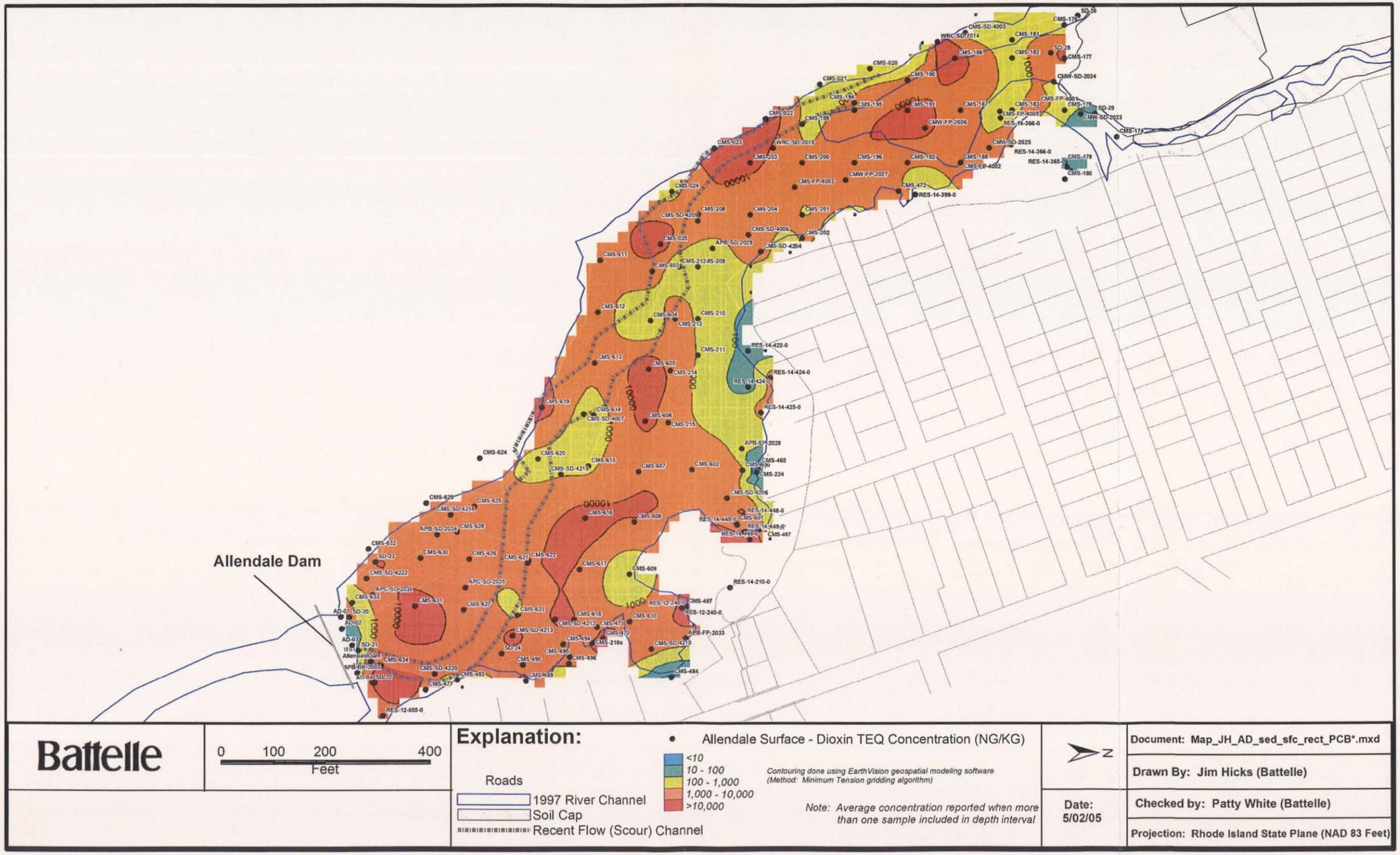


Figure 4-27. Dioxin TEQ Concentration in Allendale Pond Sediment (0-1 ft)

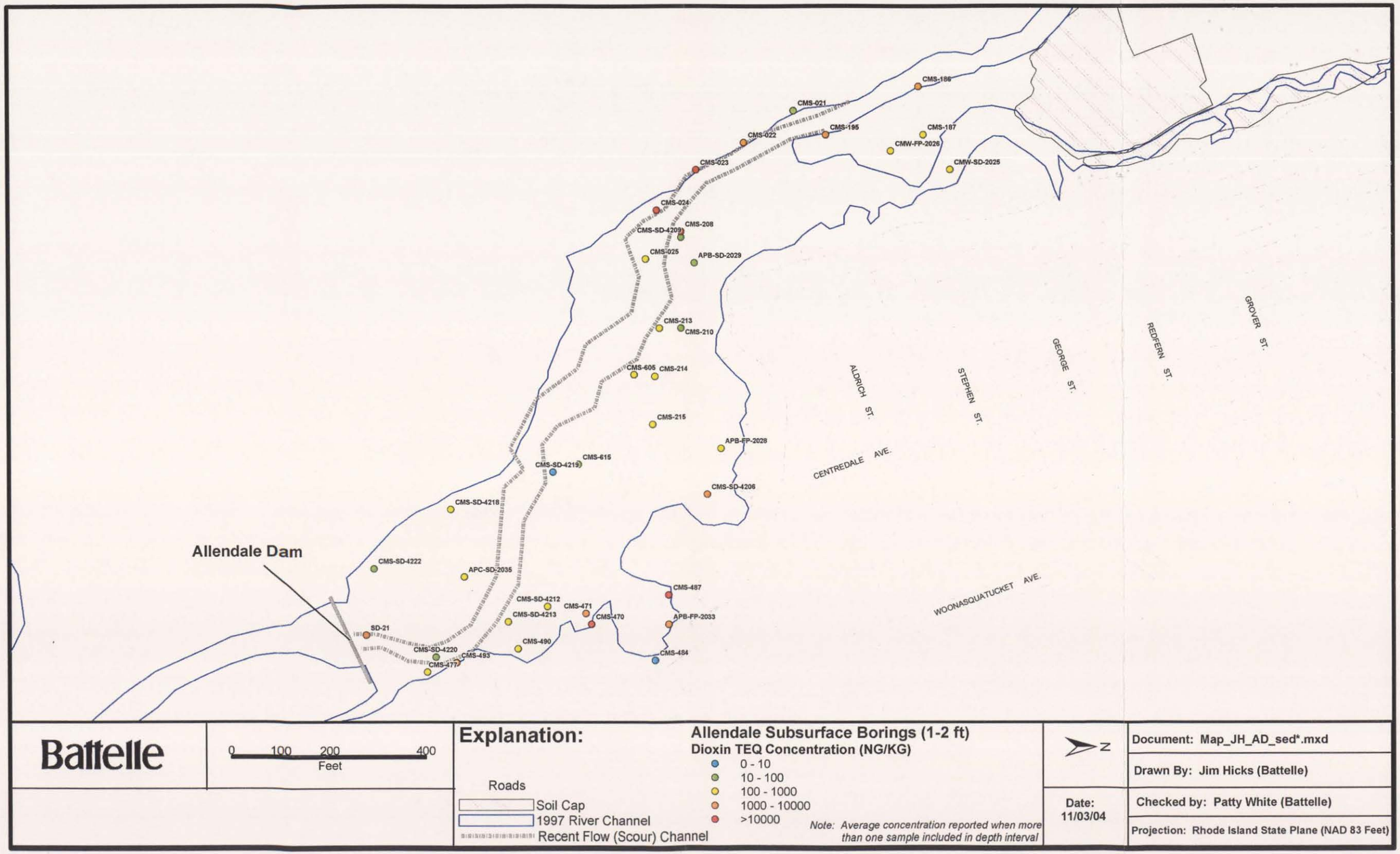


Figure 4-28. Dioxin TEQ Concentration in Allendale Pond Sediment (1-2 ft)

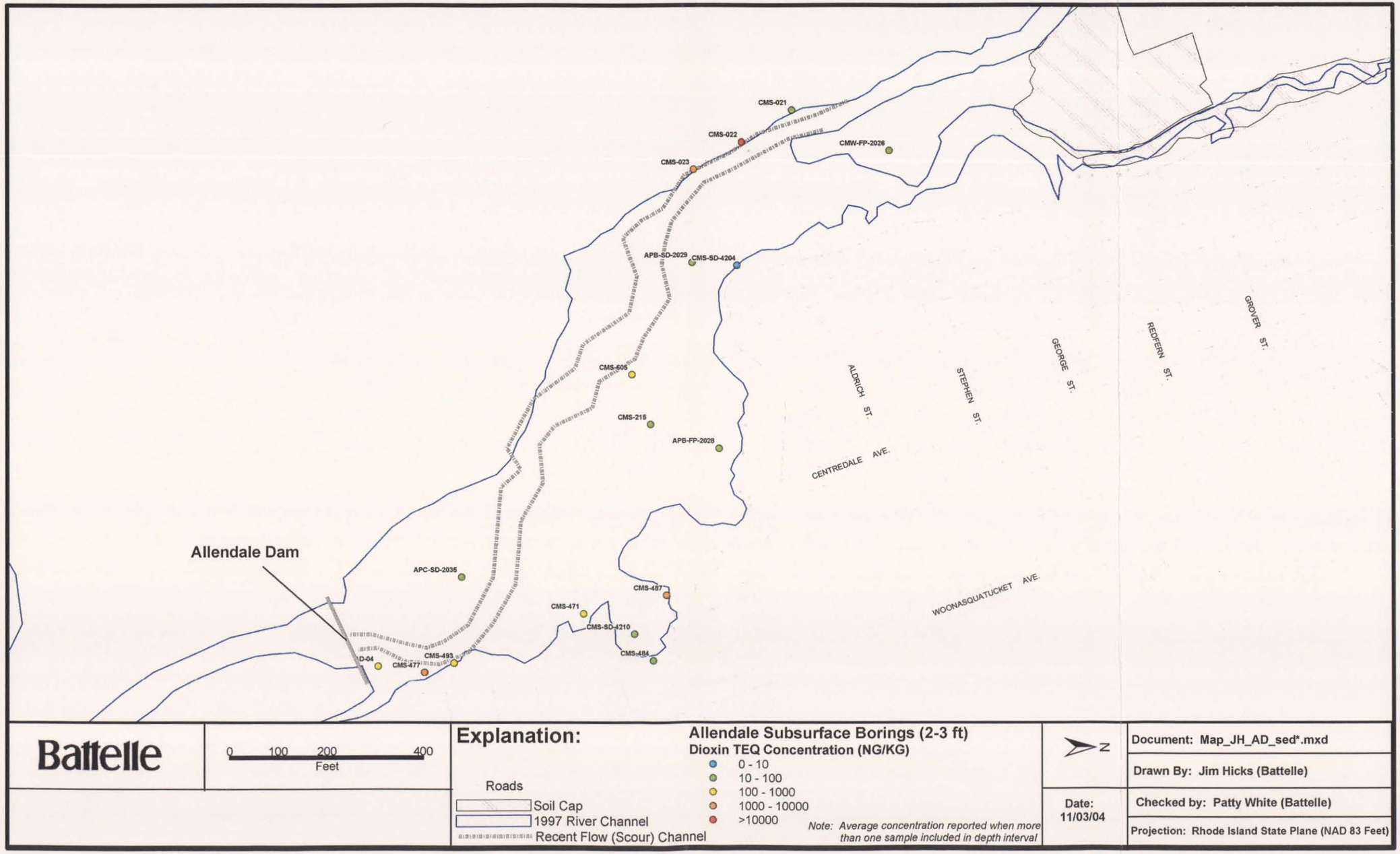


Figure 4-29. Dioxin TEQ Concentration in Allendale Pond Sediment (2-3 ft)

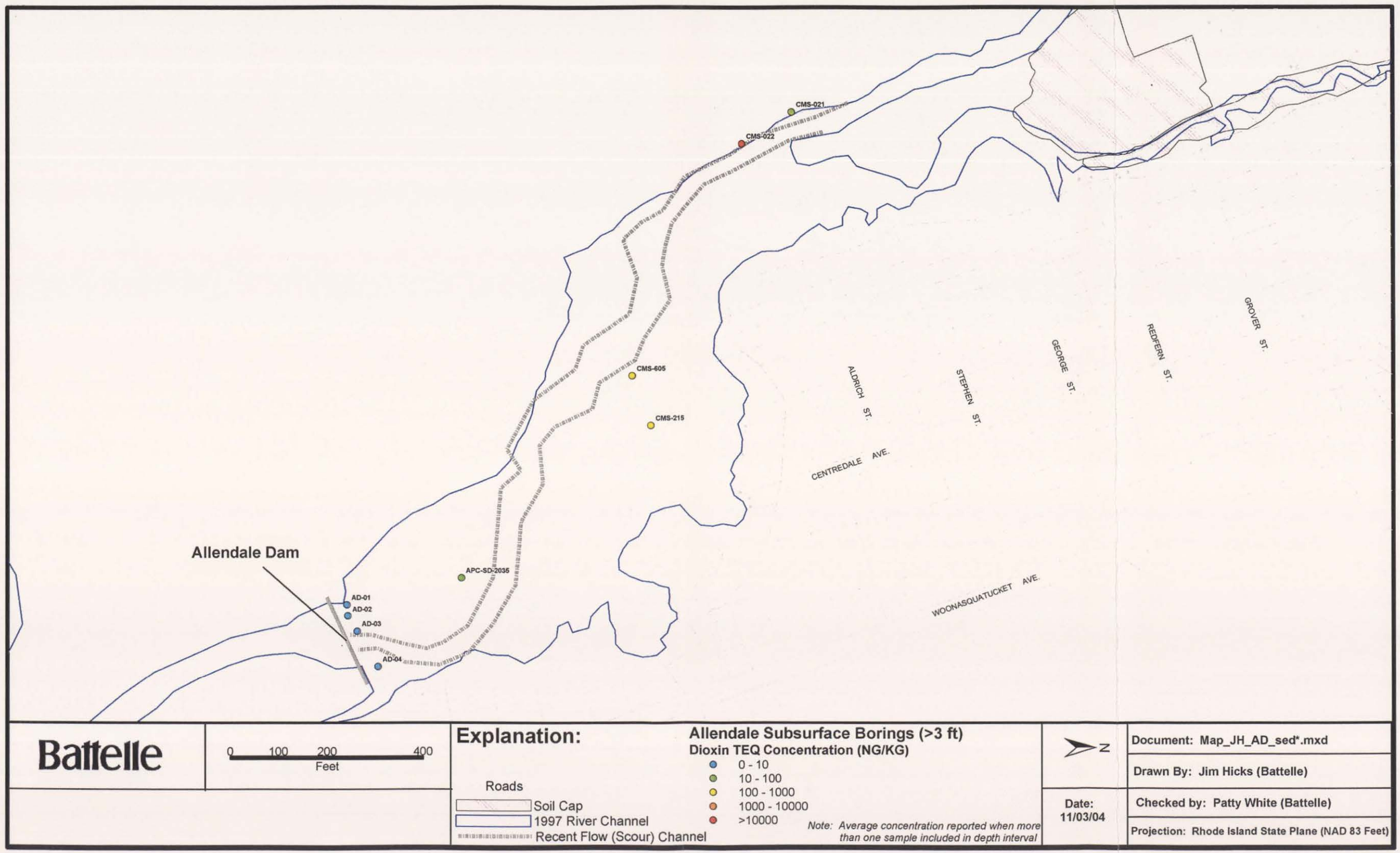


Figure 4-30. Dioxin TEQ Concentration in Allendale Pond Sediment (>3 ft)

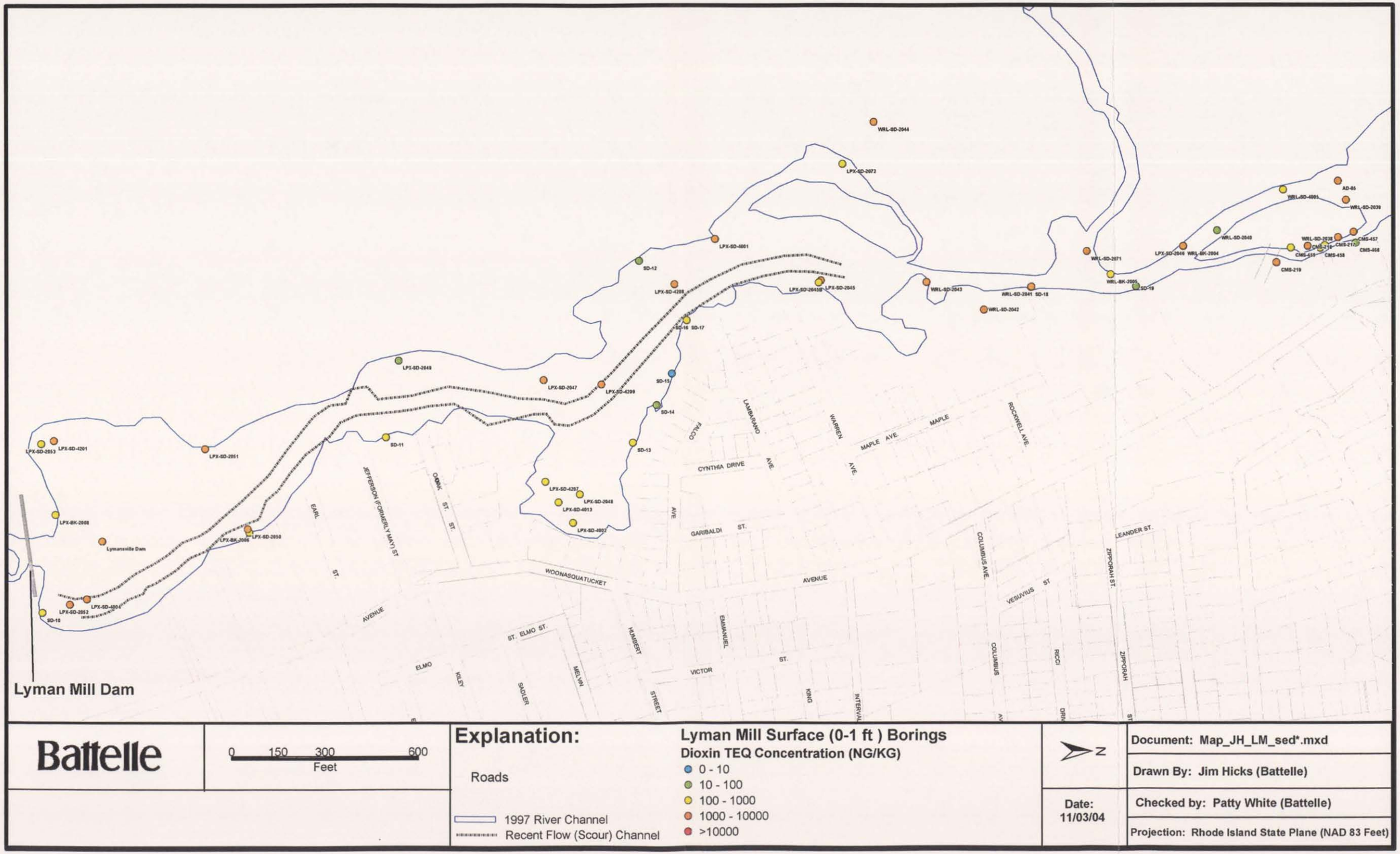


Figure 4-31. Dioxin TEQ Concentration in Lyman Mill Pond Sediment (0-1 ft)

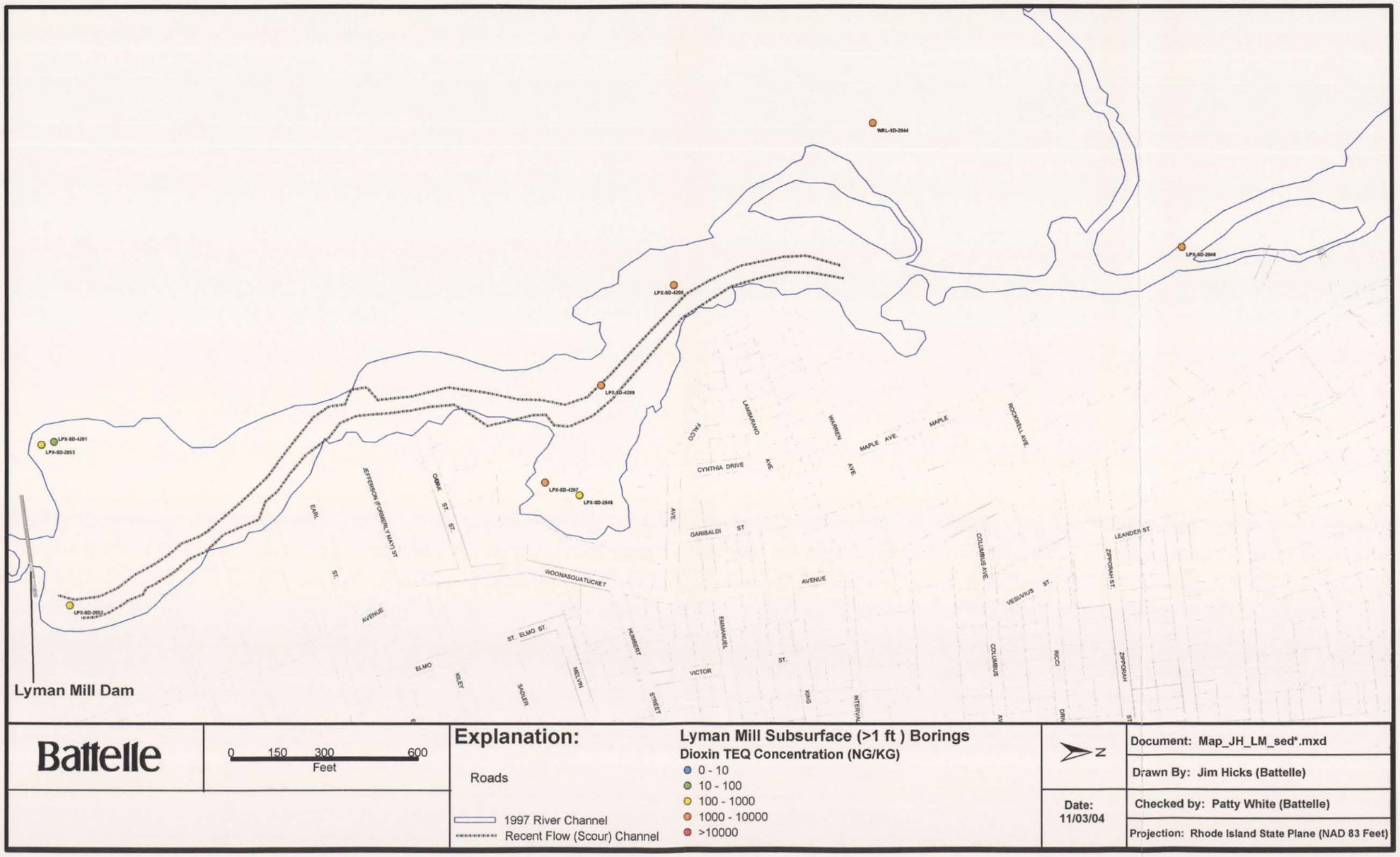


Figure 4-32. Dioxin TEQ Concentration in Lyman Mill Pond Sediment (>1 ft)

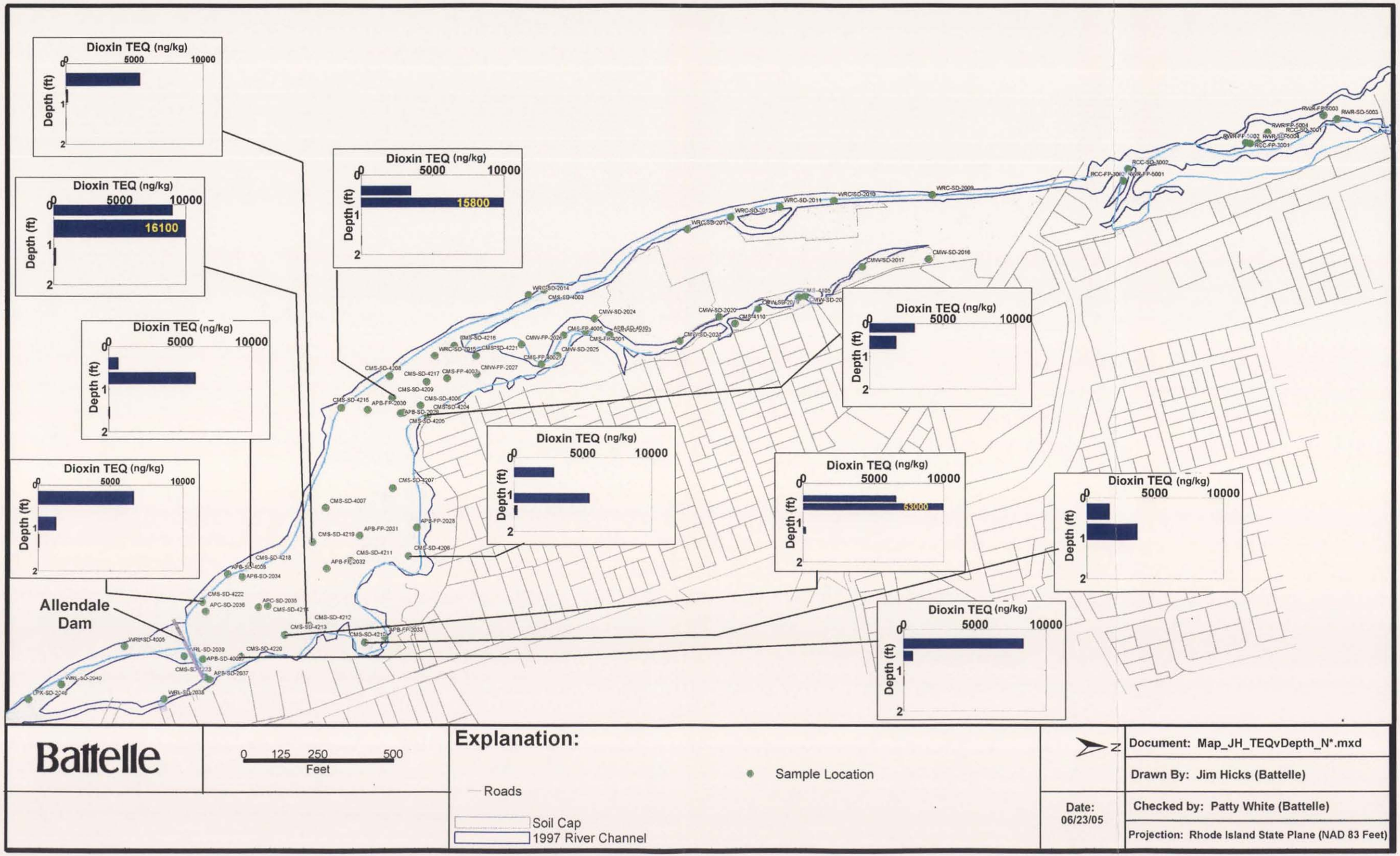


Figure 4-33. Vertical Profile of Dioxin TEQ Concentration in Allendale Pond, May 2003

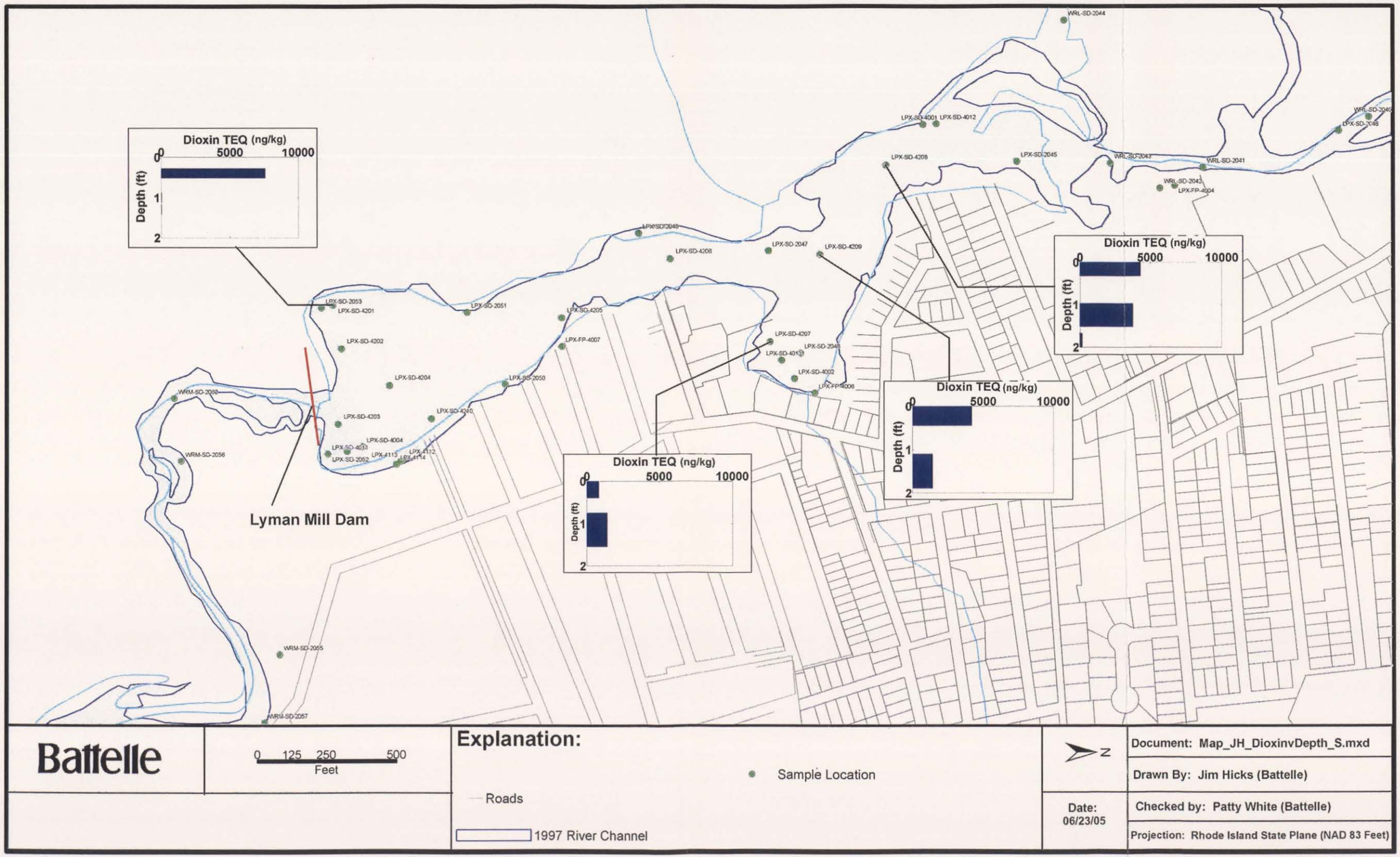
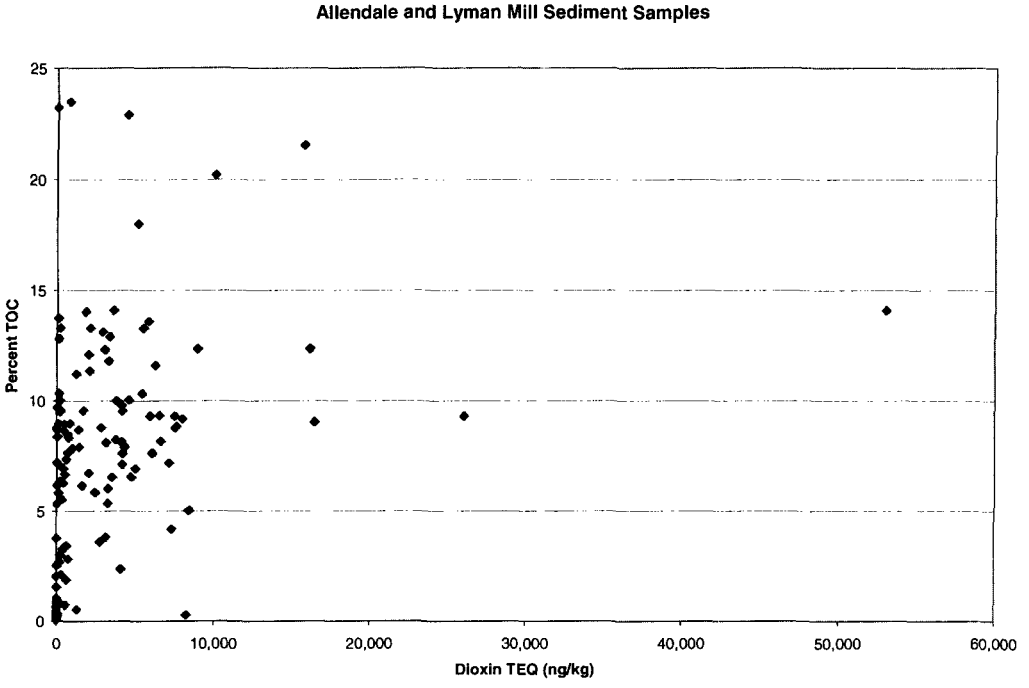
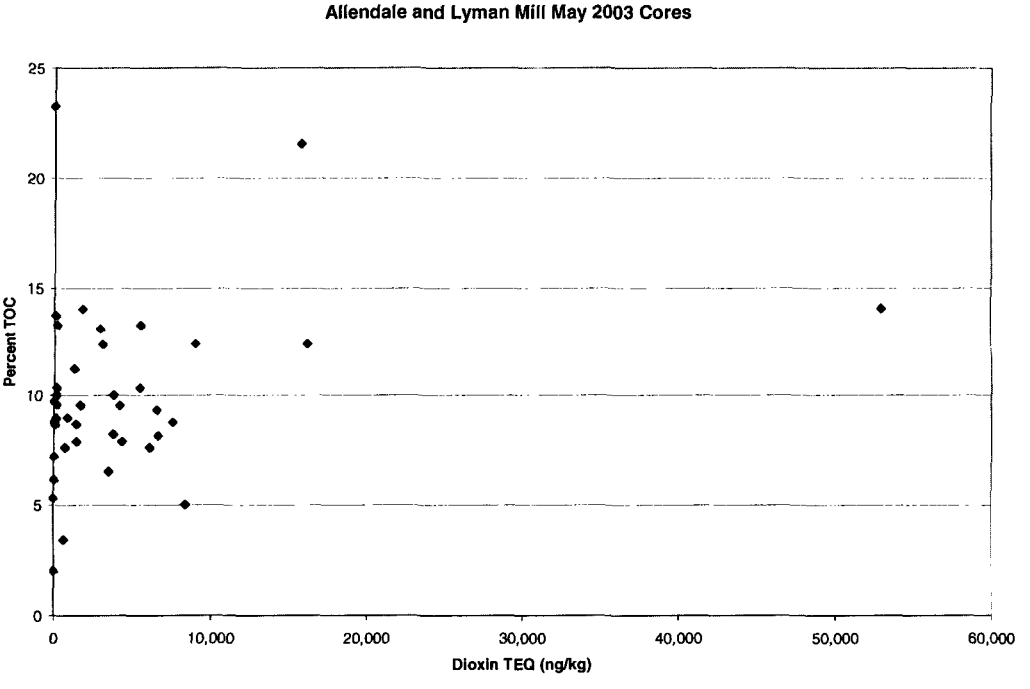


Figure 4-34. Vertical Profile of Dioxin TEQ Concentration in Lyman Mill Pond, May 2003



a. Dioxin TEQ vs. TOC in all Allendale and Lyman Mill Sediment Samples



b. Dioxin TEQ vs. TOC in May 2003 Core Samples from Allendale and Lyman Mill Pond

Figure 4-35. Dioxin TEQ Concentration vs. TOC Content in Sediment Samples from Allendale and Lyman Mill Ponds

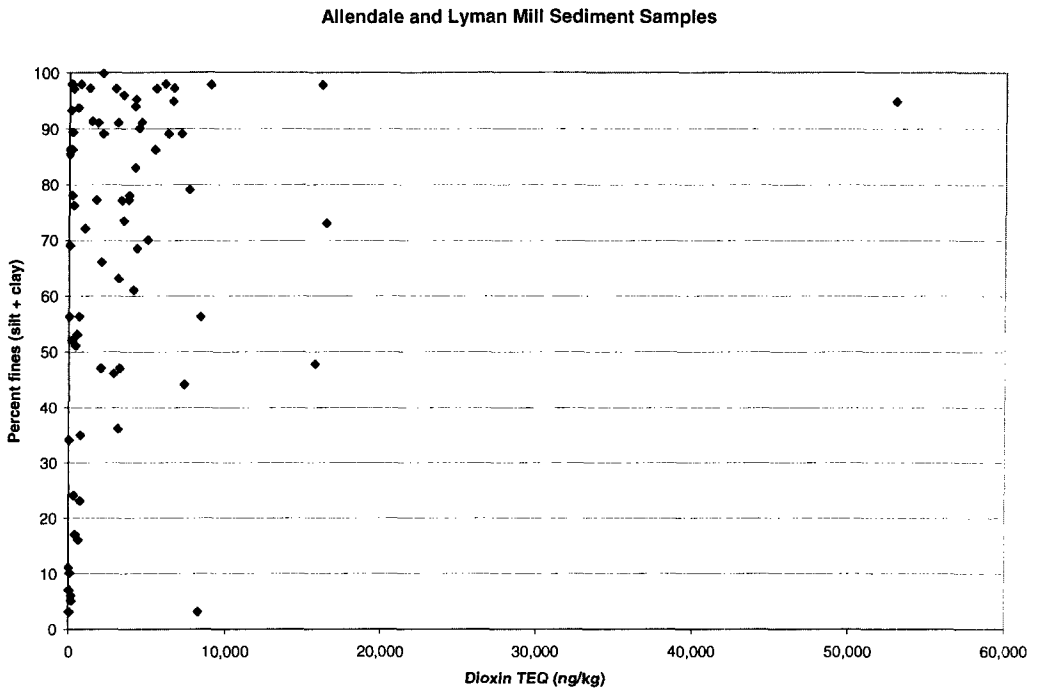


Figure 4-36. Dioxin TEQ Concentration vs. Percent Fines in Sediment Samples from Allendale and Lyman Mill Ponds

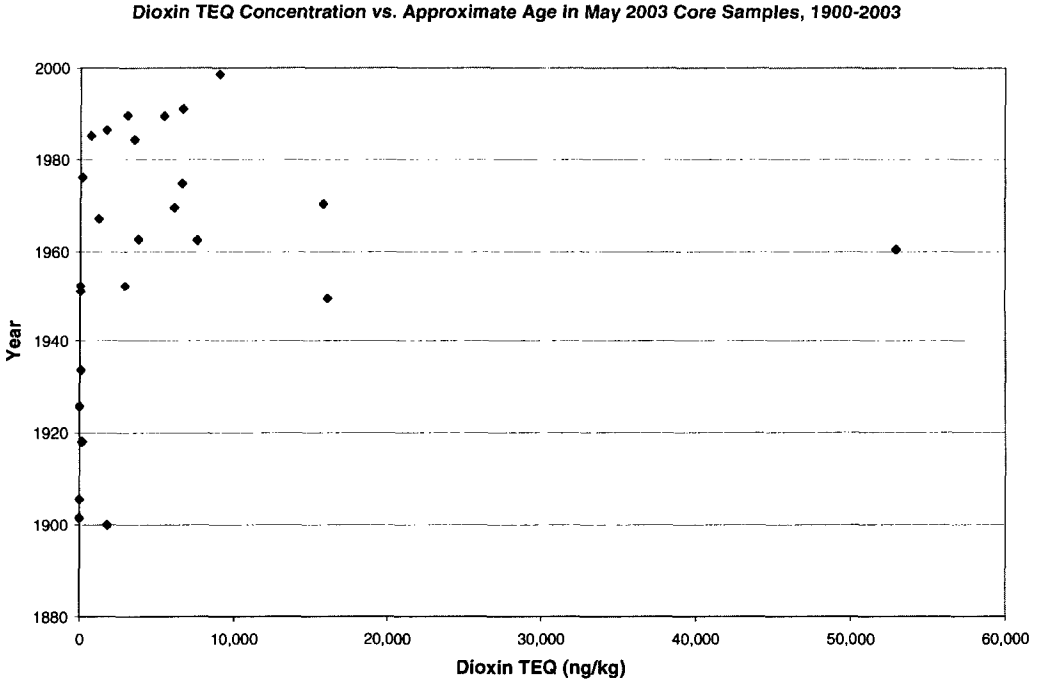


Figure 4-37. Dioxin TEQ Concentration vs. Approximate Age in Cores from Allendale and Lyman Mill Ponds

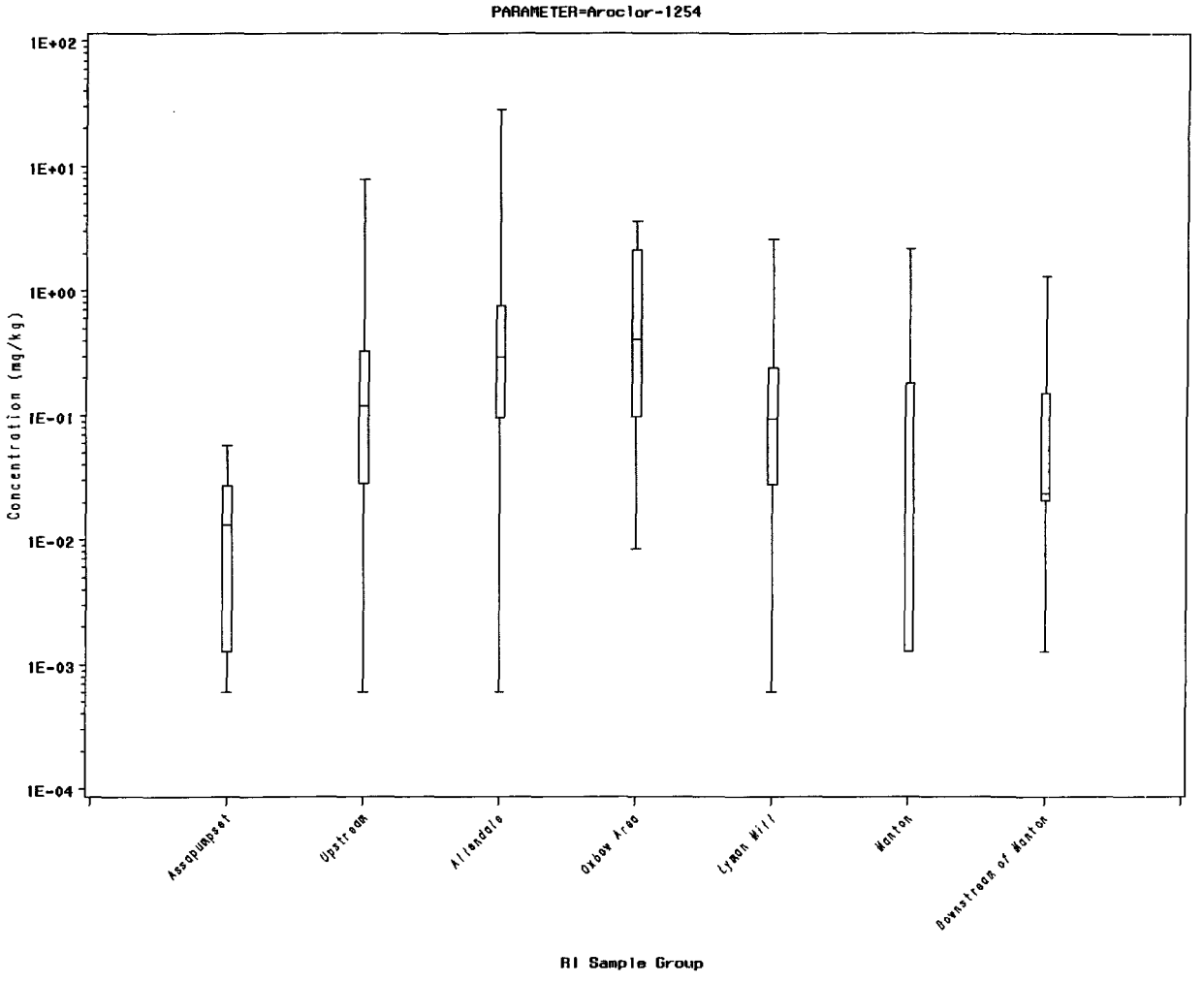


Figure 4-38. Distribution of Aroclor 1254 in Sediment Samples

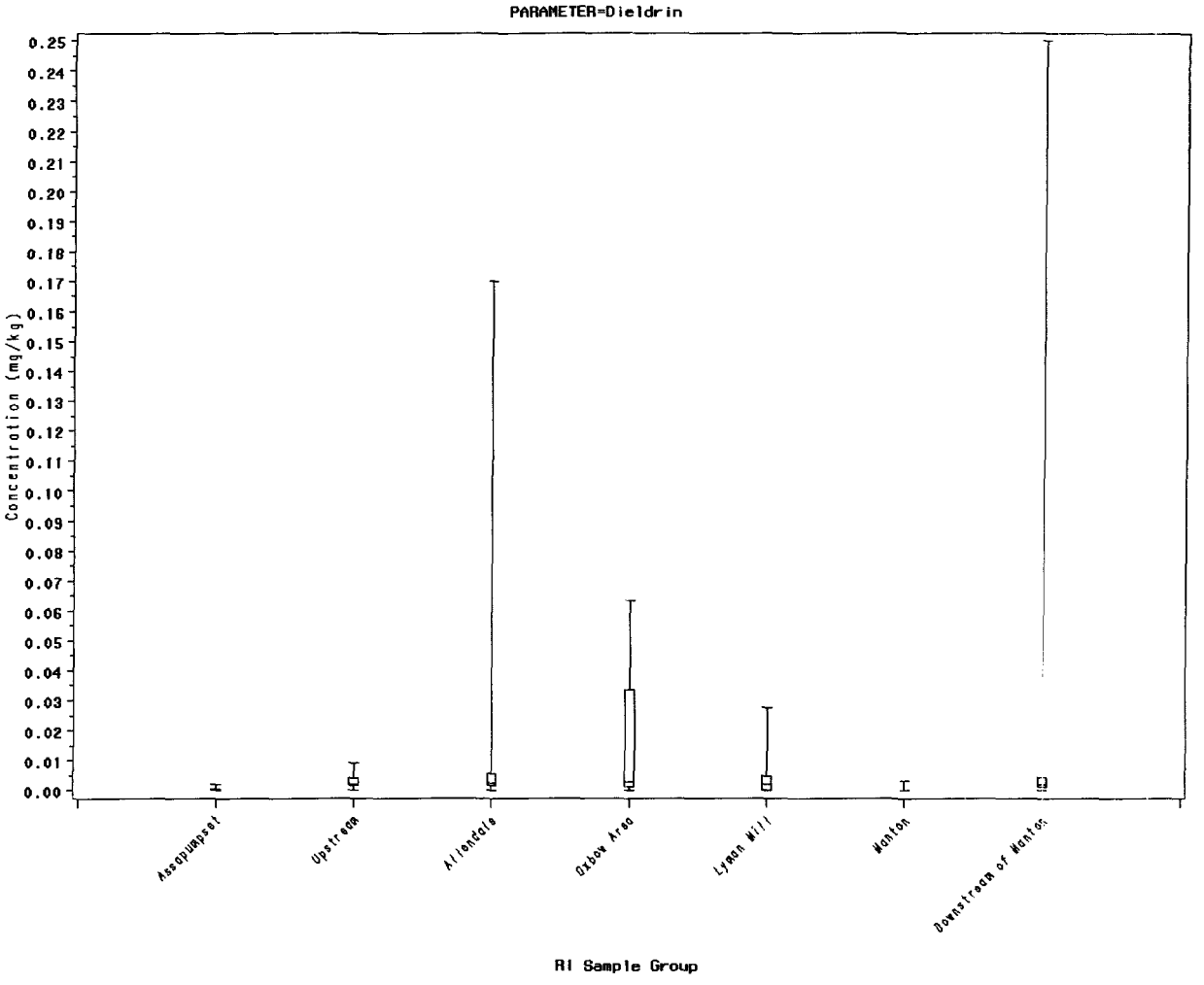


Figure 4-39. Distribution of Dieldrin in Sediment Samples

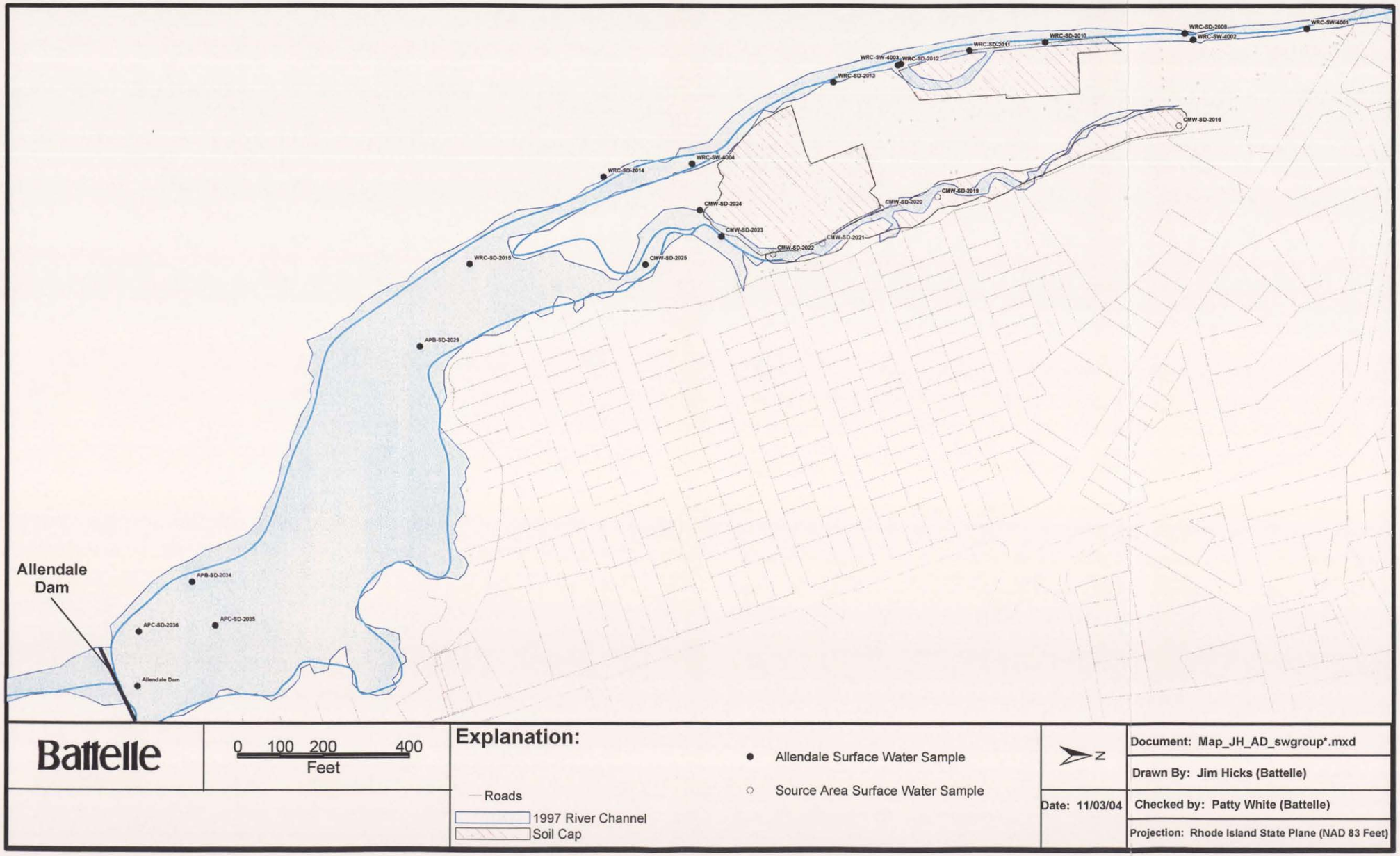


Figure 4-40. Surface Water Sample Locations in Allendale Reach

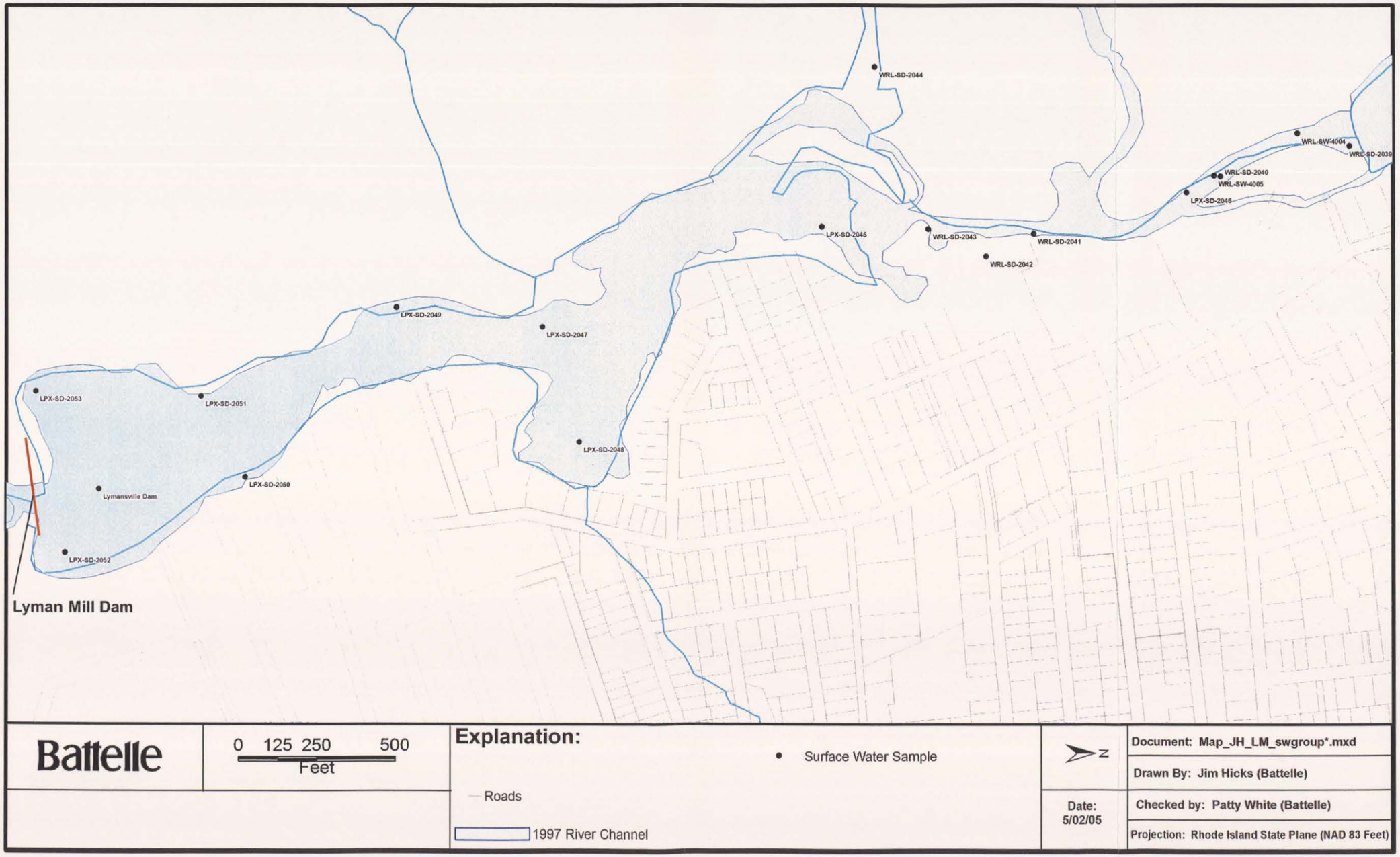


Figure 4-41. Surface Water Sample Locations in Lyman Mill Reach

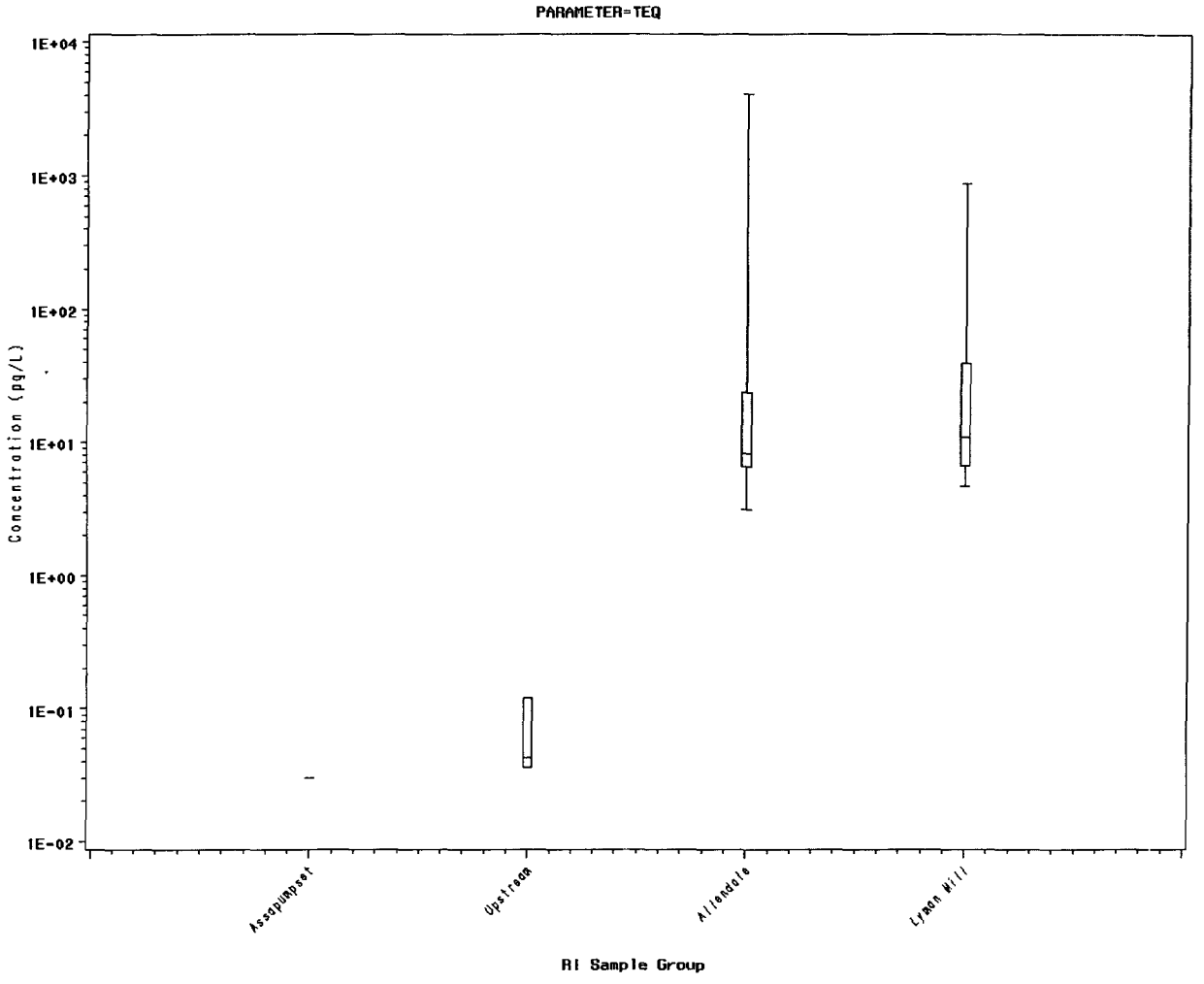


Figure 4-42. Distribution of Dioxin TEQ in Surface Water Samples

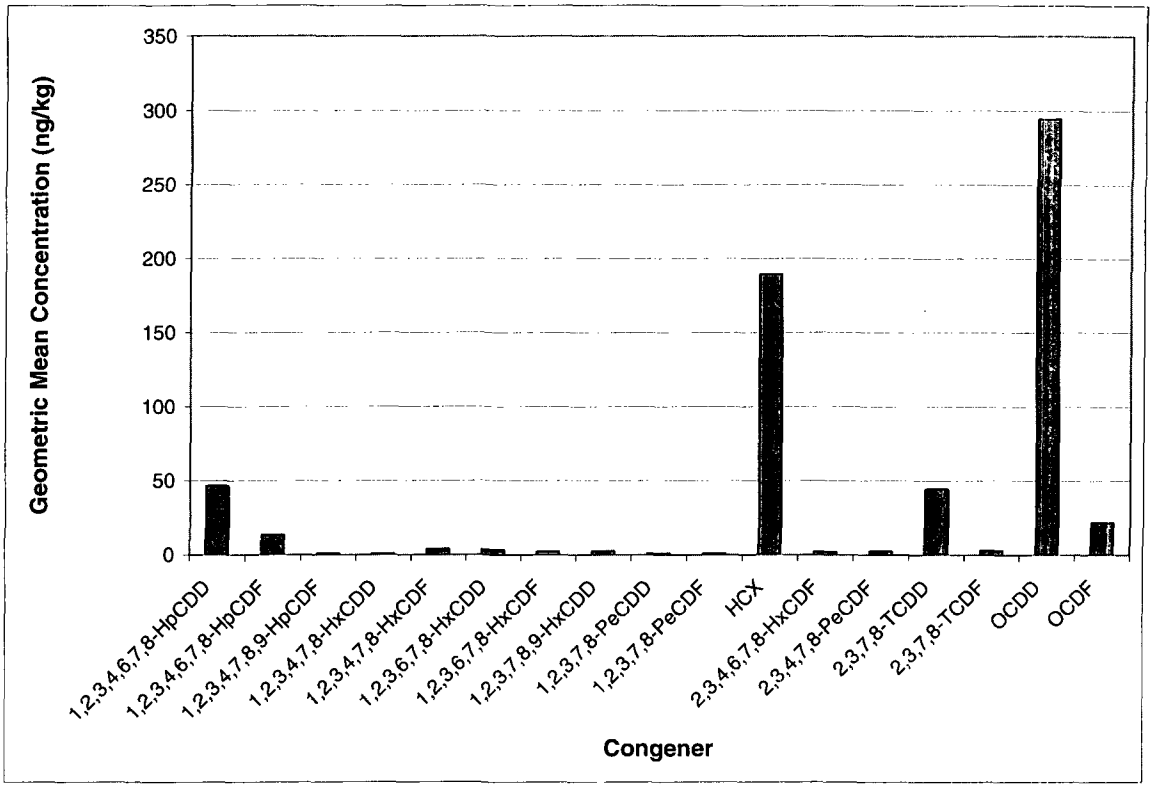
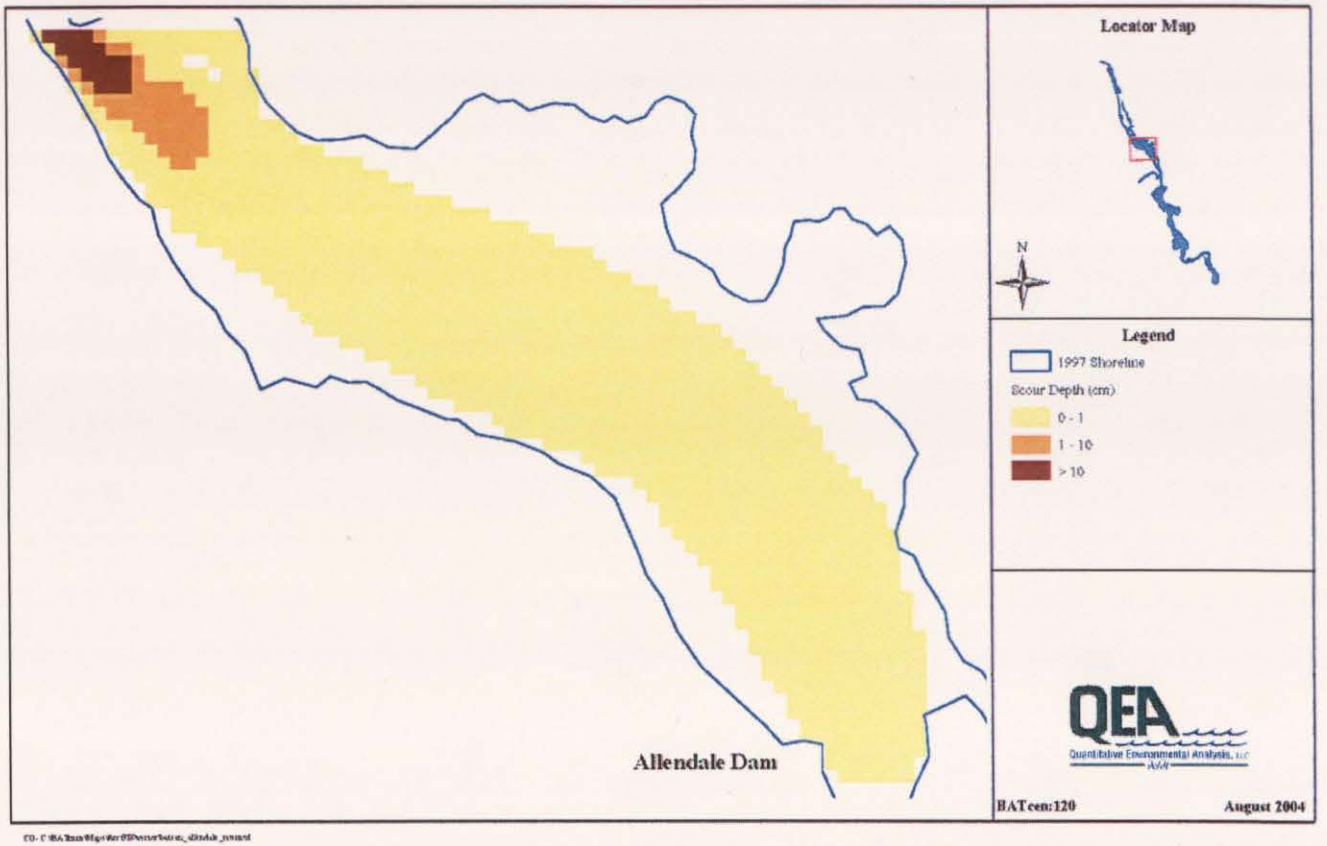
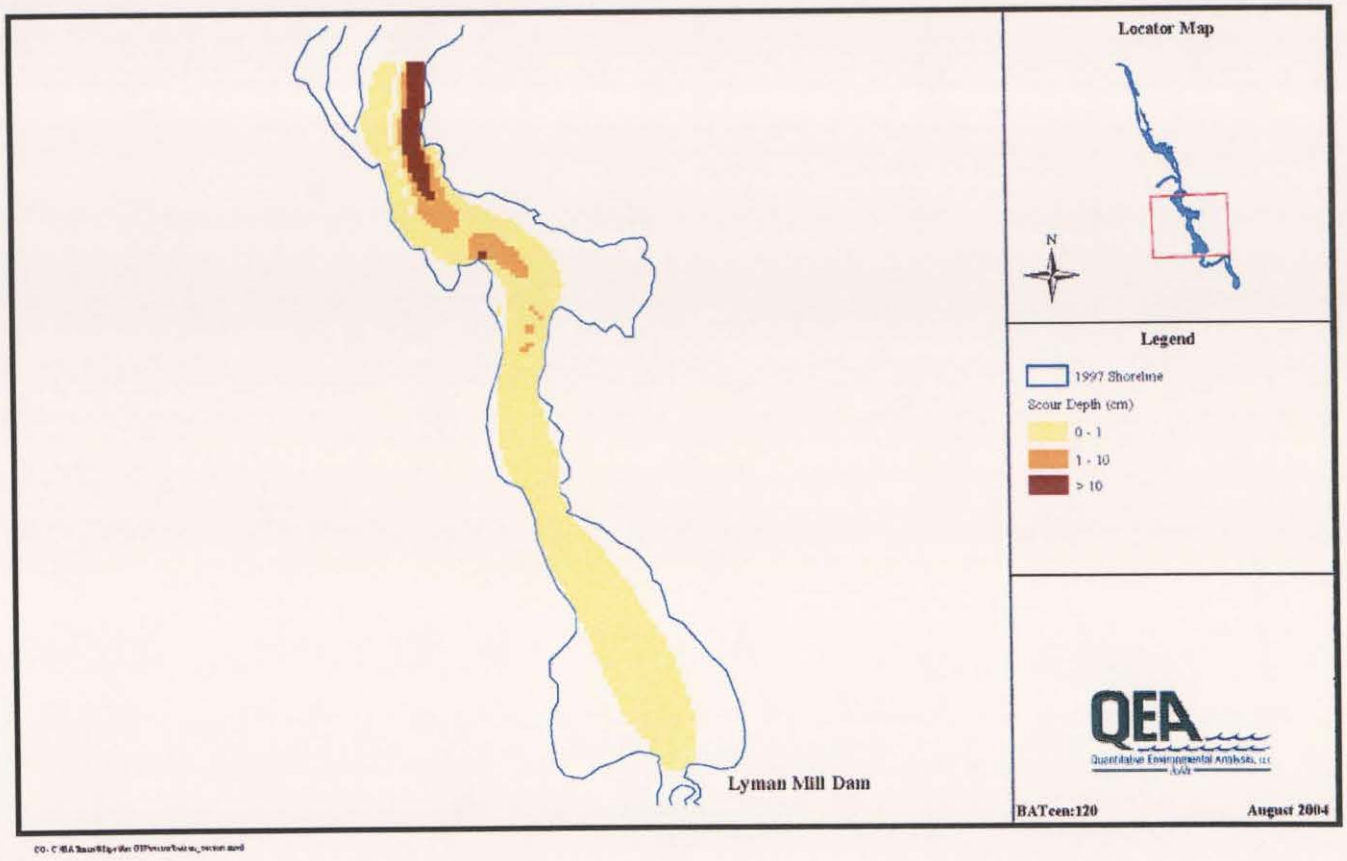


Figure 5-1. Mean Concentration of Dioxin/Furan Congeners and HCX in Source Area Soil Samples



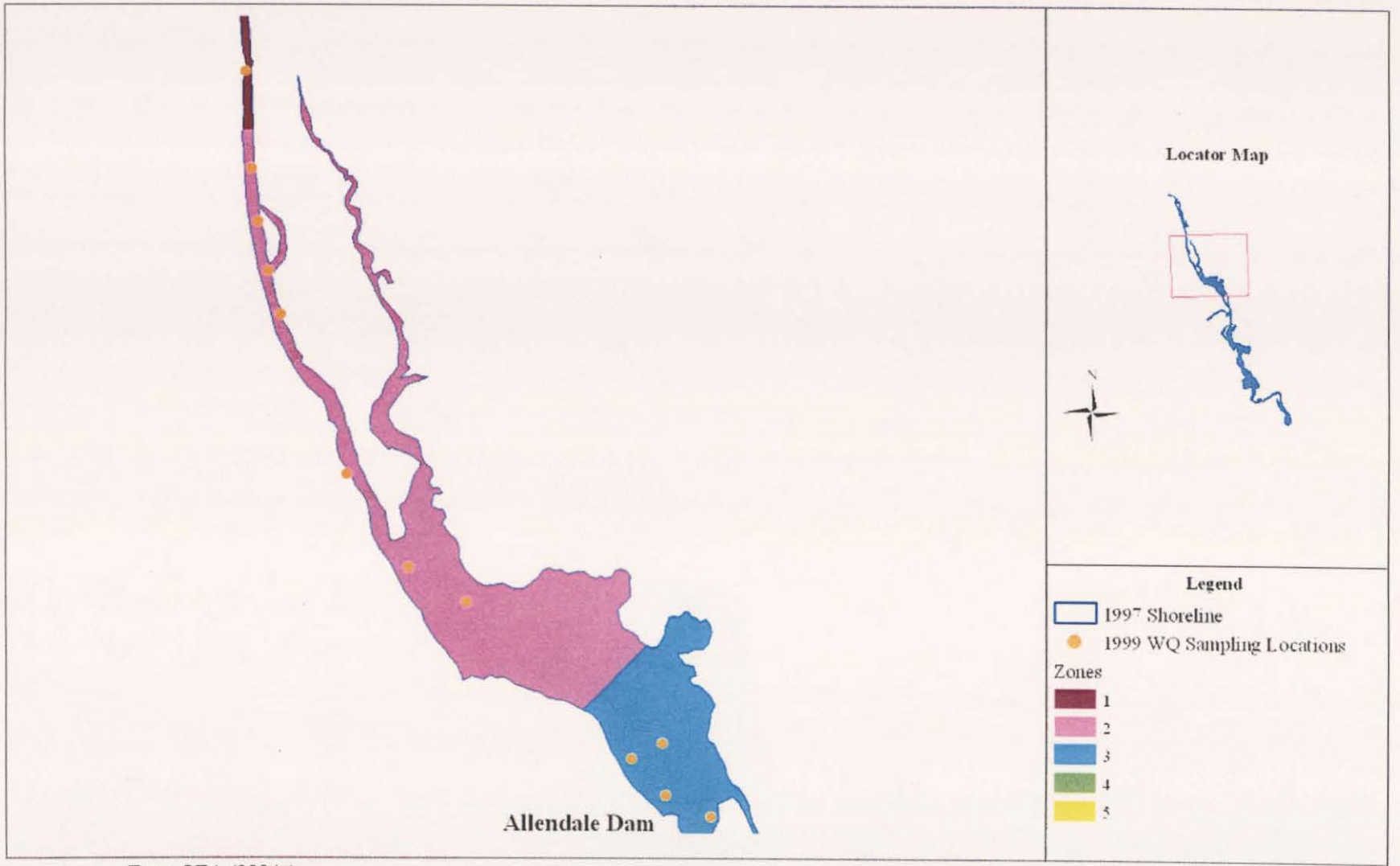
From QEA (2004a)

Figure 5-2. Potential Scour Areas and Depths, 100 year Flood in Allendale Pond



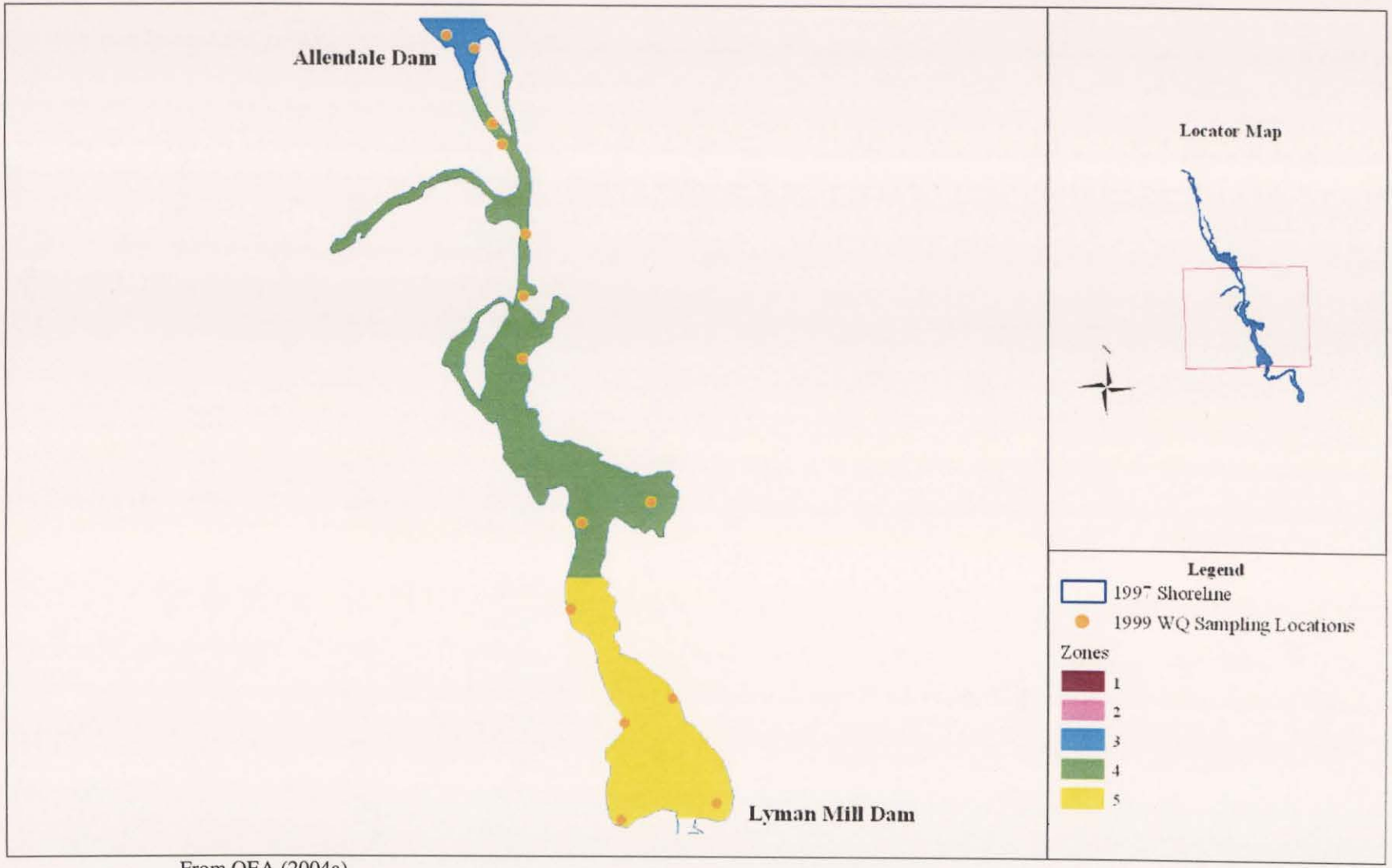
From QEA (2004a)

Figure 5-3. Potential Scour Areas and Depths, 100 year Flood in Lyman Mill Pond



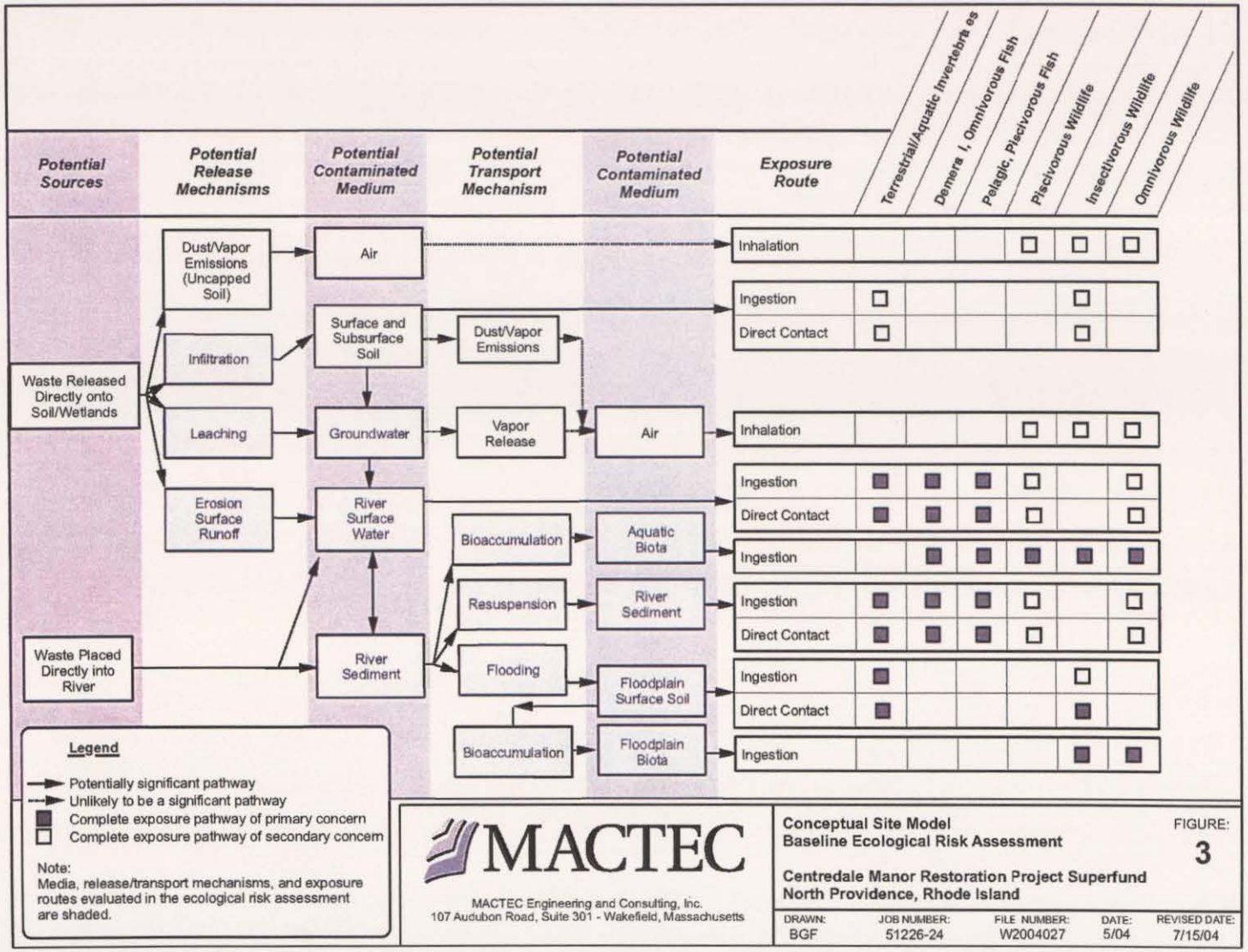
From QEA (2004a)

Figure 5-4. Water Column Dioxin Concentration Zones, Allendale Pond



From QEA (2004a)

Figure 5-5. Water Column Dioxin Concentration Zones, Lyman Mill Pond



From MACTEC (2004a)

Figure 6-1. Conceptual Site Model, Baseline Ecological Risk Assessment

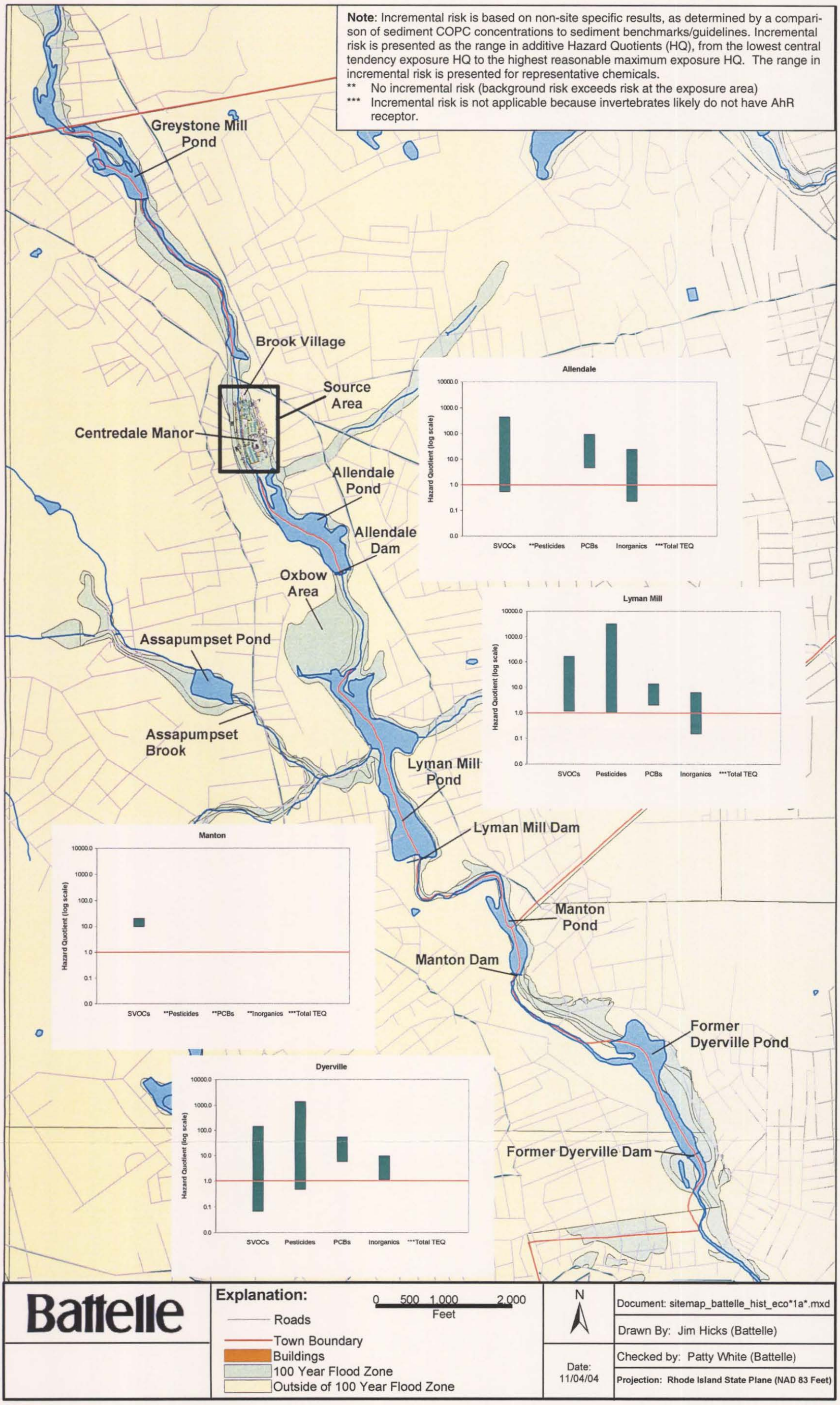


Figure 6-2. Incremental risk (above background, Greystone Mill Pond) for aquatic macroinvertebrate communities at Allendale, Lyman Mill, Manton and Dyerville reaches of the Woonasquatucket River

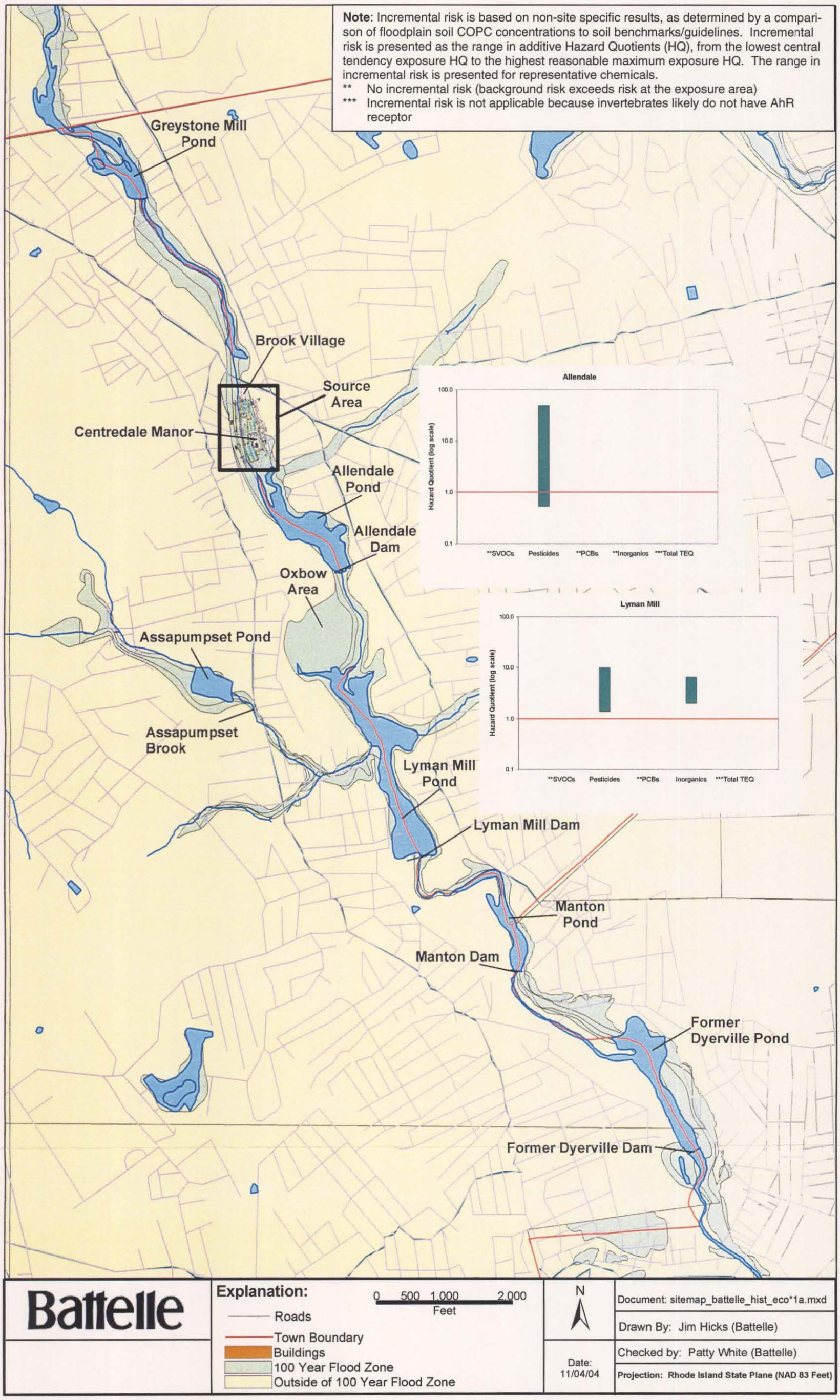


Figure 6-3. Incremental risk (above background, Greystone Mill Pond) for soil macroinvertebrate communities at Allendale and Lyman Mill reaches of the Woonasquatucket River. No data were collected for this receptor at the Manton and Dyerville reaches, and incremental risk was not calculated as a result.

Note: Incremental risk is based on non-site specific results, as determined by a comparison of measured concentrations or toxic equivalencies in fish tissue to literature derived critical body residues. Incremental risk is presented as the range in additive Hazard Quotients (HQ), from the LOAEL (lowest observed adverse effect level) based central tendency exposure HQ to the highest NOAEL (no observed adverse effect level) based reasonable maximum exposure HQ. The range in incremental risk is presented for representative chemicals, although the overall risk due to dioxin represents approximately 16% of the overall risk.
** No incremental risk (background risk exceeds risk at the exposure area).

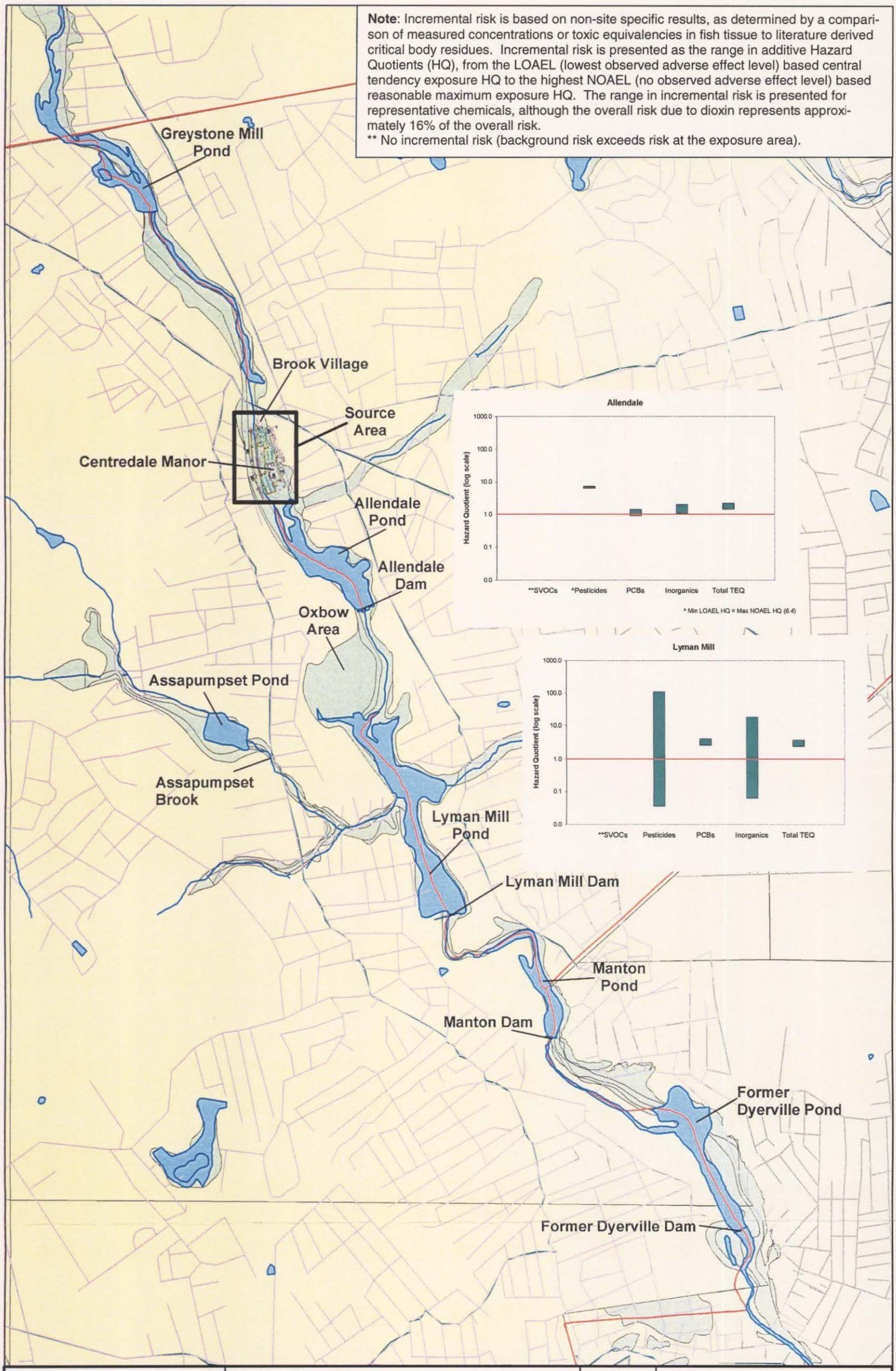


Figure 6-4. Incremental risk (above background, Greystone Mill Pond) for demersal fish populations at Allendale and Lyman Mill reaches of the Woonasquatucket River. No data were collected for this receptor at the Manton and Dyerville reaches, and incremental risk was not calculated as a result

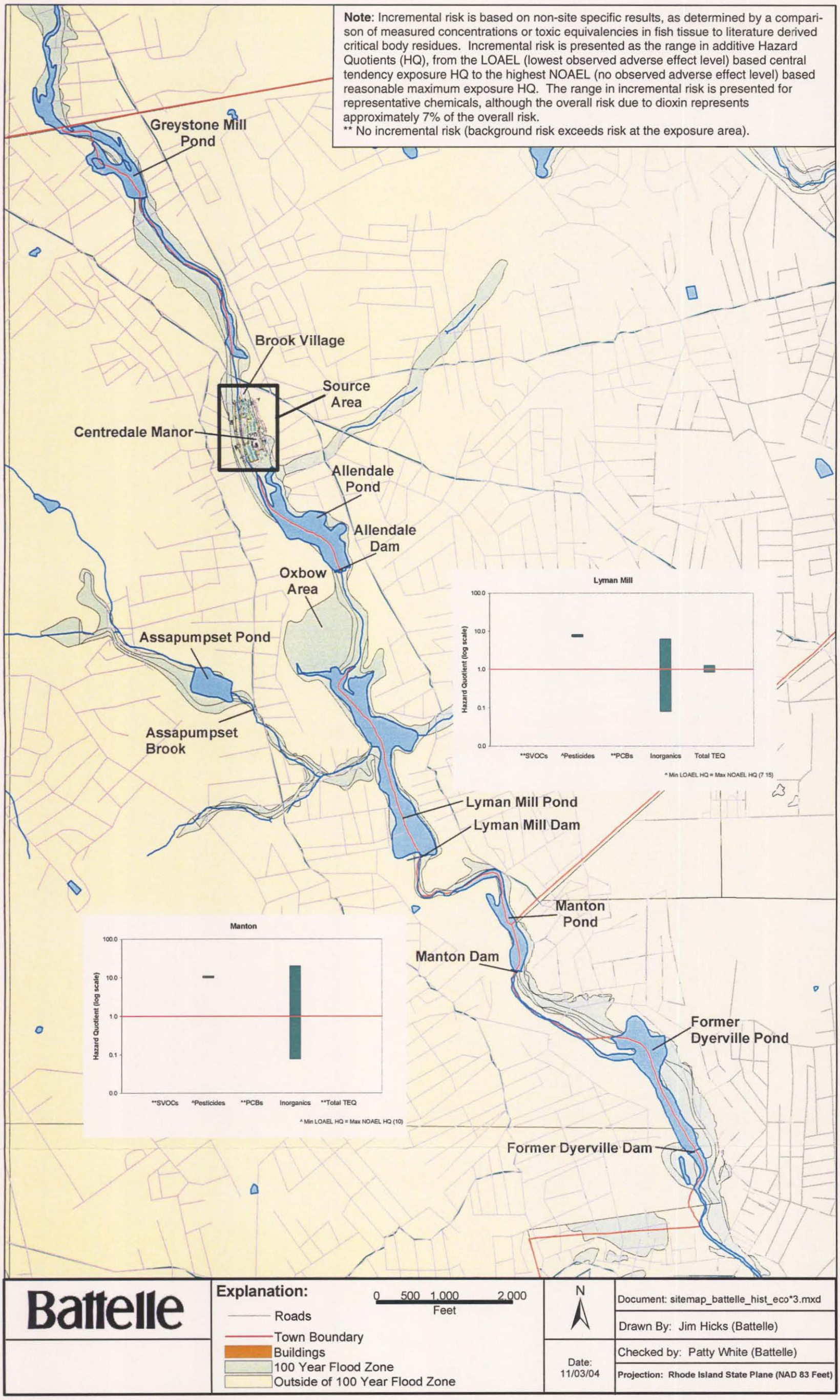


Figure 6-5. Incremental risk (above background, Greystone Mill Pond) for pelagic fish populations at Lyman Mill and Manton reaches of the Woonasquatucket River. No data were collected for this receptor at the Allendale and Dyerville reaches, and incremental risk was not calculated as a result

Note: Incremental risk is based on non-site specific results, as determined by a comparison of estimated ingestion does in Kingfisher with Toxic Reference Values and toxic equivalencies. Incremental risk is presented as the range in additive Hazard Quotients (HQ), from the LOAEL (lowest observed adverse effect level) based central tendency exposure HQ to the highest NOAEL (no observed adverse effect level) based reasonable maximum exposure HQ. The range in incremental risk is presented for representative chemicals, although the overall risk due to dioxin represents approximately 44% of the overall risk.
** No incremental risk (background risk exceeds risk at the exposure area).

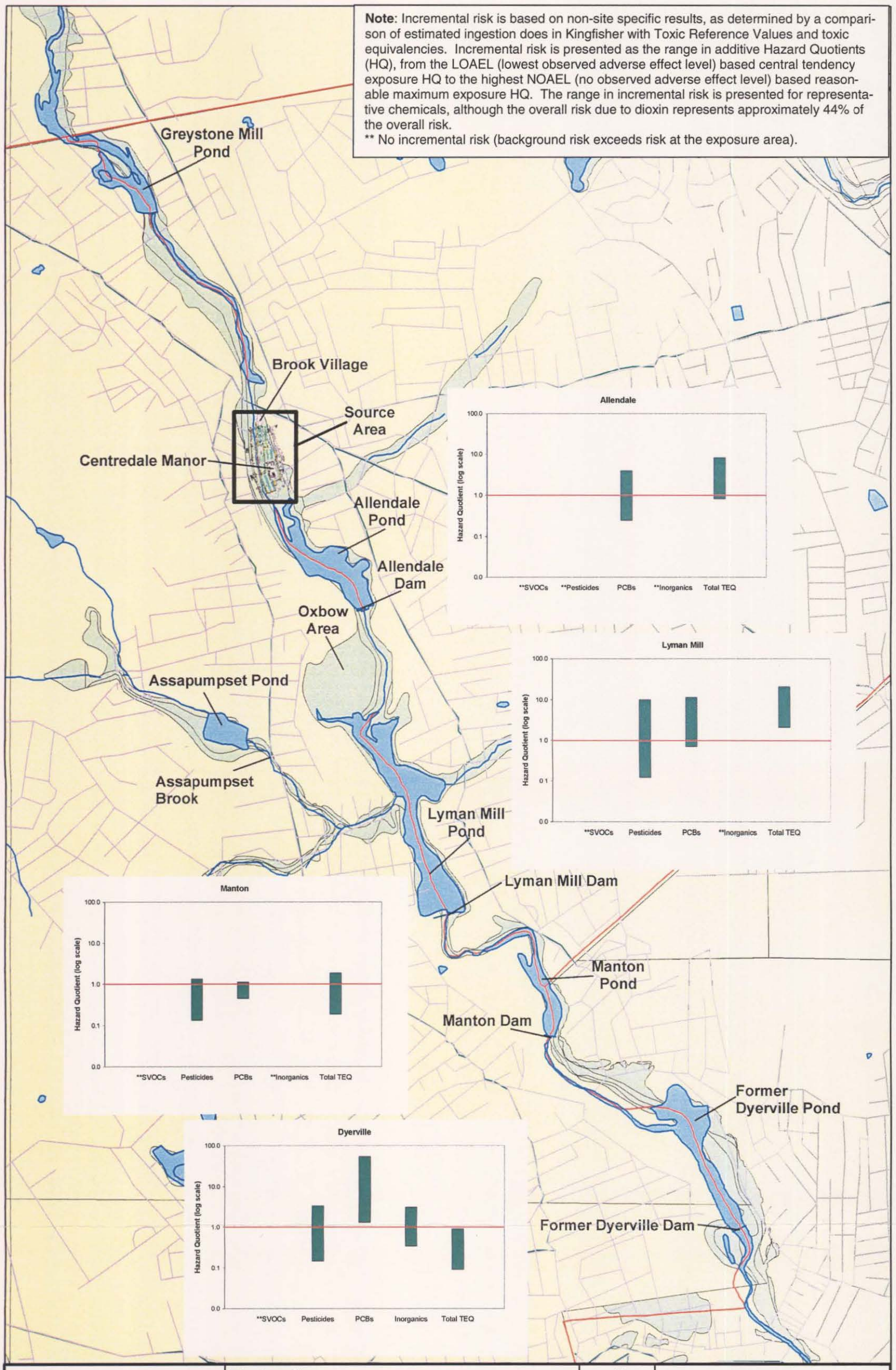


Figure 6-6. Incremental risk (above background, Greystone Mill Pond) for picivorous wildlife populations at Allendale, Lyman Mill, Manton and Dyerville reaches of the Woonasquatucket River

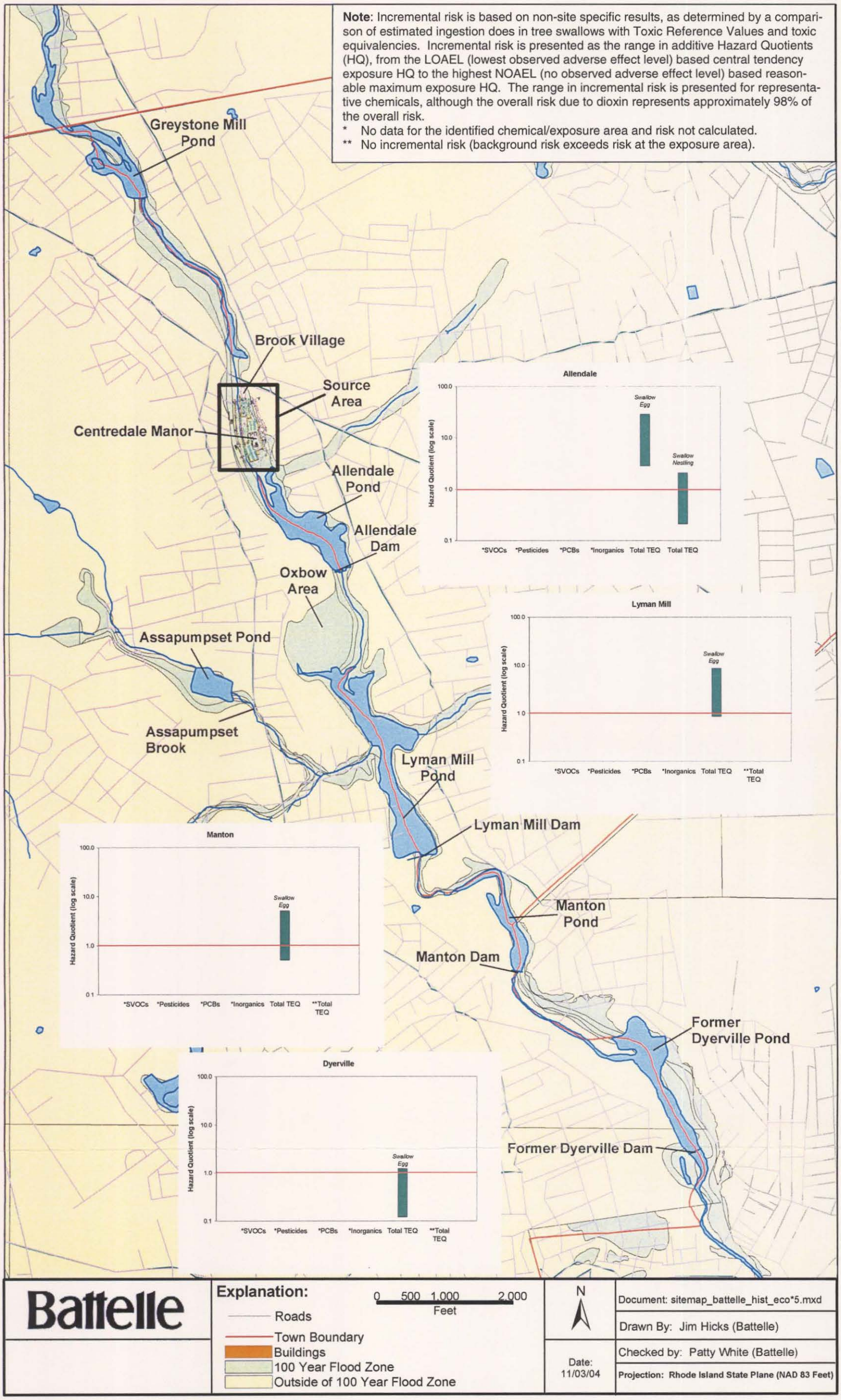
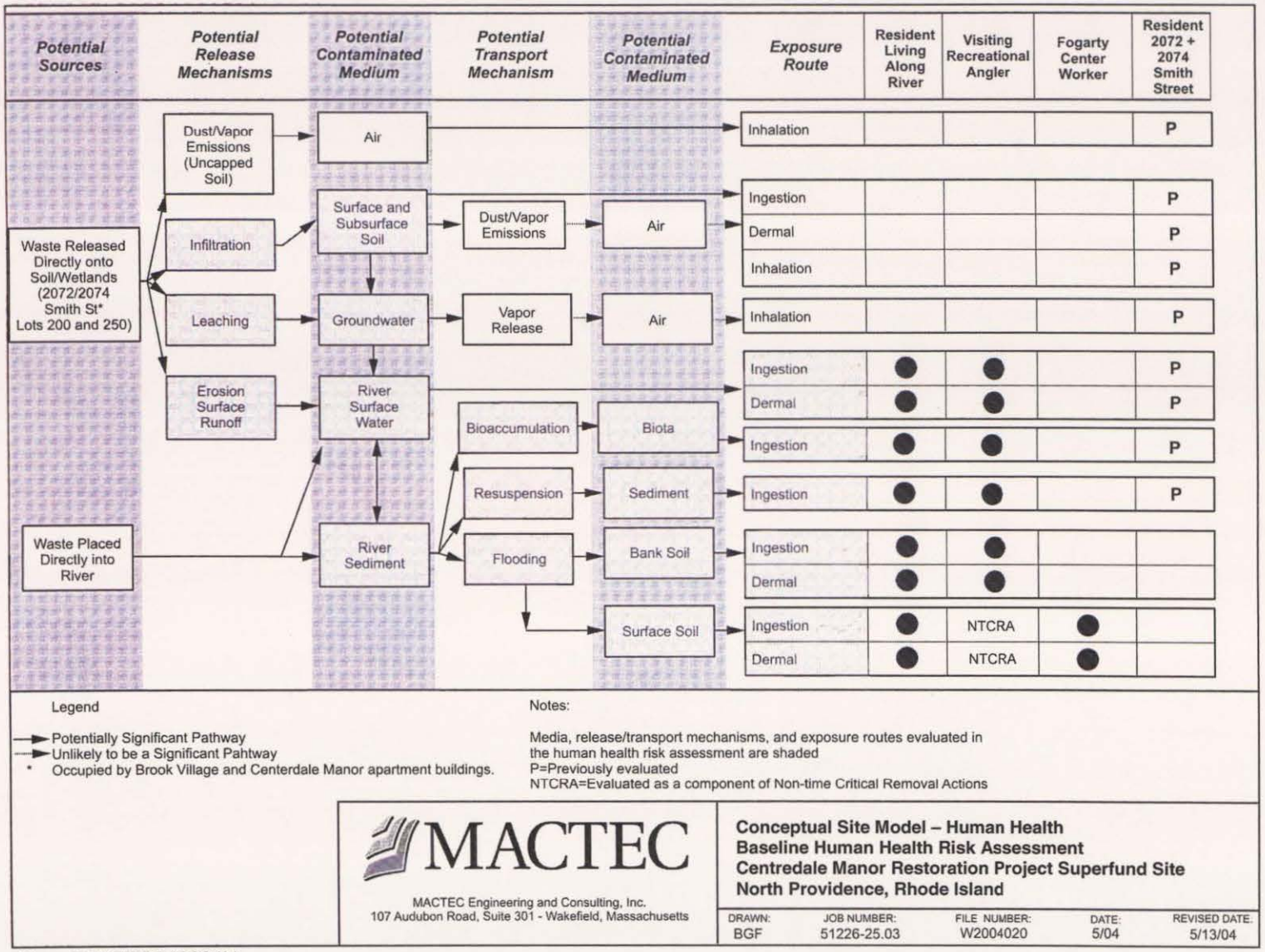


Figure 6-7. Incremental risk (above background, Greystone Mill Pond) for insectivorous wildlife populations at Allendale, Lyman Mill, Manton and Dyerville reaches of the Woonasquatucket River



From MACTEC (2004b)

Figure 6-8. Conceptual Site Model, Baseline Human Health Risk Assessment

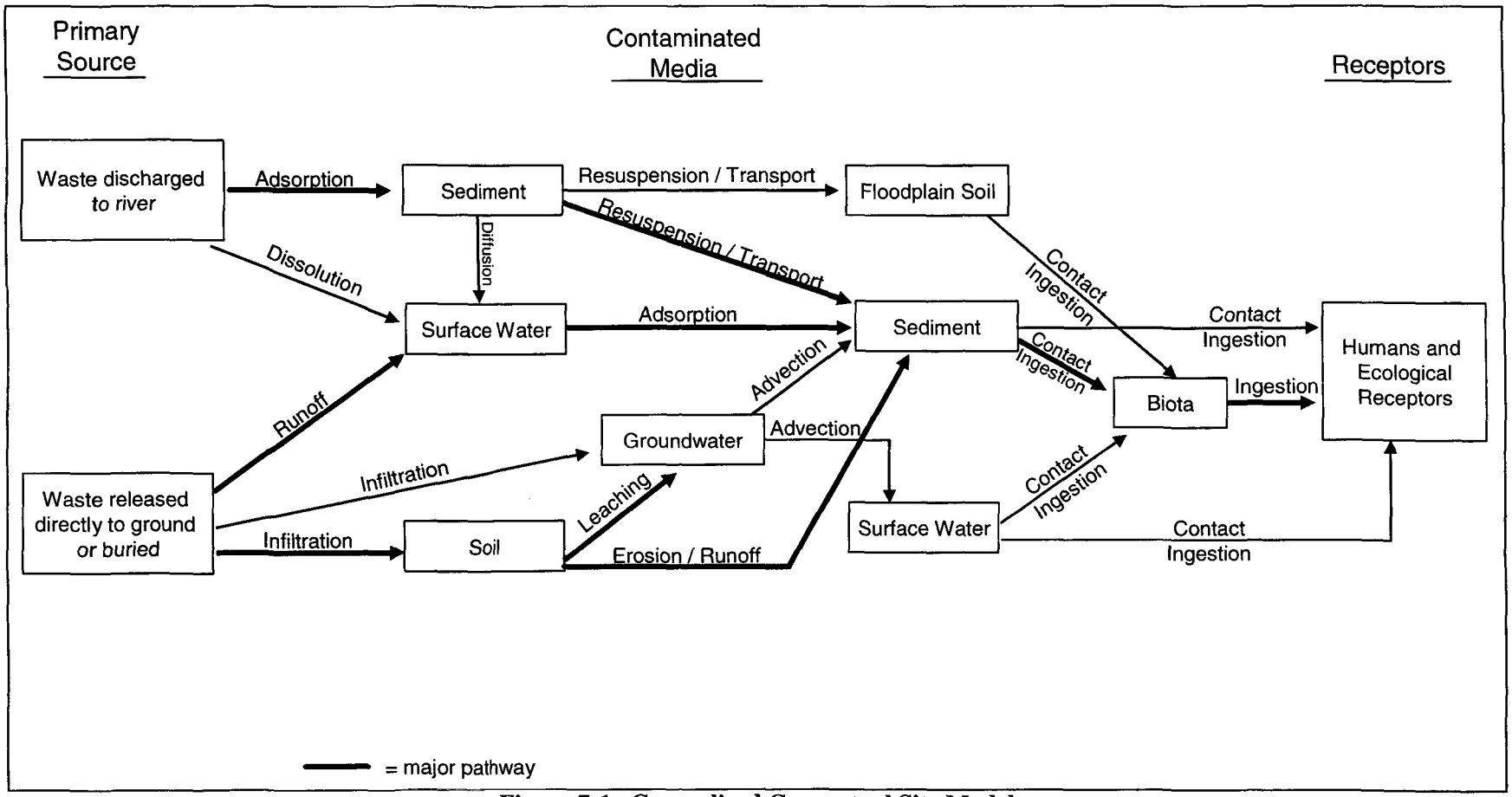


Figure 7-1. Generalized Conceptual Site Model

Tables

Table 1-1. Chronology of Events at the CMRP Site

Date	Event
1930s	Site occupied by Centredale Worsted Mills and Olneyville Wool Combing Co.
1943	Atlantic Chemical Company began operating on the properties
1952	The New England Container Company, Inc. began operating an incinerator-based drum reconditioning facility on a portion of the site
1953	Atlantic Chemical Company changed its name to Metro-Atlantic, Inc. and subsequently to Crown-Metro Inc.
1965	Metro Atlantic manufactured hexachlorophene
1971	Crown-Metro and New England Container Company ceased operating on the site
1972	Fire destroyed most property structures
1977	Brook Village apartments constructed
1982	Centredale Manor apartments constructed
1991	Allendale Dam breached, reducing the surface water level in Allendale Pond
1996	Dioxin first identified in fish collected from the Woonasquatucket River by U.S. EPA
1999	RIDOH and U.S. EPA issue a fish consumption advisory for dioxin and mercury (advisory was updated in 2003)
1999 – 2000	TCRA implemented by U.S. EPA. Major activities included construction of fencing, installation of two interim soil caps, and placement of riprap along the east bank of the Woonasquatucket River
2000	Final NPL listing
2001	Allendale Dam breached again, exposing most of the Allendale Pond bottom adjacent to residential properties along the eastern bank of the pond
2000 – 2003	NTCRA conducted at the site. Activities included: • Reconstruction of the Allendale Dam and restoration of Allendale Pond • Delineation and excavation of contaminated soils in eleven action areas on residential properties and recreational access points along Allendale and Lyman Mill Ponds, and restoration of the remediated areas
2003 – 2004	TCRA performed in the tailrace on the east side of the source area. The TCRA activities included soil grading, construction of a permeable protective cap over contaminated soils and sediments, installation of a precast modular stormwater control structure at the terminus of a storm drain at the north end of the tailrace, and construction of a drainage swale along the length of the capped area
1999 – 2004	Remedial investigation conducted at site

Table 1-2. Summary of Previous Investigations at the CMRP Site

Date	Description	Testing Parameters	Original Use of Data	Reference
May, 1996	Fish collected at two locations: 15 sunfish collected at Valley St. site, Providence. 3 American eel collected at Smith St. site (near Centredale), N. Providence. Fillet and offal samples for each.	Selected metals, PCB congeners, pesticides, dioxin/furans, and dioxin-like PCBs (#77, 126, 169)	Fish analyzed to provide an indicator of the quality of the river system.	*Human Health Risk Screening Analysis for a Subsistence Fisherman in the Woonasquatucket River* (U.S. EPA, 1996); *Human Health Risk Screening Analysis for Recreational Exposure to Sediments in the Woonasquatucket River* (U.S. EPA, 1998b)
October, 1997	Water and sediment collected behind 7 dams on Woonasquatucket River – Esmond, Allendale, Lyman Mill, Manton, Dyerville, Olneyville, Lonigan.	Water: DO, temperature, conductivity, pH Sediment: metals, PAHs, PCBs, pesticides, dioxin/furans, and TOC	First sediment evaluation to locate possible source of dioxin.	*Sediment Water Quality Analysis* (U.S. EPA, 1998c)
September, 1998	Soil and sediment samples collected from the following locations: 5 soil samples at Centredale Manor property, 1 soil sample at Brook Village property, 35 sediment samples on Woonasquatucket River, and 4 sediment samples in Centredale tailrace.	Dioxin/furans and HCX, SVOCs, pesticides, PCBs, and TOC	Sediment investigation to confirm high concentrations of chemicals in sediment near the Centredale Manor property.	*Final Summary Report for Expanded Site Inspection, Centredale Manor* (Roy F. Weston, 1999a)
January, 1999	Soil samples collected from 17 locations at Centredale Manor, No. Providence Boys and Girls Club, Early Years Learning Center, Lee Romano Baseball Field.	2,3,7,8-TCDD only	Determine possible risks to persons using these areas for recreational purposes. Ballfield and Boys/Girls club properties were found to not pose a risk to humans.	*Final Summary Report for Expanded Site Inspection, Centredale Manor* (Roy F. Weston, 1999a)
	Three drinking water samples collected collected – 2 at Yacht Club Bottling Works Co. and 1 at the Pied Piper School.	Dioxin/furans and HCX	Determine possible risks to persons drinking water at these locations.	*Final Summary Report for Expanded Site Inspection, Centredale Manor* (Roy F. Weston, 1999a)

Table 1-2. (continued)

Date	Description	Testing Parameters	Original Use of Data	Reference
February, 1999	222 soil samples collected from Centredale Manor and Brook Village properties and several residential properties located adjacent to Centredale Raceway.	2,3,7,8-TCDD only	Determine extent of surface contamination, and develop approach for short-term actions under emergency response.	*Final Site Investigation Report* (IT Group, 2000)
March, 1999	ATSDR Health Consultation	N/A	Evaluated expanded site inspection results for public health implications. Recommended measure to restrict public access to areas where dioxin in surface soil was >1,000 ng/kg.	*Health Consultation, Woonasquatucket River and Centredale Manor* (ATSDR, 1999)
February and April, 1999	Geophysical surveys conducted in source area	N/A	Determine if buried objects existed on the site.	*Geophysical Investigation Report, Centredale Manor Site* (Roy F. Weston, 1999b)
June - July, 1999	A total of 424 soil samples collected from Centredale Manor and Brook Village properties	All samples: 2,3,7,8-TCDD Most samples: PCBs 20% of samples also analyzed for SVOCs, metals, and pesticides	Determine extent of contamination and provide support for the selected approach for short-term actions.	*Final Site Inspection Report* (IT Group, 2000)
July, 1999	12 soil samples collected from the footprint of Allendale Dam	Dioxin/furans, pesticides, PCBs, PAHs, metals, and TOC	Determine extent of contamination.	*Final Site Inspection Report* (IT Group, 2000)
July, 1999	23 soil samples collected at the Narragansett Electric Company greenway	2,3,7,8-TCDD only	Identify presence of contaminants.	*Final Site Inspection Report* (IT Group, 2000)
July - August, 1999	63 soil samples collected at residential properties adjacent to Allendale Pond.	Dioxin/furans	Identify presence of contaminants on residential property, and determine appropriate location of fence to control access to contaminated areas.	*Final Site Inspection Report* (IT Group, 2000)

Table 1-2. (continued)

Date	Description	Testing Parameters	Original Use of Data	Reference
August, 1999	5 indoor air samples collected in Centredale Manor and Brook Village.	VOCs	Performed to identify possible hazards to residents from air quality inside building. No significant VOCs were found to be migrating into buildings.	*Final Report, Centredale Manor Indoor Air Survey* (U.S. EPA, 1999a)
September, 2000	Engineering Evaluation/Cost Analysis	N/A	The EE/CA was performed as the basis for a NTCRA. The EE/CA included a streamlined human health risk assessment and screening ecological risk assessment (ERA). An action level of 1,000 ng/kg dioxin as a toxic equivalency (TEQ) was selected as the action level for the NTCRA.	*Final Engineering Evaluation/Cost Analysis* (TTNUS, 2000a)
September – October, 1999	43 sediment samples collected from Allendale Pond.	2,3,7,8-TCDD and PCBs	Begin to evaluate downstream extent of contamination	*Final Site Inspection Report* (IT Group, 2000)
November, 1999	11 soil samples collected from the river bank near Brook Village. Soil now covered with rip-rap.	All samples analyzed for 2,3,7,8-TCDD and PCBs; selected samples also analyzed for VOCs, SVOCs, pesticides, herbicides, and metals.	Determine need to cap bank soils at Brook Village property	*Final Site Inspection Report* (IT Group, 2000)
April, 2002	*40 soil samples collected by LEA for the Centredale Manor Performing Parties Group*	Dioxins/furans	Define dioxin concentrations between NTCRA action areas	*Centredale Manor Restoration Project – 8290 Data* (LEA, 2002b)
July, 2002	51 soil samples collected by LEA for the Centredale Manor Performing Parties Group	Dioxin using immunoassay screening method and dioxin/furans using laboratory method	Further delineate excavation limits of action areas for NTCRA	*Additional Sampling Activities, Centredale Manor Restoration Project* (LEA, 2002a)

Modified from TTNUS (2000a).
N/A = Not applicable.

Table 2-1. Summary of RI Activities for the CMRP Site

Date	Description	Testing Parameters	Original Use of Data	Reference
September, 1999	165 vapor diffusion samples installed by the USGS in the Woonasquatucket River and tailrace	Selected VOCs	Located discharge locations of VOC-contaminated groundwater from source area into the river.	*Distribution of Selected Volatile Organic Compounds Determined with Water-to-Vapor Diffusion Samplers at the Interface Between Groundwater and Surface Water, Centredale Manor Site* (USGS, 2000a)
October – November, 1999	50 aquatic and floodplain sediment samples collected from river, Allendale and Lyman Mill ponds, and upstream locations	Dioxin/furans and HCX, SVOCs, metals, pesticides, PCBs, grain size, TOC, and AVS/SEM	Determine nature and extent of contaminants in sediment downstream of source area and provide data for risk assessments.	*Final Technical Memorandum, Woonasquatucket River Sediment Investigation* (TTNUS, 2000b)
	36 water samples collected from river, Allendale and Lyman Mill ponds, and upstream locations	Dioxin/furans and HCX, SVOCs, metals (total and dissolved), pesticides and PCBs	Determine nature and extent of contaminants in surface water downstream of source area and provide data for risk assessments.	*Final Technical Memorandum, Woonasquatucket River Sediment Investigation* (TTNUS, 2000b)
	24 bank sediment samples collected from upstream locations and south to Lyman Mill Dam	Dioxin/furans and HCX, SVOCs, pesticides and PCBs	Determine nature and extent of contaminants in bank sediment and provide data for risk assessments.	*Final Technical Memorandum, Woonasquatucket River Sediment Investigation* (TTNUS, 2000b)
	126 soil samples collected from residential use soils along Centredale tailrace, Allendale Pond, and Lyman Mill Pond.	All samples: Dioxin/furans and HCX Approximately half of samples also analyzed for SVOCs, metals, pesticides and PCBs	Determine nature and extent of contaminants on residential use property adjacent and downstream of source area and support NTCRA.	*Final Technical Memorandum, Woonasquatucket River Sediment Investigation* (TTNUS, 2000b)
July, 2000	N/A	N/A	Identified historical site features and potential sources of contamination.	*Aerial Photographic Analysis, Centredale Manor Site Subarea, North Providence, Rhode Island* (U.S. EPA, 2000)

Table 2-1. (continued).

Date	Description	Testing Parameters	Original Use of Data	Reference
Summer 2000	Tree swallow samples collected by USGS at two locations: 5 nestling, 1 diet, and 7 unhatched eggs collected at Greystone Mill Pond. 5 nestling, 2 diet and 13 unhatched eggs collected at Allendale Pond.	Dioxins/furans, HCX, PCB congeners (100+), and lipid content	Swallows analyzed to provide an indicator of the quality of the river system.	*Task 15 Revised Letter Data Report* (Battelle, 2000)
September, 2000	Sediment samples collected from 11 stations in Manton and Dyerville reaches of the Woonasquatucket River.	Dioxin/furans and HCX, SVOCs, metals, pesticides and PCBs, grain size, TOC, and AVS/SEM	Performed to determine the extent of contamination in the Woonasquatucket River downstream of Lyman Mill Dam.	*Draft Technical Memorandum, Manton and Dyerville Reaches Sediment Sampling* (TTNUS, 2001)
September, 2000 – August, 2001	Soil borings advanced and monitoring wells installed by in the source area; collection of surface and subsurface soil samples; geophysical survey; water level monitoring; and hydraulic conductivity tests.	Dioxin/furans and HCX, VOCs, SVOCs, metals, pesticides, and PCBs	Performed to determine nature of soil contamination in the source area, characterize hydro-geological setting and groundwater flow.	*Draft Technical Memorandum, Source Area Investigation* (TTNUS, 2002)
	Groundwater samples were collected in two events from monitoring wells using low-flow sampling methods. Initial sampling was conducted at 7 shallow overburden wells located in the raceway and source area monitoring wells. The second groundwater event sampled 33 monitoring wells (shallow overburden, deep overburden, and bedrock wells).	Dioxin/furans, HCX, VOCs, SVOCs, pesticides, PCBs, metals (total and dissolved), alkalinity, sulfides, and TOC	Performed to determine the nature and extent of groundwater contamination at and adjacent to the Centredale Manor and Brook Village properties.	*Draft Technical Memorandum, Source Area Investigation* (TTNUS, 2002)
April-July, 2001	Biota (99 fish, 12 crayfish, 12 earth-worm, and 2 composite emerging insects) were collected from Allendale Reach, Lyman Mill Reach, Manton Reach and Dyerville Reach, Greystone Mill Pond, and Assapumpset Brook before Alllendale Dam restored.	Dioxins/furans, HCX, PCBs, pesticides, metals, and lipid content; fish also analyzed for SVOCs Approximately 20% of the samples also analyzed for PCB congeners	Performed to support BERA and BHHRA.	*Data Evaluation Report* (MACTEC, 2003)

Table 2-1. (continued).

Date	Description	Testing Parameters	Original Use of Data	Reference
April-July, 2001	19 sediment samples were collected from upstream locations, Greystone Mill Pond, Allendale Reach, Lyman Mill Reach, and Assapumpset Brook before Allendale Dam restored.	Dioxins/furans, HCX, PCBs, pesticides, SVOCs, metals, methyl mercury, AVS/SEM, grain size and total organic carbon Approximately 20% of the samples also analyzed for PCB congeners	Performed to support BERA and BHHRA.	*Data Evaluation Report* (MACTEC, 2003)
	11 floodplain soil samples were collected from upstream locations, Allendale Reach, and Lyman Mill Reach before Allendale Dam restored.	Dioxins/furans, HCX, PCBs, pesticides, SVOCs, metals, methyl mercury, grain size and total organic carbon Approximately 20% of the samples also analyzed for PCB congeners	Performed to support BERA and BHHRA.	*Data Evaluation Report* (MACTEC, 2003)
	9 surface water samples were collected from upstream locations, Allendale Reach, Lyman Mill Reach, and Assapumpset Brook before Allendale Dam restored.	PCBs, pesticides, SVOCs, VOCs, metals (total and dissolved), hardness, biological oxygen demand, and nutrients	Performed to support BERA and BHHRA.	*Data Evaluation Report* (MACTEC, 2003)
April-May, 2001	U.S. Fish and Wildlife Service assessed differences between species and numbers of anuran amphibians (i.e., frogs) at the site and reference areas.	Anuran call survey	Performed to support BERA.	*Anuran Call Survey of the Woonasquatucket River in the Vicinity of the Centredale Manor Superfund Site, North Providence, RI.* (U.S. Fish and Wildlife Service, 2002)

Table 2-1. (continued).

Date	Description	Testing Parameters	Original Use of Data	Reference
Summer 2001	Tree swallow samples collected by USGS at three locations: • 5 nestling, 1 diet, 5 nestling liver, and 9 unhatched eggs collected at Greystone Mill Pond. • 5 nestling, 1 diet, 5 nestling liver and 16 unhatched eggs collected at Allendale Pond. • 5 nestling, 1 diet, 5 nestling liver and 11 unhatched eggs collected at Lyman Mill Pond.	All samples (except nestling liver and 8 out of the 36 nestlings) were analyzed for dioxins/furans, and HCX. Ten percent of all samples (except nestling liver) were also analyzed for approximately 130+ PCB congeners. A subset of samples (except nestling liver) were also analyzed for PCB Aroclor, chlorinated pesticides and lipid content. Nestling liver samples were analyzed for metals and methyl mercury.	Swallows analyzed to provide an indicator of the quality of the river system.	*Post Third Party Validation, Task 22A Tree Swallow Chemistry Data Report* (Battelle, 2002b)
Summer 2001	At the completion of the Early Life Stage (ELS) test, 39 ELS egg and 14 catfish fry samples were collected for chemical analysis.	Dioxins/furans, PCBs 77 and 126, and lipid content	Assess risk to demersal, omnivorous fish from contaminants associated with sediments from Allendale and Lyman Mill Ponds and the Woonasquatucket River. Results from the ELS study used to support the BERA.	*Post Third Party Validation, ELS Egg and Catfish Fry Chemistry Data Report* (Battelle, 2002a)
Summer 2002	Tree swallow samples collected by USGS at four locations: • 4 unhatched eggs and 1 nestling collected at Greystone Mill Pond. • 7 unhatched eggs collected at the Woonasquatucket Reservoir in Smithfield, RI. • 5 unhatched eggs collected at Allendale Pond. • 3 unhatched eggs collected at Lyman Mill Pond.	Dioxin/furans	Swallows analyzed to provide an indicator of the quality of the river system.	*Post Third Party Validation, Task 22H Tree Swallow Chemistry Data Report* (Battelle, 2003d)

Table 2-1. (continued).

Date	Description	Testing Parameters	Original Use of Data	Reference
October-November, 2002	27 surface and subsurface soil samples were collected from the tailrace on the east side of the source area	26 out of 27 samples analyzed for dioxin/furans and HCX; 2 samples also analyzed for PCBs, pesticides, SVOCs, metals, methyl mercury, TOC and grain size distribution	Performed in support of the RI to better define the distribution and extent of dioxin contamination, and screen for the presence of other site-related contaminants.	*Data Summary Report, Interim Data Collection for the RI/FS* (Battelle, 2003a)
	Groundwater samples collected from 33 existing monitoring wells located in the source area	VOCs (Well MW-05S also sampled for dioxin/furans)	Performed to evaluate temporal trends in contaminant concentrations in support of the RI.	*Data Summary Report, Interim Data Collection for the RI/FS* (Battelle, 2003a)
	3 surface soil samples collected from the John E. Fogarty Center near Lyman Mill Dam	Dioxin/furans, HCX, PCBs, pesticides, SVOCs, metals, methyl mercury, TOC and grain size distribution	John E. Fogarty Center data collected to support human health risk assessment.	*Data Summary Report, Interim Data Collection for the RI/FS* (Battelle, 2003a)
Summer 2003	Tree swallow samples collected by USGS at four locations: • 1 unhatched egg collected at Greystone Mill Pond (upstream of site) and Firestation (Smithfield, RI). • 2 unhatched eggs collected at Allendale Pond, downstream of the site. • 4 unhatched eggs, 4 nestling, and 1 diet collected at Manton Pond, downstream of Lyman Mill Dam.	Dioxin/furans	Swallows analyzed to provide an indicator of the quality of the river system.	*Post Third Party Validation, Task 221 Tree Swallow Chemistry Data Report* (Battelle, 2004b)
Fall 2002	U.S. EPA Environmental Response Team (ERT) conducted waterborne geophysical surveys at Allendale and Lyman Mill Ponds. Two geophysical methods were attempted: GPR imaging and acoustic sub-bottom profiling. The sub-bottom profiling was unsuccessful due to heavy vegetation and gas bubbles on the pond bottoms.	GPR was used to map soft sediment thickness in both of the ponds. Bathymetric data also were collected.	Data used in conjunction with the results of the geomorphology investigation (2002) to target depositional areas for a sediment coring study.	*Waterborne Geophysical Surveys and Sediment Coring, Centredale Manor Site* (Lockheed Martin, 2003)

Table 2-1. (continued).

Date	Media/Collected By	Testing Parameters	Original Use of Data	Reference
2002	The USACE Environmental Research and Development Center (ERDC) conducted a geomorphology investigation of the Woonasquatucket River	Aerial photographs and maps from different time periods were examined for identification and comparison of geomorphic features (e.g., floodplains, terraces, abandoned channels) and processes over time. Field mapping supported map and photo analysis.	The identification of landforms and processes used to plan future sampling operations by delineating those areas most likely to enhance contaminant concentration and migration.	*Geomorphic Assessment of the Woonasquatucket River* (USACE/ERDC, 2004)
May, 2003	U.S. EPA ERT and USACE ERDC conducted a joint sediment characterization study at Allendale and Lyman Mill Ponds. 20 sediment vibracores were collected from Allendale Pond, 10 sediment vibracores from Lyman Mill, and 6 hand-push cores were collected from the forested wetland south of Allendale Dam	Geologic characteristics of sediment cores were logged. Samples from various depth intervals were analyzed for radioisotopes (^{210}Pb and ^{137}Cs), TOC, dioxin/furans, and geotechnical parameters, (water content, specific gravity, Atterberg Limits, grain size, and moisture, ash and organic matter)	Identify the sediment depth associated with the onset of waste-related activities at the site. Identify any relationships between sediment depth, age, and dioxin (2,3,7,8-TCDD) concentration. Estimate the rate of sediment accumulation in depositional areas and assess the degree to which natural recovery (i.e., burial) appears to be occurring.	*Chemistry Data Report, Task RI-8 Sediment Investigation* (Battelle, 2004c)
Summer 2004	Sediment stability evaluation at Allendale and Lyman Mill Ponds	N/A	Existing data were analyzed to develop a CSM for sediment transport. A hydrodynamic model was developed to evaluate the potential impacts of 5-, 10-, 25-, 50-, and 100-year floods on bed stability, and to identify areas of potential scour during flood events.	*Draft Technical Memorandum, Sediment Stability Study, Centredale Manor Restoration Project Superfund Site.* (QEA, 2004a)

Table 2-1. (continued).

Date	Description	Testing Parameters	Original Use of Data	Reference
Summer 2004	7 surface sediment samples were collected from the Oxbow area (forested wetland located southwest of Allendale Dam)	All samples were analyzed for dioxin/furans; approximately half of the samples were analyzed for PCBs, pesticides, metals, and TOC	Performed in support of the RI.	*Final Work Plan, Sediment Sample Collection and Analysis at the Oxbow Area, Centredale Manor Restoration Project Superfund Site.* (Battelle, 2004a)
Fall 2004	Forensic evaluation of existing sediment and soil dioxin/furan, HCX, PCB and pesticide data	N/A	Performed for the RI to support source characterization and identify potential upstream sources of dioxin contamination.	Appendix E of this document

N/A = not applicable.

Table 2-2. Monitoring Well Summary

Monitoring Well ID[1]	Screen Length (ft)	Total Depth (ft bgs)	Rationale
GEC1	10.0	14.5	North of Brook Village, 1999 UST investigation
GEC2	10.0	15.0	Brook Village parking lot, 1999 UST investigation
GEC3	10.0	15.0	
GEC4	10.0	15.0	
GEC5	10.0	15.0	
GEC6	10.0	11.0	
GEC7	10.0	12.0	
MW-01S	4.5	8.1	Former tailrace
MW-02S	4.0	8.0	Former tailrace, downgradient of bedrock valley identified in geophysical survey
MW-02M	5.0	30.0	
MW-02D	4.5	69.8	
MW-03S	5.0	8.9	Former tailrace
MW-04S	10.0	14.0	South end of Cap #1, near location of elevated VOCs measured by USGS vapor diffusion samplers
MW-04D	3.0	45.5	
MW-04B	31.0[2]	77.0	
MW-05S	5.0	8.0	Brook Village parking lot near location of high VOCs measured by USGS vapor diffusion samplers Monitoring well located just east of the former chemical manufacturing building
MW-06S	4.0	9.0	In areas of ground disturbance noted in historical aerial photographs and near geophysical anomalies
MW-07S	4.0	7.8	
MW-07D	5.0	58.0	
MW-08S	5.0	8.5	
MW-09S	5.0	10.0	
MW-10D	5.0	45.0	Well clusters around perimeter of site
MW-10B	24.5[2]	85.0	
MW-11S	5.0	25.0	
MW-11M	6.0	42.0	
MW-11B	30.0[2]	89.5	
MW-12D	5.0	44.0	
MW-12B	50.0[2]	102.5	
MW-13S	10.0	14.0	
MW-13D	6.3	45.5	
MW-13B	30.0[2]	80.0	
MW-14M	5.0	34.0	Downgradient of hotspot identified near Well MW-05S, clustered with Well GEC-6
MW-15D	5.0	53.1	Downgradient of former mill complex, clustered with Well GEC-2

1 All wells installed by TTNUS (TTNUS, 2002) except for GEC1 – GEC7 (GEC, 1999).
2 No screen; value is length of open bedrock hole.

Table 3-1. Flood Frequency Data

Flood Return Period (years)	Flow Rate (cfs)
5	894
10	1,111
25	1,398
50	1,621
100	1,850

From QEA (2004a).

Table 3-2. Summary of Aquifer Characteristics

Characteristic	Shallow Overburden (0-14 ft bgs)	Deep Overburden (23-70 ft bgs)	Bedrock
Range of hydraulic conductivity (ft/day)	4 - 55	10 - 190	0.2 – 18.8
Average hydraulic conductivity (ft/day)	23	58	7
Horizontal hydraulic gradient	0.0032	0.0033	0.0038
Effective porosity[(a)]	0.35	0.35	0.001
Average groundwater velocity (ft/day)	0.21	0.55	27

(a) From Dominico and Schwartz (1998).

Table 3-3. Estimated Sedimentation Rates

Pond	Boring ID	Sedimentation Rate (cm/yr)	Sedimentation Rate Range (cm/yr)	
		^{210}Pb Analysis	^{210}Pb Analysis	^{137}Cs Analysis
Allendale Pond	CMS-SD-4204	0.17	0.11 – 0.30	0.33 – 0.52
	CMS-SD-4206	0.24	0.20 – 0.31	NA
	CMS-SD-4209	0.65	0.63 – 0.96	0.48 – 1.04
	CMS-SD-4210	2.8	1.55 – 7.29	0.56 – 1.12
	CMS-SD-4212	0.34	0.26 – 0.45	0.26 – 0.52
	CMS-SD-4213	0.43	0.53 – 0.59	0.56 – 0.82
	CMS-SD-4218	0.68	0.53 – 0.84	0.67 – 1.04
	CMS-SD-4219	0.90	0.58 – 1.41	NA
	CMS-SD-4222	0.76	0.73 – 1.02	0.33 – 0.74
Lyman Mill Pond	LPX-SD-4201	0.30	0.26 – 0.35	0.11 – 0.45

NA = not analyzed due to non-interpretable ^{137}Cs profile.
From QEA (2004a).

Table 4-1. Number of Samples Currently in the CMRP Database for each Chemical Class

RI Sample Group and Media	Number of Samples Currently in Database for each Chemical Class											
	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals Dissolved	Dioxins[a]	AVS/ SEM	GS	TOC	Ancillary[b]
Soil												
Source Area	146	154	74	148	423	146	N/A	763	7	9	15	9
Allendale	2	5	2	5	5	3	N/A	68	0	0	2	0
Lyman Mill	0	41	0	41	41	41	N/A	143	0	7	7	7
Groundwater												
Source Area	88	48	0	41	45	50	41	43	0	0	41	41
Sediment												
Upstream	0	24	0	30	30	22	N/A	28	9	13	22	13
Allendale	2	88	2	98	148	90	N/A	296	29	58	133	53
Oxbow Area	0	0	0	4	4	5	N/A	9	0	0	4	0
Lyman Mill	0	60	0	66	66	59	N/A	84	27	39	70	44
Assapumpset	0	5	0	6	6	6	N/A	5	6	6	6	6
Manton	0	13	0	13	13	13	N/A	13	10	10	12	10
Downstream of Manton	0	15	0	15	16	6	N/A	16	3	3	15	3
Surface Water												
Upstream	2	5	0	5	5	6	5	3	0	0	2	3
Source Area	0	5	0	5	5	5	5	4	0	0	0	0
Allendale	4	20	0	20	20	20	18	16	0	0	4	5
Lyman Mill	3	20	0	20	20	21	19	17	0	0	3	4
Assapumpset	1	2	0	2	2	2	2	1	0	0	1	1
Manton	0	0	0	0	0	0	0	0	0	0	0	2
Downstream of Manton	0	0	0	0	0	0	0	0	0	0	0	3

[a] Selected samples analyzed for 2,3,7,8-TCDD only.

[b] Ancillary parameters varied. For surface waters, ancillary parameters generally included temperature, pH, nutrients, total suspended solids, biochemical oxygen demand, and hardness. For groundwater, ancillary parameters generally included alkalinity and sulfide. For soils, ancillary parameters generally included percent solids, specific gravity, and water content. For sediments, ancillary parameters generally included Atterberg Limits, percent moisture, organic matter and ash, percent solids, specific gravity, and water content.

Table 4-2. Permitted Discharges to the Woonasquatucket River Upstream of the CMRP Site

Facility Name and Location	Permit Status	Type of Discharge	Monitoring Requirements
Benny's Inc., Esmond	Inactive 5/26/95	Non-contact cooling water	Temperature, pH, flow
Gregory Rubano, Smthfield	Inactive 6/1/99	Not available	PAHs
Induplate, LLC, North Providence	Active	Non-contact cooling water	Temperature, pH, flow, pH change
K&R Auto Salvage, North Providence	Active	Stormwater runoff	BOD (5-day), pH, total suspended solids, oil and grease, COD
Mine Safety Appliances, Esmond	Inactive 12/1/97	Process water	Temperature, pH, total suspended solids, flow
Smithfield Sewer Authority, Esmond	Active	Secondary treatment discharge	Acute and chronic toxicity (ceriodaphnia), BOD (5-day), pH, total suspended solids, settleable solids, oil and grease, total ammonia (as N), nitrite plus nitrate, total phosphorus, total cyanide, total metals (cadmium, copper, lead, silver, zinc), flow, total residual chlorine, fecal coliform, BOD (5-day carbonaceous)
Worcester Textile Company, Centredale	Active	Boiler blowdown	Temperature, pH, flow

BOD = biological oxygen demand.
COD = chemical oxygen demand.

Table 4-3. Summary of Chemical Concentrations in Source Area Soil Samples

Substance	Minimum Concentration	Maximum Detected Concentration	Geometric Mean Concentration [a]	RIDEM Residential Direct Exposure Criteria	No. Source Area Vadose Zone Sample Results [b]	No. Detected Vadose Zone Results > Criterion [c]
Dioxin (ng/kg)						
Dioxin TEQ [d]	0.000079	140000	118	1,000	690	155
Volatile Organic Compounds (mg/kg)						
Benzene	0.0003	480	-	2.5	93	7
Chlorobenzene	0.0004	1000	-	210	90	4
Dichloroethane (1,2-)	0.0002	1.7	-	0.9	87	1
Ethyl benzene	0.0003	81	-	71	90	1
Tetrachloroethene (PCE)	0.0002	1700	-	12	91	6
Toluene	0.0003	430	-	190	90	1
Trichloroethene (TCE)	0.0002	2400	-	13	90	4
Vinyl chloride	0.0006	2.3	-	0.02	89	6
Xylenes (Total)	0.0009	380	-	110	85	3
Semivolatile Organic Compounds (mg/kg)						
Benzo(a)anthracene	0.0060	8.5	0.22	0.9	122	40
Benzo(a)pyrene	0.0060	8.9	0.25	0.4	118	63
Benzo(b)fluoranthene	0.0235	10.0	0.30	0.9	122	46
Benzo(g,h,i)perylene	0.0041	5.3	-	0.8	122	23
Benzo(k)fluoranthene	0.0099	8.8	-	0.9	122	25
Chrysene	0.0045	11.0	0.27	0.4	124	75
Dibenzo(a,h)anthracene	0.0048	2.2	-	0.4	121	12
Dichlorobenzene, 1,2- (o-DCB)	0.0005	2800	-	510	165	2
Dichlorobenzene, 1,4- (p-DCB)	0.0006	40	-	27	165	3
Fluoranthene	0.0235	24	0.46	20	124	1
Indeno(1,2,3-cd)pyrene	0.0055	5.3	-	0.9	122	23
Naphthalene	0.0021	84	-	54	176	1
Pentachlorophenol	0.0110	18	-	5.3	123	1
Pyrene	0.0235	23	0.47	13	124	4
Trichlorobenzene, 1,2,4-	0.0003	340	-	96	164	2
Pesticides/PCBs (mg/kg)						
Dieldrin	0.0002	9.9	0.0009	0.04	122	4
PCBs (Total Aroclor)	0.0074	1300	0.29	10	313	56
Inorganics (mg/kg)						
Antimony	0.08	27.8	-	10	108	5
Arsenic	0.27	49.3	3.40	7.0	116	26
Beryllium	0.03	3.90	0.41	0.4	114	62
Cadmium	0.03	180	0.32	39	115	1
Lead	2.2	3160	53.8	150	116	40
Manganese	35.7	6420	194	390	115	19
Thallium	0.16	13.4	-	5.5	114	6

(a) The mean concentration was not calculated in cases where the detection frequency was less than 50%.

(b) Vadose zone represented by 0-5 ft interval; some boring locations have more than one sample in this interval.

(c) Some boring locations have more than one detected result exceeding the RIDEM residential direct exposure criteria in the 0-5 ft interval. Non-detected values with detection limits above the criterion are not included in this total.

(d) No residential direct exposure criterion for dioxin is available; criterion is preliminary remediation goal (PRG) for residential surface soil (U.S. EPA, 1998a).

Table 4-4. Boring Locations Where VOC Concentrations in Source Area Vadose Zone Soil Samples Exceed GB Leachability Criteria

Boring ID	Top of Sample (ft bgs)	Bottom of Sample (ft bgs)	Sample ID	Parameter	Result (mg/kg)		GB Leachability Criteria (mg/kg)
CMS-060	0	1	GP09-FD	Tetrachloroethene	63	J	4.2
CMS-060	1	2	CMS-060-B	Tetrachloroethene	25	J	4.2
CMS-405	1	2	CMS-405-B	Benzene	140	J	4.3
CMS-405	1	2	GP04-FD	Benzene	83	J	4.3
CMS-405	2	3	CMS-405-C	Benzene	27	J	4.3
CMS-405	3	4	CMS-405-D	Benzene	130	J	4.3
CMS-405	4	5	CMS-405-E	Benzene	66	J	4.3
CMS-408	1	2	CMS-408-B	Benzene	160		4.3
CMS-408	2	3	CMS-408-C	Benzene	480		4.3
CMS-417	0	1	CMS-417-A	Chlorobenzene	360		100
CMS-417	0	1	CMS-417-A	Cis-1,2-dichloroethene	180		60
CMS-417	0	1	CMS-417-A	Tetrachloroethene	820		4.2
CMS-417	0	1	CMS-417-A	Toluene	140		54
CMS-417	0	1	CMS-417-A	Trichloroethene	630		20
CMS-417	1	2	CMS-417-B	Chlorobenzene	1000		100
CMS-417	1	2	CMS-417-B	Cis-1,2-dichloroethene	500		60
CMS-417	1	2	CMS-417-B	Ethylbenzene	81	J	62
CMS-417	1	2	CMS-417-B	Tetrachloroethene	1700		4.2
CMS-417	1	2	CMS-417-B	Toluene	430		54
CMS-417	1	2	CMS-417-B	Trichloroethene	2400		20
CMS-417	2	3	CMS-417-C	Chlorobenzene	220		100
CMS-417	2	3	CMS-417-C	Cis-1,2-dichloroethene	490		60
CMS-417	2	3	CMS-417-C	Tetrachloroethene	9.4	J	4.2
CMS-417	2	3	CMS-417-C	Toluene	110		54
CMS-417	2	3	CMS-417-C	Trichloroethene	34		20
CMS-419	1	2	CMS-419-B	Chlorobenzene	300		100
CMS-419	1	2	CMS-419-B	Cis-1,2-dichloroethene	73		60
CMS-419	1	2	CMS-419-B	Ethylbenzene	68		62
CMS-419	1	2	CMS-419-B	Tetrachloroethene	40		4.2
CMS-419	1	2	CMS-419-B	Toluene	75		54
MW-05S	4	6	CM-SO-MW05-0406	Tetrachloroethene	300	*J	4.2
MW-05S	4	6	CM-SO-MW05-0406	Trichloroethene	26	*J	20

J Estimated value

* From dilution analysis

Table 4-5. Vertical Distribution of Selected VOCs in Source Area Vadose Zone Soil Samples

Boring	Top of sample (ft)	Bottom of sample (ft)	Chlorobenzene (mg/kg)		Tetrachloroethene (mg/kg)		Total Xylenes (mg/kg)		Trichloroethene (mg/kg)	
CMS-417	0	1	360		820		160	J	630	
CMS-417	1	2	1000		1700		380	J	2400	
CMS-417	2	3	220		9.4	J	19	J	34	
CMS-417	3	4	10		0.12	J	2.3	J	0.58	
CMS-419	1	2	300		40		250		16	J
CMS-419	3	4	0.95		0.32	U	0.51		0.32	U
CMS-419	5	6	0.018		0.0048	U	0.0033		0.0048	U
CMS-419	7	8	0.077		0.0047	U	0.085		0.0014	J
MW-05S	1	2	0.11	U	0.11	U	0.11	U	0.11	U
MW-05S	2	4	0.10	U	0.23		0.10	U	0.97	
MW-05S	4	6	0.13	J	300		2.5	J	26	*J
MW-05S	8	10	0.09	U	9		0.043	J	0.29	
MW-05S	10	12	0.10	U	12		0.088	J	0.30	

Table 4-6. Summary of PCB Aroclor Concentrations in Source Area Soil Samples

Parameter	No. Samples	No. Detections	Concentration (mg/kg)			
			Minimum	Maximum Detected	Geometric Mean [a]	Location of Maximum
Aroclor 1016	420	5	0.0024	1.4	-	MW-06S 2-4 ft
Aroclor 1221	420	0	0.0021	-	-	-
Aroclor 1232	420	5	0.0014	250	-	CMS-417 0-1 ft
Aroclor 1242	421	15	0.0046	230	-	CMS-410 0-1 ft
Aroclor 1248	420	39	0.0011	420	-	CMS-402 2-3 ft
Aroclor 1254	425	297	0.0013	1300	0.23	CMS-147 2-3 ft
Aroclor 1260	424	12	0.0024	1.70	-	MW-06S 2-4 ft
Aroclor 1268	2	2	2.01	4.35	3.18	CMS-4105 0-1 ft

(a) The mean concentration was not calculated in cases where the detection frequency was less than 50%.

Table 4-7. Comparison of Groundwater VOC Concentrations to GB Objectives

Well ID	Parameter	Spring 2001 (µg/L)	Summer 2001 (µg/L)	Fall 2002 (µg/L)	Fall 2002 Field Duplicate Sample (µg/L)	GB Groundwater Objective[a] (µg/L)	Exceeds GB Groundwater Objective[b]
GEC-4	cis-1,2-Dichloroethene	1 U		2.8		2400	
GEC-5	cis-1,2-Dichloroethene	38 U		21		2400	
GEC-5	Tetrachloroethene (PCE)	2.2		0.86 J		150	
GEC-5	Trichloroethene (TCE)	1.3		0.62 J		540	
GEC-6	Chlorobenzene		10 U	1.5		3200	
GEC-6	cis-1,2-Dichloroethene	10 U	18	5.6		2400	
GEC-6	Tetrachloroethene (PCE)	150	200 *	11		150	
GEC-6	Trichloroethene (TCE)	1 U	10 U	0.74 J		540	
GEC-7	Benzene	1.3		1 U		140	
GEC-7	cis-1,2-Dichloroethene	5.6 U		0.48 J		2400	
GEC-7	Tetrachloroethene (PCE)	11		0.21 J		150	
GEC-7	Trichloroethene (TCE)	2		1 U		540	
MW-02D	cis-1,2-Dichloroethene		2 J	12		2400	
MW-02D	Tetrachloroethene (PCE)		700 *	73		150	
MW-02D	Toluene		10 U	1.8 J		1700	
MW-02D	Trichloroethene (TCE)		27	4.2		540	
MW-02M	Tetrachloroethene (PCE)		110	110		150	
MW-02M	Trichloroethene (TCE)		2 J	1.1 J		540	
MW-02S	Benzene	10 U	1 J	1 U		140	
MW-02S	Chlorobenzene	10 U	1 J	2.1		3200	
MW-04B	Tetrachloroethene (PCE)		63	17		150	
MW-04B	Trichloroethene (TCE)		0.9 J	0.39 J		540	
MW-04D	Tetrachloroethene (PCE)		64	27		150	
MW-04D	Trichloroethene (TCE)		1 J	0.46 J		540	
MW-04S	Benzene		2 J	1 U		140	
MW-04S	Chlorobenzene		5 J	2.1		3200	
MW-04S	cis-1,2-Dichloroethene		7 J	5.9		2400	
MW-04S	Tetrachloroethene (PCE)		17 U	4.4		150	
MW-04S	Trichloroethene (TCE)		0.8 J	3.2		540	
MW-05S	cis-1,2-Dichloroethene		1200 J	1600 J	520 J	2400	
MW-05S	Tetrachloroethene (PCE)		61000 *	28000	37000	150	Yes
MW-05S	Trichloroethene (TCE)		2500	1800	2200	540	Yes
MW-06S	Benzene	5 J	6 J	6.8 J	11	140	
MW-06S	Chlorobenzene	100	58	160	190	3200	
MW-06S	cis-1,2-Dichloroethene	4 J	4 J	2.8 J	10 U	2400	
MW-06S	Ethylbenzene	7 J	10 U	1.2 J	2.7 J	1600	
MW-06S	Toluene	5 J	10 U	3.3 J	10 U	1700	
MW-06S	Trichloroethene (TCE)	10 U	0.9 J	6 U	10 U	540	
MW-07D	Tetrachloroethene (PCE)		10 U	10		150	
MW-07D	Trichloroethene (TCE)		10 U	0.31 J		540	
MW-07S	1,2-Dibromo-3-chloropropane	10 U	7 J	1 U		2	
MW-08S	Benzene	6 J	4 J	12 J		140	
MW-08S	Chlorobenzene	10	40	25		3200	
MW-08S	cis-1,2-Dichloroethene	10 U	10 U	9.3		2400	
MW-08S	Ethylbenzene	1 J	10 U	2.7 J		1600	
MW-08S	Toluene	1 J	10 U	0.98 J		1700	
MW-08S	trans-1,2-Dichloroethene	10 U	10 UJ	3 U		2800	
MW-08S	Trichloroethene (TCE)	10 U	10 U	2.8 J		540	
MW-09S	Benzene	1 J	21	9.7		140	
MW-09S	Chlorobenzene	1 J	10 U	3.4		3200	
MW-09S	cis-1,2-Dichloroethene	2 J	12	14		2400	
MW-09S	Tetrachloroethene (PCE)	2 J	21 U	3.3		150	
MW-09S	Trichloroethene (TCE)	10 U	1 J	0.72 J		540	

Table 4-7. (continued)

Well ID	Parameter	Spring 2001 (µg/L)	Summer 2001 (µg/L)	Fall 2002 (µg/L)	Fall 2002 Field Duplicate Sample (µg/L)	GB Groundwater Objective[a] (µg/L)	Exceeds GB Groundwater Objective[b]
MW-10B	Tetrachloroethene (PCE)		10 U	0.25 J		150	
MW-10D	Tetrachloroethene (PCE)		10 U	0.39 J		150	
MW-12B	Tetrachloroethene (PCE)		10 U	0.89 J		150	
MW-12D	Tetrachloroethene (PCE)		18	0.64 J		150	
MW-13B	Tetrachloroethene (PCE)		220 *	96		150	
MW-13B	Trichloroethene (TCE)		7 J	5		540	
MW-13D	Tetrachloroethene (PCE)		340 *	220		150	Yes
MW-13D	Trichloroethene (TCE)		6 J	5.2 J		540	
MW-13S	Tetrachloroethene (PCE)		10 U	7.7		150	
MW-14M	Tetrachloroethene (PCE)		10 U	1900		150	Yes

J Estimated value.
U Not detected at the given detection limit.
(a) State of Rhode Island Remediation Regulations (DEM-DSR-01-93).
(b) Evaluation against GB Groundwater Objectives conducted using fall 2002 data only.
* From dilution analysis.

Table 4-8. Chemicals of Concern in Sediment Based on BERA and BHHRA Results

Ecological Chemicals of Concern	Human Health Chemicals of Concern
Allendale Reach	**Allendale Reach**
Dioxins and furans	Dioxins and furans
Coplanar PCBs	Coplanar PCBs
Aroclor 1254	Aroclor 1254
Total Aroclors	Aroclor 1268
Technical chlordane	Dieldrin
Selenium	Technical chlordane
Zinc	Benzo(a)pyrene
	Dibenzo(a,h)anthracene
	Arsenic
Lyman Mill Reach	**Lyman Mill Reach**
Dioxins and furans	Dioxins and furans
Coplanar PCBs	Coplanar PCBs
Aroclor 1254	Aroclor 1254
Total Aroclors	Aroclor 1268
4,4′-DDD	Dieldrin
4,4′-DDE	Technical chlordane
Technical chlordane	Benzo(a)pyrene
Aluminum	Dibenzo(a,h)anthracene
Arsenic	n-nitroso-di-n-propylamine
Barium	Arsenic
Cadmium	
Selenium	
Vanadium	
Zinc	
Manton Reach	**Manton Reach**
Dioxins and furans	Dioxins and furans
Coplanar PCBs	Aroclor 1254
Total Aroclors	Aroclor 1268
4,4′-DDE	4,4′-DDE
Technical chlordane	Dieldrin
Aluminum	Technical chlordane
Barium	Methylmercury
Vanadium	
Dyerville Reach [a]	**Dyerville Reach** [a]
Dioxins and furans	Dioxins and furans
Coplanar PCBs	Aroclor 1254
Aroclor 1254	Dieldrin
Total Aroclors	Technical chlordane
4,4′-DDD	Benzo(a)pyrene
4,4′-DDE	
Zinc	

(a) The downstream extent of the Dyerville exposure area for the BERA and BHHRA is the location of the former Dyerville Dam; for the purposes of the RI, all sample results for the Woonasquatucket River downstream of the Manton Dam were grouped together.

Table 4-9. Summary of Chemical Concentrations in Sediment

PARAMETER	Allendale Sediment			Oxbow Area Floodplain Soil			Lyman Mill Sediment			Manton Sediment			Downstream of Manton Sediment			Upstream Sediment (Background)			Assapumpset Sediment (Reference)		
	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]	Minimum	Maximum Detected	Geometric Mean [a]
Dioxins/Furans/HCX (ng/kg)																					
TEQ	0.52	110000	972	347	4291	995	0.89	8030	491	16.3	2670	191	19.2	471	95.1	2.30	179	21.0	0.085	7.36	**3.29**
Semivolatile Organic Compounds (mg/kg)																					
Benzo(a)pyrene	0.012	9.62	0.72	NA	NA	NA	0.012	7.04	0.53	0.032	15.0	0.95	0.063	4.20	0.85	0.10	6.20	*2.20*	0.22	0.84	0.50
Dibenz(a,h)anthracene	0.016	2.60	-	NA	NA	NA	0.016	1.24	-	0.078	1.30	0.14	0.038	0.68	0.16	0.016	0.88	*0.45*	0.10	0.18	0.12
n-nitroso-di-n-propylamine	0.023	NA	-	NA	NA	NA	0.0083	NA	-	0.20	1.40	-	0.20	NA	-	0.023	NA	-	0.023	NA	-
PCBs and Pesticides (mg/kg)																					
PCB TEQ	0.00015	0.00015	*0.00015*	NA	NA	NA	0.000017	0.000065	*0.000019*	NA	NA	NA	NA	NA	NA	0.000025	0.000037	*0.000031*	NA	NA	NA
Aroclor-1254	0.0006	28.0	0.27	0.0085	3.58	**1.10**	0.0006	2.60	0.085	0.0013	2.20	-	0.0013	1.30	-	0.0006	7.80	0.11	0.0006	0.058	-
Aroclor-1268	0.034	0.16	0.067	0.0081	0.10	-	0.035	0.31	0.085	0.016	0.017	*0.017*	0.12	0.12	-	0.022	0.25	0.081	0.0046	0.042	*0.023*
Total Aroclor	0.0006	28.0	0.27	0.10	3.58	*0.41*	0.0006	2.92	0.084	0.20	0.39	*0.23*	0.042	1.42	-	0.0006	7.80	*0.17*	0.0006	0.099	*0.028*
4,4'-DDD	0.00002	0.040	-	0.0025	0.027	*0.0067*	0.0002	0.050	-	0.0001	0.052	-	0.0001	0.092	0.0018	0.0002	0.019	*0.0020*	0.0001	0.0032	-
4,4'-DDE	0.00007	0.23	-	0.0025	0.042	*0.0063*	0.0001	0.043	-	0.0001	0.048	-	0.0001	0.012	0.0017	0.0001	0.031	-	0.0001	0.0055	-
4,4'-DDT	0.0002	0.030	-	0.0001	0.003	-	0.0002	0.039	-	0.0001	NA	-	0.0001	0.52	0.0041	0.0002	0.053	-	0.0001	0.0090	-
Dieldrin	0.0001	0.17	-	0.0001	0.063	**0.017**	0.0001	0.017	-	0.0001	NA	-	0.0001	0.030	-	0.0001	0.0094	-	0.0001	0.0019	-
Technical Chlordane	0.0005	0.97	*0.028*	0.0081	0.030	-	0.017	2.21	**1.15**	NA	NA	-	NA	NA	-	0.15	0.74	0.37	0.064	0.15	*0.11*
Inorganics (mg/kg)																					
Aluminum	1790	22168	**8990**	NA	NA	NA	1690	27773	7892	1800	10700	3932	3000	10700	4840	1880	24690	7348	2980	21774	7593
Arsenic	0.31	18.0	3.03	0.18	12.8	2.91	0.27	14.8	4.24	0.60	13.7	1.66	1.20	6.30	-	0.36	13.5	3.83	0.24	5.21	**2.65**
Barium	0.40	326	**110**	163	514	248	10.0	380	81.3	16.3	155	48.6	31.7	228	93.9	7.60	375	**160**	26.4	204	71.9
Cadmium	0.030	5.50	-	0.0075	8.25	**2.61**	0.025	7.00	0.75	0.11	23.9	0.83	0.29	95.1	-	0.030	4.35	*0.71*	0.065	0.86	-
Mercury	0.0061	3.60	0.11	NA	NA	NA	0.0050	1.20	0.16	0.0050	0.31	-	0.0050	1.06	-	0.010	0.81	0.15	0.0050	0.11	-
Methylmercury	0.0002	0.0029	0.0006	NA	NA	NA	0.0003	0.0096	0.0009	NA	NA	NA	NA	NA	NA	0.00008	0.0008	0.0003	0.0003	0.0009	*0.0006*
Selenium	0.30	4.70	-	0.21	2.22	**1.52**	0.24	4.50	-	0.23	2.90	-	0.24	NA	-	0.38	3.60	0.91	0.23	2.20	-
Vanadium	4.85	111	24.7	31.8	71.1	**53.8**	4.00	91.7	27.9	4.80	44.4	11.6	8.90	28.4	13.1	6.80	159	39.8	5.80	32.0	**17.0**
Zinc	0.26	2088	**299**	58.3	1867	240	15.4	2060	232	14.2	1050	107	55.9	1930	355	11.4	856	175	28.0	227	79.4

(a) Central tendency not determined for analytes with less than 50% detected results, as indicated by a dash.
Bold = arithmetic mean (data normally distributed)
Italics = median (data not lognormally or normally distributed)
Yellow shaded cells indicate that mean concentration is significantly higher than background. Oxbow area floodplain soil data were not statistically compared to background data.
Blue shaded cells indicate that mean concentration is significantly lower than background. Oxbow area floodplain soils were not statistically compared to background data.

Table 4-10. Summary of Chlorinated Organic Analyte Concentrations by Location

Parameter	Source Area Soil [a]			Allendale Sediment				Allendale Soil [a]				Lyman Mill Sediment				Lyman Mill Soil [a]				Manton Sediment				Downstream Sediment				(Reference) Assapumpset Sediment				(Background) Upstream Sediment			
	n	% Det	Median[b]	n	% Det	Median[b]	PH[b]	n	% Det	Median[b]		n	% Det	Median[b]	PH[b]	n	% Det	Median[b]		n	% Det	Median[b]	PH[b]	n	% Det	Median[b]	PH[b]	n	% Det	Median[b]	PH[b]	n	% Det	Median[b]
Polychlorinated Dibenzodioxins (PCDDs ng/kg dry)																																		
1,2,4,5,7,8-hexachloro(9h)xanthene	75	89	126	74	89	678	**H**	9	44	2.28		63	79	549	**H**	112	42	8.77		10	100	259	**H**	15	60	345	**H**	3	33	17.2	NA	28	50	135
2,3,7,8-TCDD	744	69	101	296	97	1590	**H**	50	86	22.4		82	99	718	**H**	127	87	6.3		13	100	190	**H**	15	93	120	**H**	5	60	3.4	NA	27	52	2.1
1,2,3,7,8-PeCDD	113	63	1.1	148	73	6.3	-	33	48	1.1		75	79	4.75	-	117	56	1.1		13	62	2.16	-	15	40	1.6	-	5	20	1.1	NA	27	56	2.66
1,2,3,7,8,9-HxCDD	113	73	2.58	149	83	21.7	-	33	67	1.46		75	83	11.8	-	117	63	2.3		13	92	8.1	-	15	87	5.2	-	5	20	2.3	NA	28	79	15.9
1,2,3,6,7,8-HxCDD	113	79	3.32	148	80	27.2	-	33	64	2.04		73	90	15.7	-	117	64	1.9		13	92	12.2	-	13	92	6.95	-	5	40	3.04	NA	26	92	15.2
1,2,3,4,7,8-HxCDD	113	65	0.89	149	72	8.95	-	33	79	1.13		75	73	4.2	-	117	64	1.15		13	62	4.85	-	15	40	1.4	L	5	20	1.15	NA	28	71	4.15
1,2,3,4,6,7,8-HpCDD	113	90	56.8	149	90	286	-	33	97	32.5		75	81	375	-	117	91	30.2		13	100	161	-	15	60	130	-	5	80	7.7	NA	28	75	195
OCDD	113	94	431	149	93	1620	-	33	100	256		75	84	1980	-	117	97	202		13	100	522	-	15	40	652	-	5	60	181	NA	28	71	788
Polychlorinated Dibenzofurans (PCDFs ng/kg dry)																																		
2,3,7,8-TCDF	113	85	3.43	149	89	14.5	-	33	88	3.4		75	87	11.9	-	117	68	2.8		13	77	11.2	-	15	80	5.83	-	5	60	0.605	NA	28	82	6.84
2,3,4,7,8-PeCDF	113	79	2.9	149	79	10.7	-	33	82	4.12		75	81	5.89	-	117	68	1.2		13	69	6.7	-	15	73	1.63	-	5	20	2	NA	28	71	4.52
2,3,4,6,7,8-HxCDF	112	76	3.04	148	73	15.4	-	33	97	4.1		71	83	7.8	-	117	80	2.16		13	69	7	-	13	77	2.51	L	5	40	2.16	NA	26	85	7.46
1,2,3,7,8-PeCDF	106	59	1.1	145	80	5.1	-	33	79	1.76		72	83	4.5	-	117	69	1.75		13	54	3.7	-	12	67	1.91	-	5	0	3.04	NA	25	72	3.43
1,2,3,7,8,9-HxCDF	111	41	0.845	139	47	2.21	-	33	70	1.22		65	31	1.37	-	117	26	1.25		13	46	2.68	-	6	17	7.7	NA	5	20	1.25	NA	21	33	1.25
1,2,3,6,7,8-HxCDF	113	79	2.3	139	91	21.9	-	33	94	2.8		71	87	9.34	-	115	72	1.47		13	54	15.6	**H**	13	92	3.2	-	5	20	2.1	NA	24	88	13.3
1,2,3,4,7,8-HxCDF	112	83	3.76	146	84	20.9	-	33	88	2.88		71	87	16.1	-	117	63	3.08		13	62	21	**H**	12	83	4.1	-	5	20	2.5	NA	25	88	19.2
1,2,3,4,7,8,9-HpCDF	113	64	1.8	148	75	13.4	-	33	70	1.21		75	69	5.6	-	117	62	1.7		13	62	5.69	-	15	33	1.39	L	5	40	1.7	NA	28	79	4.77
1,2,3,4,6,7,8-HpCDF	113	88	13.7	146	95	190	-	33	100	15.2		75	89	123	-	117	84	11.5		13	100	50.6	-	15	73	28.4	L	5	60	8.02	NA	28	96	122
OCDF	113	83	26.6	144	85	286	-	33	100	18.1		74	80	166	-	117	97	15.2		13	100	201	-	13	46	39.7	-	5	80	10.7	NA	28	75	114
Polychlorinated Biphenyls (PCBs ug/kg dry)																																		
Aroclor-1016	420	1	95	138	1	23	-	5	0	18.5		63	0	17.7	NA	41	0	23		13	0	5.08	NA	15	0	21.3	NA	6	0	5.08	NA	30	0	17.5
Aroclor-1221	420	0	90	138	1	41.5	-	5	0	37		63	0	18.5	-	41	0	46.5		13	0	2.11	-	15	0	43	-	6	0	2.11	NA	30	3	26
Aroclor-1232	420	1	90	138	1	23.5	-	5	0	18.5		63	0	17.7	NA	41	0	23		13	0	1.35	NA	15	0	21.3	NA	6	0	1.35	NA	30	0	17.5
Aroclor-1242	421	4	90	138	1	23	-	5	0	18.5		63	0	17.7	NA	41	2	23		13	0	4.64	NA	15	13	22.3	**H**	6	0	4.64	NA	30	0	17.5
Aroclor-1248	420	9	108	139	9	26.8	**H**	5	0	18.5		63	25	20.8	**H**	41	0	23		13	0	1.08	NA	15	0	21.3	NA	6	0	1.34	NA	30	0	17.5
Aroclor-1254	425	70	350	145	90	290	**H**	5	80	210		65	75	93	-	41	44	40		13	31	1.26	-	15	27	24	L	6	50	13.2	NA	30	67	120
Aroclor-1260	424	3	95	138	2	24	-	5	0	18.5		63	11	19	-	41	5	23		13	0	4.64	-	15	0	21.3	-	6	0	4.64	NA	30	7	18.5
Aroclor-1268	2	100	3180	12	100	62	NA	0	NA	NA		10	100	72.4	NA	8	50	14		2	100	16.5	NA	3	33	120	NA	2	100	23.1	NA	9	100	83.6
Chlorinated Pesticides (Pest ug/kg dry)																																		
4,4'-DDD	144	24	2.35	91	30	2.15	-	5	20	1.85		63	29	2	-	41	32	2.55		13	23	0.095	-	15	67	3	-	6	33	0.152	NA	30	53	2.03
4,4'-DDE	148	57	5.75	97	46	2.7	NA	4	75	1.93		63	35	1.9	NA	41	59	5.2		13	31	0.069	-	15	73	3.6	-	6	33	0.069	NA	29	45	1.9
4,4'-DDT	145	14	2.45	92	27	2.05	NA	5	20	1.85		65	32	1.9	-	41	59	5.3		13	0	0.0525	L	11	73	6.3	-	6	33	0.547	NA	30	37	2.3
Aldrin	142	14	1.2	92	1	1	-	5	0	0.95		63	2	0.95	NA	41	2	1.2		13	0	0.107	-	15	7	1.08	-	6	0	0.107	NA	30	3	0.95
alpha-BHC	144	15	1.23	92	1	1	-	5	0	0.95		63	0	0.95	NA	41	0	1.2		13	0	0.184	NA	15	0	1.1	NA	6	0	0.184	NA	30	0	0.95
beta-BHC	144	18	1.6	89	3	0.975	-	4	25	0.95		62	0	0.95	NA	41	0	1.2		13	0	0.106	NA	15	0	1.15	NA	6	0	0.106	NA	28	0	0.9
delta-BHC	143	6	1.15	93	2	1	-	4	0	0.95		59	0	0.95	-	41	0	1.2		13	0	0.0865	-	15	0	1.1	-	6	0	0.0865	NA	30	3	0.9
gamma-BHC	144	8	1.2	92	3	1	-	5	0	0.95		62	3	0.95	-	41	0	1.2		13	0	0.074	NA	15	0	1.1	NA	6	0	0.0745	NA	30	0	0.95
Dieldrin	145	53	8	92	33	2.45	**H**	3	33	0.98		63	24	2	-	41	20	2.5		13	0	0.0535	-	14	29	2.2	-	6	33	0.118	NA	30	27	2.05
Endosulfan I	143	8	1.2	92	4	1	-	4	0	0.95		59	0	0.95	-	41	0	1.2		13	15	0.0675	L	15	7	1.1	-	6	0	0.071	NA	30	3	0.9
Endosulfan II	145	12	2.3	94	32	2.15	-	4	0	1.4		63	22	2.03	-	41	15	2.36		13	15	0.056	-	15	13	2.23	-	6	0	0.067	NA	30	10	1.85
Endosulfan Sulfate	143	23	2.9	90	10	1.95	-	4	25	1.4		62	6	1.55	-	41	17	2.35		13	0	0.068	-	11	9	2.1	-	6	0	0.214	NA	29	14	1.82
Endrin	144	19	2.2	92	7	1.95	-	5	0	1.85		63	5	1.48	-	41	0	2.3		13	0	0.059	-	15	7	2.1	-	6	0	0.275	NA	30	3	1.75
Endrin Aldehyde	145	26	2.6	92	9	1.9	-	5	20	1.85		59	0	1.39	NA	41	0	2.3		13	0	0.897	NA	15	20	2.13	**H**	6	0	0.854	NA	30	0	1.7
Endrin Ketone	110	21	2.6	90	6	1.9	-	1	0	1.85		57	0	1.27	-	41	10	2.35		13	0	0.065	-	9	11	2.05	NA	6	0	0.117	NA	30	10	1.7
alpha-Chlordane	109	37	3.2	91	56	2.8	-	3	67	1		66	59	3.8	-	42	57	3.17		13	23	0.06	-	15	47	1.2	-	6	33	0.06	NA	30	63	3.3
gamma-Chlordane	108	32	2.03	91	52	2.95	-	3	0	1.1		64	52	2.8	-	42	38	2.03		13	31	0.061	-	14	14	1.1	-	6	17	0.061	NA	28	50	1.94
Technical Chlordane	52	17	47.5	25	56	28.3	NA	2	0	9		11	91	992	NA	8	100	482		2	0	NA	NA	3	0	NA	NA	2	100	108	NA	9	89	355
Heptachlor	144	9	1.2	92	8	1	**H**	4	25	0.9		63	5	0.948	-	41	7	1.25		13	0	0.13	NA	15	13	1.05	-	6	0	0.13	NA	30	0	0.95
Heptachlor Epoxide	144	12	1.18	90	4	1	-	4	25	0.95		61	3	0.95	-	41	22	1.3		13	0	0.066	-	15	13	1.08	-	6	0	0.066	NA	30	7	0.95
Methoxychlor	129	11	11	96	13	9.5	-	3	0	1.85		62	5	1.51	-	41	0	12		13	0	0.075	-	12	0	10.5	-	6	0	0.625	NA	30	3	7.3
Toxaphene	144	1	115	92	1	38.5	-	5	0	95		63	0	36.9	NA	41	0	120		13	0	125	NA	15	0	120	NA	6	0	21.5	NA	30	0	80
Totals																																		
Dioxin TEQ (ng/kg dry)	759	100	101	296	100	1600	**H**	68	100	40.1		82	100	725	**H**	143	100	15		13	100	191	**H**	15	100	132	L	5	100	3.9	NA	28	100	24.8
Aroclor, Total (TPCB ug/kg dry)	417	74	400	148	89	320	-	5	80	210		59	76	109	-	38	39	55		3	100	227	-	12	25	49.3	-	4	75	28.3	NA	30	67	169

(a) Statistical comparisons were only conducted on sediment data.

(b) *The median is the nonparametric method for estimating the central tendency of the distribution.*

(c) PH = Proportional Hazard tests sediment results against Upstream Background concentrations at the 0.05 significance level.
Statistical comparisons were only conducted for chemicals with at least 10 observations in both the upstream and the "test" location.
"H" indicates that the chemical of concern is significantly greater than Background while "L" values are significantly less than Background.
"-" indicates that there is no significant difference in the chemical of concern between the Background and the "test" location.

NA, Not applicable.

Table 4-11. Summary of TEQ Concentrations in Surface Water

Parameter	Allendale Surface Water			Lyman Mill Surface Water			Upstream Surface Water (Background)			Assapumpset Surface Water (Reference)		
	Minimum	Maximum Detected	Median	Minimum	Maximum Detected	Median	Minimum	Maximum Detected	Median	Minimum	Maximum Detected	Median
Dioxins/Furans/HCX (pg/L)												
TEQ	3.1	4090	8.1	4.7	861	10.8	0.036	0.12	0.042	ND	ND	ND

ND Not detected.

Table 5-1. Physical and Chemical Properties of Primary COCs at the CMRP Site

	2,3,7,8-TCDD[a]	Aroclor 1254[b]	Dieldrin[c]
Solubility in Water (mg/L at 25°C)	$7.9 \times 10^{-6} - 3.2 \times 10^{-4}$	0.012	0.11
Log K_{ow}	6.8 – 7.58	6.5	6.2
Log K_{oc}	No Data	No Data	6.7
Henry's Law Constant (atm-m^3/mol at 25°C)	16.1×10^{-6}-101.7×10^{-6}	2.0×10^{-3}	5.2×10^{-6}
Vapor pressure (mm Hg at 25°C)	$7.4 \times 10^{-10} - 3.4 \times 10^{-5}$	7.71×10^{-5}	5.9×10^{-6}

(a) ATSDR, 1998.
(b) ATSDR, 2000.
(c) ATSDR, 2002.

Table 5-2. Summary of Zones and Dioxin Concentrations Used in Non-Resuspending Dioxin Flux Analysis

Zone	General Description	No. Observations[a]	Average (pg/L)	Standard Deviation (pg/L)	95% CI (pg/L)
1	Upstream area	3	27	7.1	9 - 45
2	Source area and upstream portion of Allendale Pond	8	1,160	3,130	0 - 3,800
3	Downstream portion of Allendale Pond	5	28	9.9	16 - 40
4	Upstream portion of Lyman Mill Pond	9	105	99	29 - 180
5	Downstream portion of Lyman Mill Pond	5	22	14	5 - 39

Modified from QEA (2004a).
(a) October-November 1999 data (TTNUS, 2000b).

Table 5-3. Statistics for Dioxin Load in Five Zones

Zone	No. Observations[a]	Average Load (mg/day)	Standard Deviation (mg/day)	95% CI (mg/day)
1	3	4.6	1.2	1.6 - 7.6
2	8	115	310	0 - 380
3	5	6.0	2.2	3.3 - 8.7
4	9	17	18	3 - 31
5	5	4.2	2.5	1.1 - 7.3

From QEA (2004a).
(a) October-November 1999 data (TTNUS, 2000b).

Table 6-1. Assessment and Measurement Endpoints Evaluated in the BERA

Assessment Endpoint		Risk Questions		Measurement Endpoint	
1a	Protection and maintenance (i.e., survival, growth, reproduction) of aquatic invertebrate communities, which are a forage base for fish and wildlife populations	A	Do measured concentrations of COPCs in surface water exceed appropriate criteria and/or guidelines for the protection of aquatic life, with special consideration of reproduction and early lifestage survival?	A	Comparison of surface water COPC concentrations to criteria/guidelines
		B	Do measured concentrations of COPCs in whole sediment exceed appropriate guidelines for the protection of benthic macroinvertebrate populations?	B	Comparison of sediment COPC concentrations to benchmarks/guidelines
		C	Are sediments toxic to aquatic macroinvertebrates under chronic laboratory exposure conditions?	C	Site-specific whole sediment laboratory bioassays
		D	Do measured and modeled concentrations of COPCs in the tissues of aquatic macroinvertebrates (such as aquatic insects, crayfish, and molluscs) exceed benchmarks for residue effects on survival, growth or reproduction?	D	Comparison of measured COPC concentrations in aquatic macroinvertebrates to Critical Body Residues (CBRs)
		E	Do the available aquatic macroinvertebrate data indicate presence/absence of ecological integrity due to VOC discharge in riffle/run habitat adjacent to the site?	E_1	Site-specific study of aquatic macroinvertebrate community structure/function
				E_2	Site-specific study of emerging aquatic macroinvertebrate productivity
1b	Protection and maintenance (i.e., survival, growth, reproduction) of floodplain invertebrate communities, which are a forage base for wildlife populations	A	Do measured concentrations of COPCs in floodplain soil exceed appropriate guidelines for the protection of floodplain soil invertebrate populations?	A	Comparison of floodplain soil COPC concentrations to benchmarks/guidelines
		B	Do measured and modeled concentrations of COPCs in the tissues of floodplain soil invertebrates (such as earthworms) exceed benchmarks for residue effects on survival, growth or reproduction?	B	Comparison of measured site-specific COPC concentrations in floodplain soil invertebrates to CBRs
		C	Do the available floodplain soil invertebrate data indicate presence/absence of ecological integrity?	C	Site-specific study of floodplain soil invertebrate community structure/function
2	Protection and maintenance of demersal, omnivorous fish populations as a forage base or sport fishery	A	Do field surveys of demersal fish populations indicate presence/absence of ecological integrity?	A_1	Fish length-weight relationships and condition indices relative to habitat characterization
				A_2	Percent gross lesions in individual fish
				A_3	Demographic structure analysis of dominant species
				A_4	Species richness and relative abundance of ichthyoplankton
		B	Do measured and modeled concentrations of COPCs or TEQs in eggs and/or tissues of demersal, omnivorous fish (such as carps, suckers, other cyprinids, bullheads, turtles or American eel) exceed benchmarks for adverse effects on survival, growth, reproduction or embryo development?	B_1	Comparison of measured concentrations or toxic equivalencies in fish tissue to literature derived CBRs
				B_2	Comparison of modeled concentrations or toxic equivalencies in eggs and fish tissue to site-specific CBRs
				B_3	Partial life cycle laboratory bioassay using channel catfish eggs, embryos, and fry

Table 6-1. (continued)

Assessment Endpoint		Risk Questions		Measurement Endpoint	
3	Protection and maintenance of pelagic, piscivorous or semi-piscivorous fish populations as a forage base or sport fishery	A	Do field surveys of piscivorous fish populations indicate presence/absence of ecological integrity?	A_1	Fish length-weight relationships and condition indices relative to habitat characterization
				A_2	Percent gross lesions in individual fish
				A_3	Demographic structure analysis of dominant species
				A_4	Species richness and relative abundance of ichthyoplankton
		B	Do measured and modeled concentrations of COPCs or TEQs in eggs and/or tissues of pelagic, piscivorous or semi-piscivorous fish (such as sunfishes, other centrarchids, or yellow perch) exceed benchmarks for adverse effects on survival, growth, reproduction or embryo development?	B_1	Comparison of measured concentrations or toxic equivalencies in fish tissue to literature-derived CBRs
				B_2	Comparison of modeled concentrations or toxic equivalencies in eggs and fish tissue to site-specific CBRs
4	Protection and maintenance of piscivorous mammal and bird populations	A	Do ingestion doses of COPCs in piscivorous wildlife (such as mink, river otter, kingfisher, great blue heron, or American bald eagle) exceed TRVs or TEQs for adverse effects on survival, growth, or reproduction?	A	Comparison of estimated ingestion doses in piscivorous wildlife with TRVs and toxic equivalencies
		B	Do residues of COPCs in tissues of piscivorous wildlife (such as mink, river otter, kingfisher, great blue heron, or American bald eagle) exceed benchmarks for adverse effects on survival, growth, or reproduction?	B	Comparison of estimated piscivorous wildlife residues with CBRs
5	Protection and maintenance of insectivorous mammal and bird populations	A	Do ingestion doses of COPCs in insectivorous wildlife (such as shrew, bat, American woodcock or tree swallow) exceed TRVs or TEQs for adverse effects on survival, growth or reproduction?	A	Comparison of estimated ingestion doses in insectivorous wildlife with TRVs and toxic equivalencies
		B	Do residues of COPCs in eggs and/or tissues of insectivorous wildlife (such as shrew, little brown bat, American woodcock, or tree swallow) exceed benchmarks for adverse effects on survival, growth, reproduction or embryo development?	B_1	Comparison of measured insectivorous wildlife tissue and/or egg residues with CBR data
				B_2	Comparison of estimated insectivorous wildlife tissue and/or egg residues with site-specific CBR data
		C	Do field survey data on insectivorous wildlife population indicate presence/absence of ecological integrity?	C_1	Site-specific measurement of reproductive effects in local tree swallow populations
				C_2	Site-specific survey of calling amphibians
		D	Do mix-function oxidase (MFO) liver enzyme levels in swallow nestlings indicate that they have been exposed to compounds with "dioxin"-like metabolic activity?	D	Elevated MFO activity in tree swallow nestling liver tissue
6	Protection and maintenance of omnivorous mammal and bird populations	A	Do ingestion doses of COPCs in omnivorous wildlife (such as raccoon or mallard) exceed TRVs or TEQs for adverse effects on survival, growth or reproduction?	A	Comparison of estimated ingestion doses in omnivorous wildlife with TRVs and TEQs

Table 6-2. Principal Risk Uncertainties Identified in the BERA

Uncertainty Category	Assessment Endpoints Affected[a]	COPC Categories[b]	Likely Direction (under-/over+ estimate risk)[c]	Magnitude of Possible Effect[d]
Exposure Assessment				
Development of EPCs				
Allendale Dam breach in 2001	1a, 2, 3, 4	PBTs	?	+
Estimated fish tissue EPCs for Dyerville	2, 3, 4	PBTs	++-	+++
Fish EPCs based on large fish	2, 3, 4	PBTs	++-	+++
Fish EPCs for Manton/Dyerville based on 3 samples	2, 3, 4	all	?	+
No tissue data for several wildlife receptors	4, 5	PBTs	?	+++
Emerging insect EPCs estimated for Manton and Dyerville	5	D/F/PCBs	++-	+
Insectivorous diets assumes to be entirely aquatic in origin within exposure area	5	D/F/PCBs	+++	+
Selection of Endpoint Receptors				
Plant receptors not evaluated	-	All	--	+
Wildlife Exposure Parameter				
Use of standard receptor exposure parameters	4, 5, 6	All	?	+
Bioaccumulation Factors				
No TCDD plant uptake factor employed	6	D/F/PCBs	---	++
No plant tissue data; literature uptake factors used	6	PBTs, inorganics	?	+
Evaluated Exposures				
No floodplain soil data available for Manton and Dyerville; no evaluation of floodplain soil exposures	5, 6	All	--	++
Effects Assessment				
Toxicity Reference Values				
Use of standard benchmarks	1a, 1b	All	+++	+++
Lack of ingestion dose data	4, 5, 6	PEST, inorganics	--	+
Lack of CBR data	1a, 1b, 2, 3, 4, 5	PEST, inorganics	---	++
Extrapolation between laboratory and field	4, 5, 6	All	?	++
TRV extrapolation between receptors	4, 5, 6	D/F/PCBs	?	++
Dioxin/furan/PCB congeners				
Interim TEF value for HCX	All	HCX, TEQ	?	+
Use of Fish TEFs for invertebrates	1a, 1b	D/F	+++	+++
Lack of uptake of HCX in ELS study	All	HCX, TEQ	?	+
Field Studies				
Amphibian call survey not qualitative	5	All	?	+
Limited ichthyological data	2, 3	D/F	--	+++
Limited emerging insect data	1a, 5	All	?	+
High background mortality in bioassay	1a	All	+++	+
Risk Characterization				
Hazard quotient approach	All	All	?	+

(a) Assessment endpoints (1a, 1b, 2, 3, 4, 5, and 6) as described in Table 6-1.
(b) COPC categories that are most likely affected by the specific uncertainty: D/F – dioxins/furans; PEST – pesticides; PBT – persistent bioaccumulative toxicants, TEQ – TCDD Toxic Equivalency.
(c) Direction of likely effect indicated by the sign:
Underestimated risks indicated by "-" sign as follows: "-" - somewhat likely; "--" - likely; "---" - very likely
Overestimated risks indicated by "+" sign as follows: "+" - somewhat likely; "++" - likely; "+++" - very likely
(d) Estimated magnitude of effect on risk estimates where magnitude ranges from "+" - least to "+++" - greatest; rows shades are the identified uncertainties that could result in risk being substantially underestimated.

Table 6-3. Summary of BERA Results for each Assessment Endpoint

Assessment Endpoint[a]	Measures of Effect[a]	Inference Weight[a]	Risk/Magnitude
1a. Protection and maintenance (i.e., survival, growth, reproduction) of aquatic invertebrate communities, which are a forage base for fish and wildlife populations	A. Comparison of surface water COC concentrations to criteria/guidelines	L-M	Yes/High
	B. Comparison of sediment COC concentrations to benchmarks/guidelines	M	Yes/High
	C. Whole sediment laboratory bioassays	M-H	Yes/High
	D. Comparison of measured COC concentrations in aquatic macroinvertebrates to CBRs	L-M	Yes/Low
	E_1. Aquatic macroinvertebrate community structure/function	M-H	No/Very Low
	E_2. Emerging aquatic macroinvertebrate productivity	L-M	No/Low
	Risk Conclusion		Yes/High[b] No/Low[c]
1b. Protection and maintenance (i.e., survival, growth, reproduction) of floodplain invertebrate communities, which are a forage base for wildlife populations	A. Comparison of soil COC concentrations to benchmarks/guidelines	L-M	Yes/High
	B. Comparison of measured COC concentrations in floodplain invertebrates to CBRs	L-M	Yes/High
	C. Floodplain macroinvertebrate community integrity	M	No/Very Low
	Risk Conclusion		No/Low
2. Protection and maintenance of demersal, omnivorous fish populations as a forage base or sports fishery.	A_1. Fish length-weight relationships and condition indices relative to habitat characterization	L-M	No/Low
	A_2. Percent gross lesions in individual fish	M	Yes/Low
	A_3. Demographic structure analysis of dominant species (based on fish scales)	M	No/Very Low
	A_4. Species richness and relative abundance of ichthyoplankton	M	Indeterminate
	B_1. Comparison of measured concentrations or toxic equivalencies in fish tissue to literature derived CBRs	M-H	Yes/High
	B_2. Comparison of modeled concentrations or toxic equivalencies (using BSAFs) in eggs and fish tissue to literature derived CBRs	M	Indeterminate
	B_3. Partial life cycle laboratory water exposure of fish eggs dosed with synthetic mixture emulating DLC composition of Allendale Pond fish tissue.	M	Yes/High
	Risk Conclusion		Yes/High
3. Protection and maintenance of pelagic, piscivorous, or semi-piscivorous fish populations as a forage base or sports fishery	A_1. Fish length-weight relationships and condition indices relative to habitat characterization	L-M	No/Low
	A_2. Percent gross lesions in individual fish	M	Yes/Low
	A_3. Demographic structure analysis of dominant species (based on fish scales)	M	No/Very Low
	A_4. Species richness and relative abundance of ichthyoplankton	M	Indeterminate
	B_1. Comparison of measured concentrations or toxic equivalencies in fish tissue to literature derived CBRs	M-H	Yes/High
	B_2. Comparison of modeled concentrations or toxic equivalencies (using BSAFs) in eggs and fish tissue to literature derived CBRs	M	Indeterminate
	Risk Conclusion		Yes/High
4. Protection and maintenance of piscivorous mammal and bird populations	A. Comparison of estimated ingestion doses in piscivorous wildlife with TRVs and toxic equivalencies	M	Yes/Low
	B. Comparison of estimated piscivorous wildlife residues with CBRs	L-M	Yes/High
	Risk Conclusion		Yes/High

Table 6-3. (continued)

Assessment Endpoint[a]	Measures of Effect[a]	Inference Weight[a]	Risk/Magnitude
5. Protection and maintenance of insectivorous mammal and bird populations	A. Comparison of estimated ingestion doses in insectivorous wildlife with TRVs and toxic equivalencies	M	Yes/Low - High, Indeterminate
	B_1. Comparison of measured insectivorous wildlife tissue and/or egg residues with CBR data	M-H	Yes/Low - High
	B_2. Comparison of estimated insectivorous wildlife tissue and/or egg residues with CBR data	M	Yes/Low - High
	C_1. Measurement of reproductive effects in local tree swallow populations	H	Yes/High
	C_2. Survey of calling amphibians	L-M	Indeterminate
	D. Measurement of MFO activity in tree swallow nestling tissue	M	Indeterminate
	Risk Conclusion		Yes/High
6. Protection and maintenance of omnivorous mammal and bird populations	A. Comparison of estimated ingestion doses in omnivorous wildlife with TRVs and toxic equivalencies	M	No/Very Low[d]
	Risk Conclusion		No/Low

(a) Information obtained from Table 6-1.
(b) Applies to lentic (but not lotic) habitat.
(c) Applies to lotic (but not lentic) habitat.
(d) Omnivorous mammals could be adversely affected from exposure to Site-related contaminants in sediments and aquatic prey; however, the spatially and temporally varied diets and exposures of these receptors minimizes the likelihood of demographically significant effects.

Table 6-4. Summary of BHHRA Results for Non-Cancer Risks

Receptor	Exposure Area	Combined Fish Diet		Sediment		Surface Water		Bank Soil		Hazard Index		Incremental Hazard Index	
		CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME
Resident Living Along River, Current and Future													
Child	Assapumpset	0.5	2	0.02	0.2	0.003	0.009	N/A	N/A	0.5	2	--	--
Older Child		0.3	1	0.002	0.02	0.003	0.009	N/A	N/A	0.3	1	--	--
Adult		0.3	1	0.001	0.01	0.003	0.007	N/A	N/A	0.3	1	--	--
Child	Greystone	3	5	0.07	0.5	0.003	0.008	0.2	1	4	7	--	--
Older Child		2	4	0.006	0.07	0.003	0.008	0.03	0.2	2	4	--	--
Adult		2	3	0.003	0.04	0.003	0.006	0.02	0.1	2	4	--	--
Child	Allendale	19	30	0.2	0.8	0.04	0.1	NC	NC	19	31	**16**	**24**
Older Child		13	20	0.02	0.1	0.04	0.09	NC	NC	13	20	**10**	**16**
Adult		12	19	0.009	0.06	0.03	0.07	NC	NC	12	19	**10**	**16**
Child	Lyman Mill	21	34	0.08	0.4	0.01	0.04	N/A	N/A	22	34	**18**	**27**
Older Child		14	22	0.007	0.05	0.01	0.03	N/A	N/A	14	22	**12**	**18**
Adult		14	21	0.004	0.03	0.01	0.02	N/A	N/A	14	22	**11**	**18**
Child	Manton	4	5	0.005	0.03	0.01	0.04	N/A	N/A	4	6	0	0
Older Child		1	4	0.0004	0.004	0.01	0.03	N/A	N/A	1	4	0	0
Adult		1	3	0.0003	0.002	0.01	0.02	N/A	N/A	1	4	0	0
Child	Dyerville	4	8	0.05	0.5	0.01	0.04	N/A	N/A	4	8	0.5	**1**
Older Child		3	5	0.004	0.07	0.01	0.03	N/A	N/A	3	5	0.4	**1**
Adult		3	5	0.003	0.04	0.01	0.02	N/A	N/A	3	5	0.4	**1**
Visiting Recreational Angler, Current and Future													
Child	Assapumpset	0.5	2	N/A	N/A	N/A	N/A	N/A	N/A	0.5	2	--	--
Older Child		0.3	1	0.0004	0.004	0.0003	0.0009	N/A	N/A	0.3	1	--	--
Adult		0.3	1	0.0003	0.002	0.0003	0.0008	N/A	N/A	0.3	1	--	--
Child	Greystone	3	5	N/A	N/A	N/A	N/A	N/A	N/A	3	5	--	--
Older Child		2	4	0.001	0.01	0.0003	0.0008	0.002	0.02	2	4	--	--
Adult		2	3	0.0008	0.007	0.0003	0.0007	0.001	0.01	2	3	--	--
Child	Allendale	19	30	N/A	N/A	N/A	N/A	N/A	N/A	19	30	**16**	**25**
Older Child		13	20	0.004	0.03	0.004	0.009	NC	NC	13	20	**10**	**16**
Adult		12	19	0.002	0.01	0.003	0.008	NC	NC	12	19	**10**	**16**
Child	Lyman Mill	21	34	N/A	N/A	N/A	N/A	N/A	N/A	21	34	**18**	**28**
Older Child		14	22	0.002	0.01	0.001	0.003	N/A	N/A	14	22	**12**	**19**
Adult		14	21	0.001	0.006	0.001	0.002	N/A	N/A	14	22	**11**	**18**
Child	Manton	2	5	N/A	N/A	N/A	N/A	N/A	N/A	2	5	0	0
Older Child		1	4	0.0001	0.0007	0.001	0.003	N/A	N/A	1	4	0	0
Adult		1	3	0.00006	0.0004	0.001	0.002	N/A	N/A	1	3	0	0
Child	Dyerville	4	8	N/A	N/A	N/A	N/A	N/A	N/A	4	8	0.7	**2**
Older Child		3	5	0.001	0.01	0.001	0.003	N/A	N/A	3	5	0.4	**2**
Adult		3	5	0.0006	0.007	0.001	0.002	N/A	N/A	3	5	0.4	**2**

Table 6-4. (continued)

Receptor	Exposure Area	Combined Fish Diet		Sediment		Surface Water		Bank Soil		Hazard Index		Incremental Hazard Index	
		CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME
Commercial/Industrial Employee	Fogarty Center [1]	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.07	0.01	0.07	NB	NB

[1] Surface Soil

CTE = Central Tendency; RME = Reasonable Maximum Exposure; NB = No background Information for surface soil. Incremental Risk not calculated; N/A = Not Applicable - Medium not assessed for this exposure area.

Incremental Receptor Risk = Difference in risk between the exposure point and the background exposure point.

-- = Incremental risk is not calculated for background on reference areas.

BOLDED incremental risks are above the high end of the Superfund Cancer risk Range (1E-04 to 1E-06).

Table 6-5. Summary of BHHRA Results for Cancer Risks

Receptor	Exposure Area	Combined Fish Diet		Sediment		Surface Water		Bank Soil		Receptor Total		Incremental Receptor Risk	
		CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME
Resident Living Along River (all age groups)													
Current & Future	Assapumpset	6E-06	5E-05	2E-07	6E-06	6E-06	4E-05	N/A	N/A	1E-05	1E-04	--	--
	Greystone	2E-05	8E-05	1E-06	2E-05	6E-06	4E-05	2E-06	4E-05	3E-05	2E-04	--	--
	Allendale	1E-03	5E-03	2E-05	2E-04	1E-03	9E-03	1E-06	2E-05	2E-03	1E-02	**2E-03**	**1E-02**
	Lyman Mill	1E-03	6E-03	6E-06	3E-04	1E-04	7E-03	N/A	N/A	1E-03	1E-02	**1E-03**	**1E-02**
	Manton	2E-04	5E-04	1E-06	4E-05	1E-04	7E-03	N/A	N/A	3E-04	7E-03	**3E-04**	**7E-03**
	Dyerville	2E-04	1E-03	7E-07	2E-05	1E-04	7E-03	N/A	N/A	3E-04	8E-03	**3E-04**	**8E-03**
Visiting Recreational Angler (all age groups)													
Current & Future	Assapumpset	6E-06	5E-05	1E-08	4E-07	6E-07	4E-06	N/A	N/A	7E-06	6E-05	--	--
	Greystone	2E-05	8E-05	5E-08	2E-06	6E-07	4E-06	6E-08	2E-06	2E-05	9E-05	--	--
	Allendale	1E-03	5E-03	8E-07	1E-05	1E-04	9E-04	3E-08	7E-07	1E-03	6E-03	**1E-03**	**6E-03**
	Lyman Mill	1E-03	6E-03	3E-07	2E-05	1E-05	7E-04	N/A	N/A	1E-03	7E-03	**1E-03**	**7E-03**
	Manton	2E-04	5E-04	6E-08	2E-06	1E-05	7E-04	N/A	N/A	2E-04	1E-03	**2E-04**	**1E-03**
	Dyerville	2E-04	1E-03	3E-08	1E-06	1E-05	7E-04	N/A	N/A	2E-04	2E-03	**2E-04**	**2E-03**
Commercial/Industrial Employee													
Current & Future	Fogarty Center [1]	N/A	N/A	N/A	N/A	N/A	N/A	8E-07	2E-05	8E-07	2E-05	NB	NB

[1] Surface Soil

CTE = Central Tendency; RME = Reasonable Maximum Exposure; NB = No background Information for surface soil. Incremental Risk not calculated; N/A = Not Applicable - Medium not assessed for this exposure area.

Incremental Receptor Risk = Difference in risk between the exposure point and the background exposure point.

-- = Incremental risk is not calculated for background on reference areas.

BOLDED incremental risk are above the high end of the Superfund Cancer risk Range (1E-04 to 1E-06).

Appendix A

APPENDIX A

DATA MANAGEMENT, ANALYSES, AND VERIFICATION/VALIDATION PROCEDURES

APPENDIX A

Data Management, Analyses, and Verification/Validation Procedures

Procedures used to manage, analyze, and verify data used to support the Centredale Manor Restoration Project (CMRP) Superfund Site Remedial Investigation (RI) are discussed below. All sediment and soil data discussed in the RI are expressed as dry weight.

DATA MANAGEMENT PROCEDURES

The CMRP Superfund Site database is the source of all chemical and physical data used to support the site RI. Prior to data extractions and evaluations, *NSAMPLE*s (unique sample number assigned upon sample collection) were assigned a *RI_SAMPLE_GROUP* name, which is a descriptive name that identifies the exposure area from which the sample was collected and the sample media type. Biota samples were not assigned a *RI_SAMPLE_GROUP* name, as these data were evaluated in the Baseline Human Health Risk Assessment (BHHRA) and Baseline Ecological Risk Assessment (BERA) reports (MACTEC 2004a, b), not the site RI. *RI_SAMPLE_GROUP* names are defined in Table A-1. A list of qualifiers and definitions, where available, used to qualify the CMRP data are provided in Table A-2.

A list of samples used in the RI, presented by media type (soil, sediment, surface water and groundwater) was prepared from the CMRP database output. Sample list tables identify the type of data available (e.g., VOC, SVOC) for each sample and the numbers of samples with data for each class of data. The tables also identify the RI_SAMPLE_GROUP, NSAMPLE, FIELD_QC_TYPE, SAMP_DATE, BORING, TOP_OF_SAMPLE, BOTTOM_OF_SAMPLE, and DATASOURCE for each sample using in support of the RI.

A series of updates were made to the CMRP database to support the site RI, including:

1) Wherever the same chemical was reported with the two different *PARAMETER* codes, the *PARAMETER* was updated to one consistent code. For example, benzo(a)anthracene is also reported as benzo[a]anthracene in the database. Affected data generally included SVOC and GS *CLASS* categories for selected *NSAMPLE*s.

2) Duplicate records were deleted. Specifically, *NSAMPLE*s DAM002-SD through DAM007-SD reported the same coplanar polychlorinated biphenyl (PCB) results using both the DIOXIN and PCBC *CLASS* categories.

3) The *CLASS* field for dioxin/furan data was updated to DIOXIN; previously this field was reported as DIOX, DIOXI, or DIOXIN.

4) The *CLASS* field for dissolved metals data for groundwater and surface water samples was updated to MD to ensure that dissolved and particulate data could be distinguished.

5) Toxic Equivalency Quotient (TEQ) values were calculated in cases where dioxins and furans data were in the Centredale database, but a record with the corresponding TEQ value did not exist. Details regarding calculation of TEQ values are provided in the Data Terms section, below.

After the changes to the CMRP database were incorporated, a working copy of the database (referred to as Working RI Statistics database) was created for statistical data evaluations. A series of additional changes were then applied to the Working RI Statistics database, including:

6) All data were excluded where,
   a. *LAB_QC_CODE* N (for NORMAL);
   b. An RI_SAMPLE_GROUP was not assigned;
   c. *CLASS* = WET, AVS/SEM, TOX, DIOXI-M, and PCBC-M; and
   d. *UNITS* = PCT_REC.

7) Wherever the same *PARAMETER* was reported with different units (e.g., total organic carbon (TOC) is reported as both mg/kg and %), the data were converted to one consistent set of units. Affected data generally included DIOXIN, SVOC, and TOC *CLASS* categories for selected *NSAMPLE*s.

8) Selected *NSAMPLE*s were excluded from data evaluations because field records were not available to clearly indicate where a sample was collected. Excluded *NSAMPLE*s included 06199, 06205, BV01-COMP, S-1-SOIL through S-5-SOIL.

DATA TERMS

In the discussion of chemical and physical data, the following terms are used in the site RI.

- Dioxin TEQ – The TEQ value is calculated according to a toxicity weighting scale. The compound 2,3,7,8-tetrachlorinated dibenzo-p-dioxin is usually considered the most toxic compound and is assigned a weighting factor of 1.0. The remaining 16 dioxin and furan congeners are assigned weighting factors (toxicity equivalency factors [TEFs]) according to Van den Berg (1998), ranging from 0.5 down to 0.001 (see Table A-3). The observed concentrations of these 17 dioxin-furan congeners are multiplied by the weighting factors (TEF) to determine the total concentration of dioxin-furan compounds that have a toxic equivalent to 2,3,7,8-tetrachlorinated dibenzo-p-dioxin.

- PCB TEQ – values were determined previously (MACTEC, 2003b), and are based on the application of TEFs (mammal, fish, bird) to measured concentrations (Van den Berg, 1998) of dioxin-like PCB congeners. Dioxin-like PCB congeners include PCBs 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189. PCB TEQ was calculated as the sum of the detected concentrations of the Dioxin-like PCB congeners multiplied by the appropriate Mammal TEF.

- Total Aroclor – values were calculated as the sum of the detected individual Aroclors. Where all individual Aroclors were undetected, then the Total Aroclor is the sum of the detection limits for the individual Aroclors.

- Percent Fines – sum of percent silt and clay

For calculated values (Dioxin TEQ, PCB TEQ, Total Aroclor, and Percent Fines) a value of 0.0 was assigned to individual analytes that were not detected.

DATA ANALYSES PROCEDURES

Chemical and physical data associated with each *RI_SAMPLE_GROUP* (above) were extracted from the CMRP and Working RI Statistics databases and used to support of the site RI. Data manipulations performed included:

1. Grain size data from the TetraTech 2000-2001 sediment investigations, originally reported in units of particle size, were converted to %gravel, %sand, and %silt + %clay. A combined grain size data set (converted TetraTech data and all other grain size data from the CMRP database) were used for statistical data evaluations.

Table A-1. CMRP Sample Identification List

RI_SAMPLE_GROUP	Description
Upstream sediment	NSAMPLEs collected upstream of the source area; MATRIX is sediment or soil
Upstream surface water	NSAMPLEs collected upstream of the source area; MATRIX is surface water
Source area soil	NSAMPLEs collected at the source area; MATRIX is soil or sediment
Source area surface water	NSAMPLEs collected at the source area; MATRIX is surface water
Source area groundwater	NSAMPLEs collected at the source area; MATRIX is groundwater. Note that groundwater samples have only been collected at the source area exposure area
Allendale sediment	NSAMPLEs collected south of the source area cap #1 to Allendale Mill Dam; MATRIX can be either sediment or soil. Field notes and/or sample location suggest sample is aquatic sediment.
Allendale soil	NSAMPLEs collected south of the source area cap #1 to Allendale Mill Dam; MATRIX can be either sediment or soil. Field notes and/or sample location suggest sample is terrestrial soil.
Allendale surface water	NSAMPLEs collected along the western bank of the Woonasquatucket River in the source area, and south of the source area cap #1 to Allendale Mill Dam; MATRIX is surface water.
Oxbow floodplain soil	NSAMPLEs collected from the forested wetland, in the northwest region of Lyman Mill reach.
Lyman Mill sediment	NSAMPLEs collected south of Allendale Mill Dam to Lyman Mill Dam; MATRIX can be either sediment or soil. Field notes and/or sample location suggest sample is aquatic sediment.
Lyman Mill soil	NSAMPLEs collected south of Allendale Mill Dam to Lyman Mill Dam; MATRIX can be either sediment or soil. Field notes and/or sample location suggest sample is terrestrial soil.
Lyman Mill surface water	NSAMPLEs collected south of Allendale Mill Dam to Lyman Mill Dam; MATRIX is surface water.
Assapumpset sediment	NSAMPLEs collected from the Assapumpset Pond or Brook area; MATRIX is sediment.
Assapumpset surface water	NSAMPLEs collected from the Assapumpset Pond or Brook area; MATRIX is surface water.
Manton sediment	NSAMPLEs collected south of Lyman Mill Dam to Manton Dam; MATRIX is sediment.
Manton surface water	NSAMPLEs collected south of Lyman Mill Dam to Manton Dam; MATRIX is surface water.
Downstream of Manton sediment	NSAMPLEs collected south of Manton Dam; MATRIX is sediment.
Downstream of Manton surface water	NSAMPLEs collected south of Manton Dam; MATRIX is surface water.

Table A-2. List of Data Qualifiers, CMRP Remedial Investigation Report

Qualifier	Definition
$	From dilution analysis
$J	From dilution analysis, Quantitation approximate
&	*(not defined in project documents)*
*	From dilution analysis
*J	From dilution analysis, Quantitation approximate
DPJ	*(not defined in project documents)*
EB	Equipment Blank Contamination
EB$	Equipment Blank Contamination, From dilution analysis
EB*	Equipment Blank Contamination, From dilution analysis
EBJ	Equipment Blank Contamination, Quantitation approximate
EMPC	Estimated Maximum Possible Concentration
J	Quantitation approximate
J$	Quantitation approximate, From dilution analysis
J$EB	Quantitation approximate, From dilution analysis, Equipment Blank Contamination
J&	*(not defined in project documents)*
J*	Quantitation approximate, From dilution analysis
J_1	Estimate (1)
J_2	Estimate (1)
J_12	Estimate (1)
J_3	Estimate (1)
J_4	Estimate (1)
J_5	Estimate (1)
J_7	Estimate (1)
J,EB	Quantitation approximate, From dilution analysis, Equipment Blank Contamination
JEB	Quantitation approximate, Equipment Blank Contamination
JN	*(not defined in project documents)*
JN_1	*(not defined in project documents)*
JN_2	*(not defined in project documents)*
JP	*(not defined in project documents)*
JTB	Quantitation approximate, Holding time exceeded, Blank contamination (2)
NA	Not Analyzed
ND	Not detected and no detection limit reported
NJ	*(not defined in project documents)*
NJ_1	*(not defined in project documents)*
NJ_2	*(not defined in project documents)*
NJ_3	*(not defined in project documents)*
NR	Not Reported
P	*(not defined in project documents)*
R	Rejected
U	Not detected
UJ	Detection limit approximate

(1) Qualifier description provided in the project documents, but the description varied across data sets. The J qualifier indicates that the value is considered an estimate. The 1, 2, 3, 4, 5, or 7 codes indicate why the value is considered an estimate, usually due to chromatography, calibration, and/or unacceptable results from the laboratory-based QC samples.

(2) Qualifier not defined in project documents. Description for J assumed based on documented definition; description for T and B assumed based on standard descriptions for these qualifiers.

Table A-3. Toxic Equivalency Factors (TEF)

Dioxin/Furans	TEF	PCB Congeners	TEF[1]
2,3,7,8-TCDD	1	3,3',4,4'-Tetrachlorobiphenyl (77)	0.0001
1,2,3,7,8-PeCDD	1	3,4,4',5-Tetrachlorobiphenyl (81)	0.0001
1,2,3,4,7,8-HxCDD	0.1	2,3,3',4,4'-Pentachlorobiphenyl (105)	0.0001
1,2,3,6,7,8-HxCDD	0.1	2,3,4,4',5-Pentachlorobiphenyl (114)	0.0005
1,2,3,7,8,9-HxCDD	0.1	2,3',4,4',5-Pentachlorobiphenyl (118)	0.0001
1,2,3,4,6,7,8-HpCDD	0.01	2,3',4,4',5'-Pentachlorobiphenyl (123)	0.0001
OCDD	0.0001	3,3',4,4',5-Pentachlorobiphenyl (126)	0.1
2,3,7,8-TCDF	0.1	2,3,3',4,4',5-Hexachlorobiphenyl (156)	0.0005
1,2,3,7,8-PeCDF	0.05	2,3,3',4,4',5'-Hexachlorobiphenyl (157)	0.0005
2,3,4,7,8-PeCDF	0.5	2,3',4,4',5,5'-Hexachlorobiphenyl (167)	0.00001
1,2,3,4,7,8-HxCDF	0.1	3,3',4,4',5,5'-Hexachlorobiphenyl (169)	0.01
1,2,3,6,7,8-HxCDF	0.1	2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	0.0001
1,2,3,7,8,9-HxCDF	0.1		
2,3,4,6,7,8-HxCDF	0.1		
1,2,3,4,6,7,8-HpCDF	0.01		
1,2,3,4,7,8,9-HpCDF	0.01		
OCDF	0.0001		

(1) Mammal TEF used.

Source: Van den Berg et al. (1998).

2. In the case of non-detects (where the *QUAL* field is populated with any combination of the U qualifier), the detection limit was used for data analysis. Note that selected chemical data were reported as 0 in the *LAB_RESULT* field, yet an associated detection limit was not provided in the *MDL*, *IDL*, or *CRDL* fields. Affected data were excluded from the statistics evaluations.

Sample data were then input into mapping, statistical software, and principal component analysis programs for additional data evaluations, as follows:

Data Mapping – Dioxin TEQ, total Aroclor (also referred to as total PCB), 1,2,4,5,7,8-hexachloro(9h)xanthene (HCX), tetrachloroethylene (or perchloroethylene, PCE), and lead were prepared in Excel spreadsheets for mapping. Sample data were sorted by *RI_SAMPLE_GROUP*, *BORING*, and depth interval. Additional data manipulations included:

- Sample data from the same *BORING* and depth interval were averaged.
- Total Aroclor was calculated in cases where the database output included individual Aroclor data, but no corresponding record for Total Aroclor. Total Aroclor was calculated as described above.
- Selected data were excluded from the color contour maps that show the distribution of Dioxin TEQ concentrations in surface (0-1 ft) sediments at Allendale Pond (and the posted map for Lyman Mill Pond). This was necessary because only one value for each boring ID can be mapped. However, there were cases where two distinct surface intervals were collected within the same boring ID. For example,

- Selected borings have data for the 0-1 ft and 0-0.25 ft depth intervals; the 0-0.25 interval was excluded because this interval was sampled less frequently than the 0-1 ft interval;
- Selected borings have data for the 0-0.5 ft and 0.5-2 ft depth intervals; data for the 0.5-2ft intervals were excluded because these data represent subsurface data (deeper than the top foot);
- Selected borings from the May 2003 investigation have data for one or more surface intervals; these data were averaged for mapping (no data were excluded).

Statistical Data Analyses – were undertaken to summarize the CMRP site data to support the RI and assist with an environmental forensics evaluation. The analyses are divided into four phases:

- Calculation of summary statistics;
- Comparison of chemical concentrations in sediment data between the upstream (i.e., Greystone Mill) background location and the other reaches of the Woonasquatucket River adjacent to and downstream of the CMRP site;
- Correlation analysis to determine relationships between several key variables; and
- Preparation of box plots.

The methods used for these analyses are discussed below. It should be noted that the CMRP database includes results from numerous investigations that were conducted for a variety of purposes by different organizations over a period of about 5 years (over 100,000 records). Chemical analyses were performed using a variety of methods with different detection limits. In some cases, detection limits from one sampling event were higher than detected values measured in a different sampling event. The methods used to calculate dioxin toxic equivalents (TEQs) for some of the previous sample events are not known, and in some cases dioxin TEQs are based solely on 2,3,7,8-TCDD rather than a full list of dioxin and furan congeners.

1) Calculation of Summary Statistics

The first phase of statistical analyses was the calculation of summary statistics. The statistical measures included in the summaries are:

- the number of observations;
- the number and percent of observations that were found to be above the method detection limit (MDL);
- the minimum and maximum observed values;
- the median of the observed values; and
- the mean and standard deviation of the observed values.

The maximum was calculated two ways: the maximum of all observations and the maximum of all observations above the MDL. Separate sets of summary statistics were calculated for each of the RI sample groups (Table A-1) and each chemical measured.

Many of the measured chemical concentrations in samples collected at the CMRP site were found to be below the MDL. The U.S. Environmental Protection Agency (EPA) has provided guidance (EPA, 2000) on calculating means and standard deviations for cases where there are non-detected observations. The EPA guidance recommends:

- if the percentage of non-detected observations is less than 15, the mean and standard deviation should be calculated using all of the data;
- if the percentage of non-detected observations is greater than 15 but less than 50, trimmed means and standard deviations should be calculated; and
- if the percentage of non-detected observations is greater than 50, no means and standard deviations should be calculated.

These guidelines have been adopted for the CMRP RI with one caveat: where possible, one-half the MDL is used for non-detected observations in cases where the non-detects comprise less than 15% of the total number of observations.

The summary statistics, particularly the mean and standard deviation, are intended to provide measurements that capture important qualities of the population being examined. How well the mean and standard deviation represent the central tendency and dispersion of the population depends on the probability distribution of the measurement. When the distribution of measurements is symmetric and bell-shaped (i.e., normally distributed), the mean and standard deviation are reasonable estimates of the central tendency and dispersion of the population. However, if the distribution of the measurement is asymmetrical (skewed), the mean and the standard deviation are not reasonable estimates of the corresponding population parameters. In some cases, mathematical transformation of the data may result in a symmetrical, bell-shaped distribution. With chemical concentrations in environmental media, the logarithms of the concentrations often are normally-distributed (i.e., the data are log-normally distributed). In this case, the geometric mean and geometric standard deviation provide better estimates of the central tendency and dispersion of the data. If there is no reasonable transformation of the measurements that "normalizes" the data, then the central tendency can best be estimated by the sample median, and the dispersion will not have a reasonable estimate.

In calculating the summary statistics for the CMRP RI, the distribution of the data was first examined to determine whether the mean and standard deviation, the geometric mean and geometric standard deviation, or the median with no dispersion estimate was most appropriate for the measurement. To determine which set of summary statistics was most appropriate, the Shapiro-Wilkes normality test was applied to both the untransformed chemical concentration data and the logarithms of the concentrations, and the p-value for each test was calculated. The appropriate probability distribution was determined using the following criteria:

- if there were fewer than 5 observations in the sample, the distribution was deemed to be neither normal nor log-normal because there was an insufficient number of observations to make a determination;
- if there were between 5 and 50 observations, then
  - if the larger of the two Shapiro-Wilkes p-values (normal and log-normal) was greater than 0.05, then the distribution was selected corresponding to the larger p-value;

- o if the larger of the two p-values was less than 0.05, then neither normal nor log-normal distributions adequately fit the data, and "None" was selected as the appropriate distribution;

- if there were more than 50 observations, then the distribution corresponding to the larger of the two p-values was selected as the appropriate distribution.

In the case of large sample sizes (more than 50), the Shapiro-Wilkes test tends to reject both distributions regardless of how well the distribution appears to fit – that is, even if the data come from a normal distribution, the Shapiro-Wilkes test is likely to reject normality because of a large number of apparent small deviations from the normal distribution. Thus, rather than declare neither normal nor log-normal to be appropriate when there is a large number of observations, we have chosen to select the better distribution as being representative of the data.

As noted above, when the percentage of non-detected observations is between 15 and 50, EPA guidance calls for the use of trimmed means and standard deviations to represent the central tendency and dispersion of the population of measurements. For this study, these trimmed mean and standard deviations were calculated under the assumption that the samples where a chemical was measured below the MDL were the samples with the smallest concentrations. Because several different methods may have been used to quantify the concentrations of the same chemical in the CMRP database, it is likely that the actual concentration obtained for a sample using one method may be larger than a detected concentration in a different sample using a different method. Thus, strictly speaking, the trimming assumption may not be accurate. The trimmed mean was calculated by taking the mean of the set of observations remaining after removing the observations below the MDL and removing an equal number of the highest measured concentrations. For example, in a sample with two non-detected observations, the trimmed mean would be calculated after eliminating the two non-detects and the two largest values of the concentration in the sample. Calculation of the standard deviation associated with the trimmed mean is more complicated. It is calculated by replacing the non-detected concentrations with the smallest detected concentration, replacing an equal number of the highest observed values with the highest concentrations remaining after trimming, calculating the standard deviation for the modified data, and adjusting it by the number of non-trimmed observations.

The summary statistics were calculated using a computer program written in SAS. Most of the summary statistics were calculated using summary statistics procedures available in SAS (PROC UNIVARIATE). Calculations for trimmed means and standard deviations required the use of special code. All SAS code was checked by applying it to a dataset with known results.

2) Comparison of Two Populations

The concentrations of the various chemicals in sediment were statistically compared between the upstream background location (i.e., Greystone Mill) and the other locations where sediment samples were collected, with separate comparisons for each location. Traditionally, such statistical comparisons would take the form of a t-test (for normal data), a t-test based on the logarithms of concentration (for log-normal data), or the nonparametric Wilcoxon test (for data whose distribution can not be determined). However, the presence of a large number of non-detected observations makes the results of these tests uncertain. The Wilcoxon test can be adapted to situations where there are non-detects, but there is the further problem that the MDL may vary among samples collected at the same location.

As an alternative to the traditional methods, the sediment concentrations can be compared using methods developed for censored data. In the CMRP case, the data are "left-censored" – that is, there

are several observations whose values are only known to be "less than some specified value." Most censored-data methods have been developed for right-censored data – that is, where there are observations whose values are only known to be "greater than some specified value." These methods are often used in life-testing settings, where subjects may leave a study before the measurement of interest (usually time until an event) can be measured. Left-censored data can be transformed to right-censored data by reversing the order of the data. With environmental data, this can best be done by subtracting the actual concentration of a particular chemical from the maximum concentration across all observations of that chemical (i.e., over all locations). The resulting transformed data will have a minimum value of zero and a maximum value approximately equal to the maximum observed value over all locations. The non-detected observations then become right-censored observations. The equality of two population distributions of chemical concentrations can then be tested using methods for censored life-table data. In this case, the proportional hazards analysis was used (at the 0.05 significance level) for comparing sediment concentrations for the various locations to those for the upstream background location. In order to assure that there are a sufficient number of observations for performing the statistical inference, only those chemicals for which there are at least 10 observations in both the upstream and the "test" location are included.

The proportional hazards analysis was performed using a program written in SAS programming software. No existing procedure exists to perform the proportional hazards test, so code was written to perform the test. The code was tested using a dataset with known results to verify that it was performing correctly. The Wilcoxon test was also performed on the data (using SAS PROC NPAR1WAY) and used to validate the results of the proportional hazards analysis.

3) Correlation Analyses

The relationships between several chemicals can be used in performing forensic evaluations of environmental data. Specifically, the correlation of two chemicals may provide evidence about the location and number of sources as well as information about the transport of the chemicals at a site. In this study, four chemicals were examined to determine their relationships: TEQ, TOC, total PCBs (calculated as total Aroclor), and total pesticides. The first three chemicals were available in the database as unique measurements. The total pesticide concentration was determined by summing the concentrations of 22 individual pesticides in the database to create a total pesticide concentration (replacing non-detected observations with zero in the sum). The relationship between these four variables was determined using two types of correlation coefficients: Pearson correlations (parametric) and Kendall correlations (nonparametric). The Pearson correlation coefficient measures the degree to which two variables have a linear relationship if the variables have normal distributions. The Kendall correlation, on the other hand, measures the degree to which high concentrations of one variable are associated with high concentrations of the second variable. Kendall correlation coefficients are calculated by subtracting the number of discordant pairs of observations in a sample from the number of concordant pairs of observations and dividing by the total number of pairs of observations. For a dataset with n observations, the total number of pairs is equal to $n(n+1)/2$. Concordant pairs are pairs of observations for which the higher concentration of both chemicals appears in the same observation, while discordant pairs are pairs for which the higher concentration of the two chemicals appears in different observations. For example, if the values of TEQ for two observations are 1 and 2, and the values of TOC for the same observations are 5 and 7, then the pair of points is concordant, because the higher concentration appears in the second observation for both TEQ and TOC. Similarly, if the TEQ concentrations are 1 and 2 and the TOC concentrations are 5 and 3, then the pair of points is discordant because TEQ is higher in the second observation while TOC is higher in the first observation. For both Pearson and Kendall correlations, values near 1 indicate that the two variables have a strong positive correlation, values near -1 indicate that the two

variables have a strong negative correlation, and values near 0 indicate that the two variables are unrelated.

Correlation coefficients were calculated using PROC CORR in SAS. The total pesticide concentration was also calculated within the program.

4) Box Plots

Box plots were prepared for selected chemicals in site sediment and surface waters. Each boxplot summarizes the sample distribution. The ends of the box represent the 25th and 75th quartiles, and the line across the middle represents the median value. The lines extending from either end of the box are "whiskers" that extend to the minimum and maximum values. Box plots were prepared using the GPLOT procedure in SAS.

Principal Component Analysis (PCA) – Sediment and soil dioxin/furan, HCX, PCB, pesticide, and TOC data were prepared in Excel for PCA, a multivariant numerical analysis technique that effectively compares chemical data from many samples, visually displaying samples that are chemically similar or distinct. For PCA, a complete set of analyte data is required and the entire sample must be excluded if any one parameter is missing. For example, if a sample has dioxin data but no corresponding PCB data, then the entire sample is excluded from PCA. PCA was performed by using Pirouette (Version 3.02; Infometrix, Inc., Seattle, WA). Additional detail regarding PCA methods are provided in Appendix E.

DATA VERIFICATION/VALIDATION PROCEDURES

Sample location maps, contaminant distribution maps, statistical data summaries, and summary sample list tables received a quality assurance (QA) review according to Battelle SOP 4-039 *Quality Assurance Reviews for Project Deliverables,* and SOP 4-015 *Quality Assurance Audits of Reported Data.* Battelle's QA Unit verified a minimum of 10% of the data presented in the final maps (sample location and contaminant) and tables (statistical summaries, sample lists) to assess the accuracy and completeness of the reported data. The sample location and contaminant distribution maps were audited to ensure that the correct data were used, that the figure accurately represents the data and that units and captions were correct. The statistical summary and sample list tables were reviewed against source data (i.e., Centredale database query outputs), and formula components (e.g., mean and median calculations) were verified from raw or verified data by reproducing the reported result. Results from the QA review were summarized on the Document Review Forms or audit reports. Any documentation or data errors identified by the QA review process were corrected, and the affected maps and/or tables updated accordingly and reverified.

PCA results were not reconstructed during the QA review process given the complex nature of the software program employed for the analysis. Instead, the final PCA results received a technical review by staff familiar with the processing procedures, and the data input into the program were reviewed for accuracy.

REFERENCE

U.S. EPA. 2000. *EPA QA/G-9, Guidance for Data Quality Assessment, Practical Methods for Data Analysis.* EPA/600/R-96/084.

APPENDIX B

RI SAMPLING SUMMARY

Table B-1. List of Soil Samples ently in the CMRP Database
CMRP Remedial Investigation Report

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	2108324	NORMAL	7/22/2002	03-DEL-201	0	2							x					
Source Area soil	2108325	NORMAL	7/22/2002	03-DEL-202	0	2							x					
Source Area soil	2108326	NORMAL	7/22/2002	03-DEL-203	0	2							x					
Source Area soil	2108327	NORMAL	7/22/2002	03-DEL-102	0	2							x					
Source Area soil	2108328	NORMAL	7/22/2002	03-DEL-101	0	2							x					
Source Area soil	2108329	NORMAL	7/22/2002	03-DEL-103	0	2							x					
Source Area soil	2108330	NORMAL	7/22/2002	02-DEL-202	0	2							x					
Source Area soil	2108331	NORMAL	7/22/2002	02-DEL-203	0	2							x					
Source Area soil	2108332	NORMAL	7/22/2002	02-DEL-201	0	2							x					
Source Area soil	2108333	NORMAL	7/22/2002	02-DEL-300	0	2							x					
Source Area soil	2108334	NORMAL	7/22/2002	02-DEL-100	0	2							x					
Source Area soil	2108335	DU	7/22/2002	02-DEL-100	0	2							x					
Source Area soil	2108336	NORMAL	7/22/2002	01-DEL-201	0	2							x					
Source Area soil	2108337	NORMAL	7/22/2002	01-DEL-300	0	2							x					
Source Area soil	2108338	NORMAL	7/22/2002	01-DEL-100	0	2							x					
Source Area soil	2108339	NORMAL	7/22/2002	01-DEL-203	0	2							x					
Source Area soil	2108340	NORMAL	7/22/2002	01-DEL-202	0	2							x					
Source Area soil	3428-CMS-001	Field Dup. 3428-CMS-001	2/17/1999	CMS-001	0	0.25	IT						x					
Source Area soil	3428-CMS-001D	Field Dup. 3428-CMS-001	2/17/1999	CMS-001	0	0.25	IT						x					
Source Area soil	3428-CMS-002	NORMAL	2/17/1999	CMS-002	0	0.25	IT						x					
Source Area soil	3428-CMS-003	NORMAL	2/17/1999	CMS-003	0	0.25	IT						x					
Source Area soil	3428-CMS-004	Field Dup. 3428-CMS-004	2/17/1999	CMS-004	0	0.25	IT						x					
Source Area soil	3428-CMS-004D	Field Dup. 3428-CMS-004	2/17/1999	CMS-004	0	0.25	IT						x					
Source Area soil	3428-CMS-005	Field Dup. 3428-CMS-005	2/17/1999	CMS-005	0	0.25	IT						x					
Source Area soil	3428-CMS-005D	Field Dup. 3428-CMS-005	2/17/1999	CMS-005	0	0.25	IT						x					
Source Area soil	3428-CMS-006	NORMAL	2/17/1999	CMS-006	0	0.25	IT						x					
Source Area soil	3428-CMS-007	NORMAL	2/17/1999	CMS-007	0	0.25	IT						x					
Source Area soil	3428-CMS-008	NORMAL	2/17/1999	CMS-008	0	0.25	IT						x					
Source Area soil	3428-CMS-009	NORMAL	2/17/1999	CMS-009	0	0.25	IT						x					
Source Area soil	3428-CMS-010	NORMAL	2/17/1999	CMS-010	0	0.25	IT						x					
Source Area soil	3428-CMS-011	NORMAL	2/17/1999	CMS-011	0	0.25	IT						x					
Source Area soil	3428-CMS-012	NORMAL	2/17/1999	CMS-012	0	0.25	IT						x					
Source Area soil	3428-CMS-013	NORMAL	2/17/1999	CMS-013	0	0.25	IT						x					
Source Area soil	3428-CMS-014	NORMAL	2/17/1999	CMS-014	0	0.25	IT						x					
Source Area soil	3428-CMS-015	NORMAL	2/17/1999	CMS-015	0	0.25	IT						x					
Source Area soil	3428-CMS-016	NORMAL	2/17/1999	CMS-016	0	0.25	IT						x					
Source Area soil	3428-CMS-017	NORMAL	2/17/1999	CMS-017	0	0.25	IT						x					
Source Area soil	3428-CMS-026	NORMAL	2/16/1999	CMS-026	0	0.25	IT						x					
Source Area soil	3428-CMS-027	NORMAL	2/16/1999	CMS-027	0	0.25	IT						x					
Source Area soil	3428-CMS-028	NORMAL	2/16/1999	CMS-028	0	0.25	IT						x					
Source Area soil	3428-CMS-029	NORMAL	2/16/1999	CMS-029	0	0.25	IT						x					
Source Area soil	3428-CMS-030	NORMAL	2/16/1999	CMS-030	0	0.25	IT						x					
Source Area soil	3428-CMS-031	NORMAL	2/16/1999	CMS-031	0	0.25	IT						x					
Source Area soil	3428-CMS-033	NORMAL	2/16/1999	CMS-033	0	0.25	IT						x					
Source Area soil	3428-CMS-034	NORMAL	2/16/1999	CMS-034	0	0.25	IT						x					
Source Area soil	3428-CMS-035	NORMAL	2/17/1999	CMS-035	0	0.25	IT						x					
Source Area soil	3428-CMS-037	NORMAL	2/16/1999	CMS-037	0	0.25	IT						x					
Source Area soil	3428-CMS-038	NORMAL	2/16/1999	CMS-038	0	0.25	IT						x					
Source Area soil	3428-CMS-041	NORMAL	2/16/1999	CMS-041	0	0.25	IT						x					
Source Area soil	3428-CMS-044	NORMAL	2/16/1999	CMS-044	0	0.25	IT						x					

Table B-1. List of Soil Samples Currently in the CMRP Database
CMRP Remedial Investigation Report

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	3428-CMS-047	NORMAL	2/16/1999	CMS-047	0	0.25	IT						x					
Source Area soil	3428-CMS-048	NORMAL	2/16/1999	CMS-048	0	0.25	IT						x					
Source Area soil	3428-CMS-050	NORMAL	2/16/1999	CMS-050	0	0.25	IT						x					
Source Area soil	3428-CMS-051	NORMAL	2/16/1999	CMS-051	0	0.25	IT						x					
Source Area soil	3428-CMS-052	Field Dup. 3428-CMS-052	2/16/1999	CMS-052	0	0.25	IT						x					
Source Area soil	3428-CMS-052D	Field Dup. 3428-CMS-052	2/16/1999	CMS-052	0	0.25	IT						x					
Source Area soil	3428-CMS-053	NORMAL	2/16/1999	CMS-053	0	0.25	IT						x					
Source Area soil	3428-CMS-054	NORMAL	2/16/1999	CMS-054	0	0.25	IT						x					
Source Area soil	3428-CMS-055	NORMAL	2/17/1999	CMS-055	0	0.25	IT						x					
Source Area soil	3428-CMS-056	NORMAL	2/16/1999	CMS-056	0	0.25	IT						x					
Source Area soil	3428-CMS-057	NORMAL	2/16/1999	CMS-057	0	0.25	IT						x					
Source Area soil	3428-CMS-058	NORMAL	2/16/1999	CMS-058	0	0.25	IT						x					
Source Area soil	3428-CMS-059	NORMAL	2/16/1999	CMS-059	0	0.25	IT						x					
Source Area soil	3428-CMS-060	NORMAL	2/16/1999	CMS-060	0	0.25	IT						x					
Source Area soil	3428-CMS-061	Field Dup. 3428-CMS-061	2/16/1999	CMS-061	0	0.25	IT						x					
Source Area soil	3428-CMS-061D	Field Dup. 3428-CMS-061	2/16/1999	CMS-061	0	0.25	IT						x					
Source Area soil	3428-CMS-062	NORMAL	2/16/1999	CMS-062	0	0.25	IT						x					
Source Area soil	3428-CMS-063	NORMAL	2/16/1999	CMS-063	0	0.25	IT						x					
Source Area soil	3428-CMS-064	NORMAL	2/16/1999	CMS-064	0	0.25	IT						x					
Source Area soil	3428-CMS-065	NORMAL	2/16/1999	CMS-065	0	0.25	IT						x					
Source Area soil	3428-CMS-066	NORMAL	2/16/1999	CMS-066	0	0.25	IT						x					
Source Area soil	3428-CMS-067	NORMAL	2/16/1999	CMS-067	0	0.25	IT						x					
Source Area soil	3428-CMS-068	Field Dup. 3428-CMS-068	2/16/1999	CMS-068	0	0.25	IT						x					
Source Area soil	3428-CMS-068D	Field Dup. 3428-CMS-068	2/16/1999	CMS-068	0	0.25	IT						x					
Source Area soil	3428-CMS-069	NORMAL	2/16/1999	CMS-069	0	0.25	IT						x					
Source Area soil	3428-CMS-070	NORMAL	2/16/1999	CMS-070	0	0.25	IT						x					
Source Area soil	3428-CMS-071	Field Dup. 3428-CMS-071	2/16/1999	CMS-071	0	0.25	IT						x					
Source Area soil	3428-CMS-071D	Field Dup. 3428-CMS-071	2/16/1999	CMS-071	0	0.25	IT						x					
Source Area soil	3428-CMS-072	NORMAL	2/16/1999	CMS-072	0	0.25	IT						x					
Source Area soil	3428-CMS-073	NORMAL	2/16/1999	CMS-073	0	0.25	IT						x					
Source Area soil	3428-CMS-074	NORMAL	2/16/1999	CMS-074	0	0.25	IT						x					
Source Area soil	3428-CMS-075	NORMAL	2/16/1999	CMS-075	0	0.25	IT						x					
Source Area soil	3428-CMS-076	NORMAL	2/16/1999	CMS-076	0	0.25	IT						x					
Source Area soil	3428-CMS-078	Field Dup. 3428-CMS-078	2/16/1999	CMS-078	0	0.25	IT						x					
Source Area soil	3428-CMS-078D	Field Dup. 3428-CMS-078	2/16/1999	CMS-078	0	0.25	IT						x					
Source Area soil	3428-CMS-079	NORMAL	2/16/1999	CMS-079	0	0.25	IT						x					
Source Area soil	3428-CMS-080	NORMAL	2/16/1999	CMS-080	0	0.25	IT						x					
Source Area soil	3428-CMS-081	NORMAL	2/16/1999	CMS-081	0	0.25	IT						x					
Source Area soil	3428-CMS-082	NORMAL	2/16/1999	CMS-082	0	0.25	IT						x					
Source Area soil	3428-CMS-084	Field Dup. 3428-CMS-084	2/16/1999	CMS-084	0	0.25	IT						x					
Source Area soil	3428-CMS-084D	Field Dup. 3428-CMS-084	2/16/1999	CMS-084	0	0.25	IT						x					
Source Area soil	3428-CMS-085	NORMAL	2/17/1999	CMS-085	0	0.25	IT						x					
Source Area soil	3428-CMS-086	NORMAL	2/16/1999	CMS-086	0	0.25	IT						x					
Source Area soil	3428-CMS-087	NORMAL	2/16/1999	CMS-087	0	0.25	IT						x					
Source Area soil	3428-CMS-088	NORMAL	2/16/1999	CMS-088	0	0.25	IT						x					
Source Area soil	3428-CMS-089	NORMAL	2/16/1999	CMS-089	0	0.25	IT						x					
Source Area soil	3428-CMS-090	NORMAL	2/17/1999	CMS-090	0	0.25	IT						x					
Source Area soil	3428-CMS-091	NORMAL	2/17/1999	CMS-091	0	0.25	IT						x					
Source Area soil	3428-CMS-092	NORMAL	2/16/1999	CMS-092	0	0.25	IT						x					
Source Area soil	3428-CMS-093	Field Dup. 3428-CMS-093	2/16/1999	CMS-093	0	0.25	IT						x					

Table B-1. List of Soil Samples ently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	3428-CMS-093D	Field Dup. 3428-CMS-093	2/16/1999	CMS-093	0	0.25	IT						x					
Source Area soil	3428-CMS-094	NORMAL	2/16/1999	CMS-094	0	0.25	IT						x					
Source Area soil	3428-CMS-095	NORMAL	2/16/1999	CMS-095	0	0.25	IT						x					
Source Area soil	3428-CMS-096	Field Dup. 3428-CMS-096	2/16/1999	CMS-096	0	0.25	IT						x					
Source Area soil	3428-CMS-096D	Field Dup. 3428-CMS-096	2/16/1999	CMS-096	0	0.25	IT						x					
Source Area soil	3428-CMS-098	NORMAL	2/17/1999	CMS-098	0	0.25	IT						x					
Source Area soil	3428-CMS-099	NORMAL	2/17/1999	CMS-099	0	0.25	IT						x					
Source Area soil	3428-CMS-100	NORMAL	2/17/1999	CMS-100	0	0.25	IT						x					
Source Area soil	3428-CMS-101	NORMAL	2/16/1999	CMS-101	0	0.25	IT						x					
Source Area soil	3428-CMS-102	NORMAL	2/16/1999	CMS-102	0	0.25	IT						x					
Source Area soil	3428-CMS-103	Field Dup. 3428-CMS-103	2/16/1999	CMS-103	0	0.25	IT						x					
Source Area soil	3428-CMS-103D	Field Dup. 3428-CMS-103	2/16/1999	CMS-103	0	0.25	IT						x					
Source Area soil	3428-CMS-104	NORMAL	2/16/1999	CMS-104	0	0.25	IT						x					
Source Area soil	3428-CMS-107	NORMAL	2/17/1999	CMS-107	0	0.25	IT						x					
Source Area soil	3428-CMS-108	NORMAL	2/17/1999	CMS-108	0	0.25	IT						x					
Source Area soil	3428-CMS-109	NORMAL	2/16/1999	CMS-109	0	0.25	IT						x					
Source Area soil	3428-CMS-110	NORMAL	2/16/1999	CMS-110	0	0.25	IT						x					
Source Area soil	3428-CMS-111	NORMAL	2/16/1999	CMS-111	0	0.25	IT						x					
Source Area soil	3428-CMS-112	NORMAL	2/16/1999	CMS-112	0	0.25	IT						x					
Source Area soil	3428-CMS-114	Field Dup. 3428-CMS-114	2/17/1999	CMS-114	0	0.25	IT						x					
Source Area soil	3428-CMS-114D	Field Dup. 3428-CMS-114	2/17/1999	CMS-114	0	0.25	IT						x					
Source Area soil	3428-CMS-115	NORMAL	2/17/1999	CMS-115	0	0.25	IT						x					
Source Area soil	3428-CMS-116	NORMAL	2/17/1999	CMS-116	0	0.25	IT						x					
Source Area soil	3428-CMS-117	NORMAL	2/16/1999	CMS-117	0	0.25	IT						x					
Source Area soil	3428-CMS-118	NORMAL	2/16/1999	CMS-118	0	0.25	IT						x					
Source Area soil	3428-CMS-119	NORMAL	2/17/1999	CMS-119	0	0.25	IT						x					
Source Area soil	3428-CMS-121	NORMAL	2/17/1999	CMS-121	0	0.25	IT						x					
Source Area soil	3428-CMS-124	NORMAL	2/16/1999	CMS-124	0	0.25	IT						x					
Source Area soil	3428-CMS-125	NORMAL	2/16/1999	CMS-125	0	0.25	IT						x					
Source Area soil	3428-CMS-126	Field Dup. 3428-CMS-126	2/16/1999	CMS-126	0	0.25	IT						x					
Source Area soil	3428-CMS-126D	Field Dup. 3428-CMS-126	2/16/1999	CMS-126	0	0.25	IT						x					
Source Area soil	3428-CMS-127	NORMAL	2/16/1999	CMS-127	0	0.25	IT						x					
Source Area soil	3428-CMS-128	NORMAL	2/16/1999	CMS-128	0	0.25	IT						x					
Source Area soil	3428-CMS-130	NORMAL	2/17/1999	CMS-130	0	0.25	IT						x					
Source Area soil	3428-CMS-131	NORMAL	2/16/1999	CMS-131	0	0.25	IT						x					
Source Area soil	3428-CMS-132	NORMAL	2/16/1999	CMS-132	0	0.25	IT						x					
Source Area soil	3428-CMS-133	NORMAL	2/16/1999	CMS-133	0	0.25	IT						x					
Source Area soil	3428-CMS-134	NORMAL	2/16/1999	CMS-134	0	0.25	IT						x					
Source Area soil	3428-CMS-135	NORMAL	2/17/1999	CMS-135	0	0.25	IT						x					
Source Area soil	3428-CMS-136	NORMAL	2/17/1999	CMS-136	0	0.25	IT						x					
Source Area soil	3428-CMS-137	NORMAL	2/17/1999	CMS-137	0	0.25	IT						x					
Source Area soil	3428-CMS-138	NORMAL	2/16/1999	CMS-138	0	0.25	IT						x					
Source Area soil	3428-CMS-139	NORMAL	2/16/1999	CMS-139	0	0.25	IT						x					
Source Area soil	3428-CMS-140	NORMAL	2/16/1999	CMS-140	0	0.25	IT						x					
Source Area soil	3428-CMS-141	NORMAL	2/16/1999	CMS-141	0	0.25	IT						x					
Source Area soil	3428-CMS-142	NORMAL	2/17/1999	CMS-142	0	0.25	IT						x					
Source Area soil	3428-CMS-143	NORMAL	2/17/1999	CMS-143	0	0.25	IT						x					
Source Area soil	3428-CMS-144	NORMAL	2/17/1999	CMS-144	0	0.25	IT						x					
Source Area soil	3428-CMS-145	NORMAL	2/16/1999	CMS-145	0	0.25	IT						x					
Source Area soil	3428-CMS-147	NORMAL	2/16/1999	CMS-147	0	0.25	IT						x					

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	3428-CMS-148	NORMAL	2/17/1999	CMS-148	0	0.25	IT						x					
Source Area soil	3428-CMS-149	NORMAL	2/17/1999	CMS-149	0	0.25	IT						x					
Source Area soil	3428-CMS-150	NORMAL	2/17/1999	CMS-150	0	0.25	IT						x					
Source Area soil	3428-CMS-151	NORMAL	2/17/1999	CMS-151	0	0.25	IT						x					
Source Area soil	3428-CMS-152	NORMAL	2/16/1999	CMS-152	0	0.25	IT						x					
Source Area soil	3428-CMS-153	NORMAL	2/16/1999	CMS-153	0	0.25	IT						x					
Source Area soil	3428-CMS-154	NORMAL	2/16/1999	CMS-154	0	0.25	IT						x					
Source Area soil	3428-CMS-155	NORMAL	2/16/1999	CMS-155	0	0.25	IT						x					
Source Area soil	3428-CMS-156*	NORMAL	2/17/1999	CMS-156	0	0.25	IT						x					
Source Area soil	3428-CMS-157	NORMAL	2/17/1999	CMS-157	0	0.25	IT						x					
Source Area soil	3428-CMS-158	Field Dup. 3428-CMS-158	2/17/1999	CMS-158	0	0.25	IT						x					
Source Area soil	3428-CMS-158D	Field Dup. 3428-CMS-158	2/17/1999	CMS-158	0	0.25	IT						x					
Source Area soil	3428-CMS-159	NORMAL	2/17/1999	CMS-159	0	0.25	IT						x					
Source Area soil	3428-CMS-160	Field Dup. 3428-CMS-160	2/16/1999	CMS-160	0	0.25	IT						x					
Source Area soil	3428-CMS-160D	Field Dup. 3428-CMS-160	2/16/1999	CMS-160	0	0.25	IT						x					
Source Area soil	3428-CMS-161	NORMAL	2/17/1999	CMS-161	0	0.25	IT						x					
Source Area soil	3428-CMS-162	NORMAL	2/17/1999	CMS-162	0	0.25	IT						x					
Source Area soil	3428-CMS-163	NORMAL	2/17/1999	CMS-163	0	0.25	IT						x					
Source Area soil	3428-CMS-164	Field Dup. 3428-CMS-164	2/17/1999	CMS-164	0	0.25	IT						x					
Source Area soil	3428-CMS-164D	Field Dup. 3428-CMS-164	2/17/1999	CMS-164	0	0.25	IT						x					
Source Area soil	3428-CMS-165	NORMAL	2/17/1999	CMS-165	0	0.25	IT						x					
Source Area soil	3428-CMS-166	NORMAL	2/17/1999	CMS-166	0	0.25	IT						x					
Source Area soil	3428-CMS-167	NORMAL	2/17/1999	CMS-167	0	0.25	IT						x					
Source Area soil	3428-CMS-168	NORMAL	2/17/1999	CMS-168	0	0.25	IT						x					
Source Area soil	3428-CMS-169	NORMAL	2/17/1999	CMS-169	0	0.25	IT						x					
Source Area soil	3428-CMS-170	NORMAL	2/17/1999	CMS-170	0	0.25	IT						x					
Source Area soil	3428-CMS-171	NORMAL	2/17/1999	CMS-171	0	0.25	IT						x					
Source Area soil	3428-CMS-172	NORMAL	2/17/1999	CMS-172	0	0.25	IT						x					
Source Area soil	3428-CMS-173	NORMAL	2/17/1999	CMS-173	0	0.25	IT						x					
Source Area soil	3428-CMS-175	NORMAL	2/17/1999	CMS-175	0	0.25	IT						x					
Source Area soil	3428-CMS-220	NORMAL	2/16/1999	CMS-220	0	0.25	IT						x					
Source Area soil	3428-CMS-222	NORMAL	2/16/1999	CMS-222	0	0.25	IT						x					
Source Area soil	3428-CMS-223	NORMAL	2/16/1999	CMS-223	0	0.25	IT						x					
Source Area soil	3428-CMS-225	NORMAL	2/16/1999	CMS-225	0	0.25	IT						x					
Source Area soil	3428-CMS-226	NORMAL	2/17/1999	CMS-226	0	0.25	IT						x					
Source Area soil	3428-CMS-227	NORMAL	2/17/1999	CMS-227	0	0.25	IT						x					
Source Area soil	3428-CMS-228	NORMAL	2/17/1999	CMS-228	0	0.25	IT						x					
Source Area soil	3428-CMS-229	NORMAL	2/17/1999	CMS-229	0	0.25	IT						x					
Source Area soil	3428-CMS-230	NORMAL	2/17/1999	CMS-230	0	0.25	IT						x					
Source Area soil	3428-CMS-231	NORMAL	2/17/1999	CMS-231	0	0.25	IT						x					
Source Area soil	3428-CMS-232	NORMAL	2/17/1999	CMS-232	0	0.25	IT						x					
Source Area soil	3428-CMS-233	NORMAL	2/17/1999	CMS-233	0	0.25	IT						x					
Source Area soil	3428-CMS-234	NORMAL	2/17/1999	CMS-234	0	0.25	IT						x					
Source Area soil	3428-CMS-235	NORMAL	2/17/1999	CMS-235	0	0.25	IT						x					
Source Area soil	3428-CMS-236	NORMAL	2/17/1999	CMS-236	0	0.25	IT						x					
Source Area soil	3428-CMS-237	NORMAL	2/17/1999	CMS-237	0	0.25	IT						x					
Source Area soil	3428-CMS-238	NORMAL	2/17/1999	CMS-238	0	0.25	IT						x					
Source Area soil	3428-CMS-239	NORMAL	2/17/1999	CMS-239	0	0.25	IT						x					
Source Area soil	3428-CMS-240	NORMAL	2/17/1999	CMS-240	0	0.25	IT						x					
Source Area soil	3428-CMS-241	NORMAL	2/17/1999	CMS-241	0	0.25	IT						x					

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	3428-CMS-242	NORMAL	2/17/1999	CMS-242	0	0.25	IT						x					
Source Area soil	B-1, S-3	NORMAL	3/12/1999	GEC-1	8.5	10.5	GEC						x					
Source Area soil	B-1, S-4	NORMAL	3/12/1999	GEC-1	13.5	15.5	GEC		x			x						
Source Area soil	B-2, S-2	NORMAL	3/11/1999	GEC-2	5	7	GEC	x	x				x					
Source Area soil	B-3, S-3	NORMAL	3/11/1999	GEC-3	8	10	GEC	x										
Source Area soil	B-3, S-4	NORMAL	3/11/1999	GEC-3	10	12	GEC		x			x	x					
Source Area soil	B-4, S-2	NORMAL	3/11/1999	GEC-4	5	7	GEC	x	x				x					
Source Area soil	B-5, S-2	NORMAL	3/11/1999	GEC-5	5	7	GEC	x										
Source Area soil	B-5, S-3	NORMAL	3/11/1999	GEC-5	8	10	GEC		x									
Source Area soil	B-5, S-4	NORMAL	3/11/1999	GEC-5	10	12	GEC					x	x					
Source Area soil	B-6, S-2	NORMAL	3/12/1999	GEC-6	2.5	4.5	GEC	x	x				x					
Source Area soil	B-7, S-2	NORMAL	3/12/1999	GEC-7	2.5	4.5	GEC	x				x	x					
Source Area soil	BV01-COMP (3)	NORMAL	11/5/1999	BV01COMP	0	4	IT		x	x	x		x					
Source Area soil	BV01-FD	Field Dup. CMS-701-A	11/5/1999	CMS-701	0	1	IT					x		x				
Source Area soil	CMS-051-A	NORMAL	7/2/1999	CMS-051	0	1	IT							x				
Source Area soil	CMS-051-B	NORMAL	7/2/1999	CMS-051	1	2	IT							x				
Source Area soil	CMS-051-C	NORMAL	7/2/1999	CMS-051	2	3	IT							x				
Source Area soil	CMS-057-A	NORMAL	7/1/1999	CMS-057	0	1	IT							x				
Source Area soil	CMS-057-B	NORMAL	7/1/1999	CMS-057	1	2	IT							x				
Source Area soil	CMS-057-C	NORMAL	7/1/1999	CMS-057	2	3	IT							x				
Source Area soil	CMS-057-D	NORMAL	7/1/1999	CMS-057	3	4	IT							x				
Source Area soil	CMS-060-A	Field Dup. CMS-060-A	6/30/1999	CMS-060	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-060-A-QC	Field Dup. CMS-060-A	6/30/1999	CMS-060	0	1	IT							x				
Source Area soil	CMS-060-B	NORMAL	6/30/1999	CMS-060	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-060-C	NORMAL	6/30/1999	CMS-060	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-060-D	NORMAL	6/30/1999	CMS-060	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-060-E	NORMAL	6/30/1999	CMS-060	4	5	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-063-A	NORMAL	7/2/1999	CMS-063	0	1	IT							x				
Source Area soil	CMS-063-B	NORMAL	7/2/1999	CMS-063	1	2	IT							x				
Source Area soil	CMS-069-A	NORMAL	6/30/1999	CMS-069	0	1	IT							x				
Source Area soil	CMS-069-B	Field Dup. CMS-069-B	6/30/1999	CMS-069	1	2	IT							x				
Source Area soil	CMS-069-B-QC	Field Dup. CMS-069-B	6/30/1999	CMS-069	1	2	IT							x				
Source Area soil	CMS-069-C	NORMAL	6/30/1999	CMS-069	2	3	IT							x				
Source Area soil	CMS-069-D	NORMAL	6/30/1999	CMS-069	3	4	IT							x				
Source Area soil	CMS-069-E	NORMAL	6/30/1999	CMS-069	4	5	IT							x				
Source Area soil	CMS-069-F	NORMAL	6/30/1999	CMS-069	5	6	IT							x				
Source Area soil	CMS-069-G	NORMAL	6/30/1999	CMS-069	6	7	IT							x				
Source Area soil	CMS-069-H	NORMAL	6/30/1999	CMS-069	7	8	IT							x				
Source Area soil	CMS-074-A	NORMAL	6/29/1999	CMS-074	0	1	IT							x				
Source Area soil	CMS-074-B	NORMAL	6/29/1999	CMS-074	1	2	IT							x				
Source Area soil	CMS-074-C	NORMAL	6/29/1999	CMS-074	2	3	IT							x				
Source Area soil	CMS-075-A	NORMAL	6/30/1999	CMS-075	0	1	IT							x				
Source Area soil	CMS-075-B	NORMAL	6/30/1999	CMS-075	1	2	IT							x				
Source Area soil	CMS-075-C	NORMAL	6/30/1999	CMS-075	2	3	IT							x				
Source Area soil	CMS-075-D	NORMAL	6/30/1999	CMS-075	3	4	IT							x				
Source Area soil	CMS-076-A	NORMAL	6/29/1999	CMS-076	0	1	IT							x				
Source Area soil	CMS-076-B	NORMAL	6/29/1999	CMS-076	1	2	IT							x				
Source Area soil	CMS-076-C	NORMAL	6/29/1999	CMS-076	2	3	IT							x				
Source Area soil	CMS-081-A	NORMAL	6/29/1999	CMS-081	0	1	IT							x				
Source Area soil	CMS-081-B	NORMAL	6/29/1999	CMS-081	1	2	IT							x				

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Source Area soil	CMS-082-A	NORMAL	6/29/1999	CMS-082	0	1	IT						x					
Source Area soil	CMS-082-B	NORMAL	6/29/1999	CMS-082	1	2	IT						x					
Source Area soil	CMS-089-A	NORMAL	6/28/1999	CMS-089	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-089-B	NORMAL	6/28/1999	CMS-089	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-089-C	NORMAL	6/28/1999	CMS-089	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-089-D	NORMAL	6/28/1999	CMS-089	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-093-A	NORMAL	6/30/1999	CMS-093	0	1	IT						x					
Source Area soil	CMS-094-A	NORMAL	6/29/1999	CMS-094	0	1	IT						x					
Source Area soil	CMS-098-A	NORMAL	6/28/1999	CMS-098	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-102-A	NORMAL	6/29/1999	CMS-102	0	1	IT						x					
Source Area soil	CMS-109-A	NORMAL	6/29/1999	CMS-109	0	1	IT						x					
Source Area soil	CMS-117-A	NORMAL	6/29/1999	CMS-117	0	1	IT						x					
Source Area soil	CMS-118-A	NORMAL	6/30/1999	CMS-118	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-118-B	NORMAL	6/30/1999	CMS-118	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-118-C	NORMAL	6/30/1999	CMS-118	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-118-D	NORMAL	6/30/1999	CMS-118	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-118-E	NORMAL	6/30/1999	CMS-118	4	5	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-131-A	NORMAL	6/25/1999	CMS-131	0	1	IT					x		x				
Source Area soil	CMS-131-B	NORMAL	6/25/1999	CMS-131	1	2	IT					x		x				
Source Area soil	CMS-131-C	NORMAL	6/25/1999	CMS-131	2	3	IT					x		x				
Source Area soil	CMS-131-D	NORMAL	6/25/1999	CMS-131	3	4	IT					x		x				
Source Area soil	CMS-134-A	NORMAL	6/24/1999	CMS-134	0	1	IT					x		x				
Source Area soil	CMS-135-A	NORMAL	6/25/1999	CMS-135	0	1	IT							x				
Source Area soil	CMS-140-A	NORMAL	6/24/1999	CMS-140	0	1	IT					x		x				
Source Area soil	CMS-141-A	NORMAL	6/24/1999	CMS-141	0	1	IT					x		x				
Source Area soil	CMS-142-A	Field Dup. CMS-142-A	6/28/1999	CMS-142	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-142-A-QC	Field Dup. CMS-142-A	6/28/1999	CMS-142	0	1	IT							x				
Source Area soil	CMS-147-A	NORMAL	6/24/1999	CMS-147	0	1	IT					x		x				
Source Area soil	CMS-147-B	NORMAL	6/24/1999	CMS-147	1	2	IT					x		x				
Source Area soil	CMS-147-C	Field Dup. CMS-147-C	6/24/1999	CMS-147	2	3	IT					x		x				
Source Area soil	CMS-147-C-QC	Field Dup. CMS-147-C	6/24/1999	CMS-147	2	3	IT							x				
Source Area soil	CMS-148-A	NORMAL	6/24/1999	CMS-148	0	1	IT					x		x				
Source Area soil	CMS-149-A	NORMAL	6/25/1999	CMS-149	0	1	IT							x				
Source Area soil	CMS-150-A	Field Dup. CMS-150-A	6/25/1999	CMS-150	0	1	IT							x				
Source Area soil	CMS-150-A-QC	Field Dup. CMS-150-A	6/25/1999	CMS-150	0	1	IT							x				
Source Area soil	CMS-150-B	NORMAL	6/25/1999	CMS-150	1	2	IT							x				
Source Area soil	CMS-152-A	NORMAL	6/21/1999	CMS-152	0	1	IT					x		x				
Source Area soil	CMS-152-B	NORMAL	6/21/1999	CMS-152	1	2	IT					x		x				
Source Area soil	CMS-152-C	NORMAL	6/21/1999	CMS-152	2	3	IT					x		x				
Source Area soil	CMS-153-A	NORMAL	6/22/1999	CMS-153	0	1	IT					x		x				
Source Area soil	CMS-153-B	Field Dup. CMS-153-B	6/22/1999	CMS-153	1	2	IT					x		x				
Source Area soil	CMS-153-B-QC	Field Dup. CMS-153-B	6/22/1999	CMS-153	1	2	IT							x				
Source Area soil	CMS-153-C	NORMAL	6/22/1999	CMS-153	2	3	IT					x		x				
Source Area soil	CMS-153-D	NORMAL	6/22/1999	CMS-153	3	4	IT					x		x				
Source Area soil	CMS-153-E	NORMAL	6/22/1999	CMS-153	4	5	IT					x		x				
Source Area soil	CMS-153-F	NORMAL	6/22/1999	CMS-153	5	5.5	IT					x		x				
Source Area soil	CMS-154-A	NORMAL	6/22/1999	CMS-154	0	1	IT					x		x				
Source Area soil	CMS-154-B	NORMAL	6/22/1999	CMS-154	1	2	IT					x		x				
Source Area soil	CMS-154-C	NORMAL	6/22/1999	CMS-154	2	3	IT					x		x				
Source Area soil	CMS-155-A	NORMAL	6/22/1999	CMS-155	0	1	IT					x		x				

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-155-B	NORMAL	6/22/1999	CMS-155	1	2	IT					x		x				
Source Area soil	CMS-155-D	NORMAL	7/2/1999	CMS-155	3	4	IT					x		x				
Source Area soil	CMS-155-E	NORMAL	7/2/1999	CMS-155	4	5	IT					x		x				
Source Area soil	CMS-155-F	NORMAL	7/2/1999	CMS-155	5	6	IT					x		x				
Source Area soil	CMS-156-A	NORMAL	6/24/1999	CMS-156	0	1	IT					x		x				
Source Area soil	CMS-157-A	NORMAL	6/29/1999	CMS-157	0	1	IT							x				
Source Area soil	CMS-158-A	NORMAL	6/29/1999	CMS-158	0	1	IT							x				
Source Area soil	CMS-159-A	NORMAL	7/1/1999	CMS-159	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-160-A	NORMAL	6/23/1999	CMS-160	0	1	IT					x		x				
Source Area soil	CMS-160-B	NORMAL	6/23/1999	CMS-160	1	2	IT					x		x				
Source Area soil	CMS-160-C	NORMAL	6/23/1999	CMS-160	2	3	IT					x		x				
Source Area soil	CMS-161-A	NORMAL	6/23/1999	CMS-161	0	1	IT					x		x				
Source Area soil	CMS-161-B	Field Dup. CMS-161-B	6/23/1999	CMS-161	1	2	IT					x		x				
Source Area soil	CMS-161-B-QC	Field Dup. CMS-161-B	6/23/1999	CMS-161	1	2	IT							x				
Source Area soil	CMS-162-A	Field Dup. CMS-162-A	6/22/1999	CMS-162	0	1	IT					x		x				
Source Area soil	CMS-162-B	NORMAL	6/22/1999	CMS-162	1	2	IT					x		x				
Source Area soil	CMS-162-C	NORMAL	6/22/1999	CMS-162	2	3	IT					x		x				
Source Area soil	CMS-162-D	Field Dup. CMS-162-D	7/2/1999	CMS-162	3	4	IT					x		x				
Source Area soil	CMS-162-D-QC	Field Dup. CMS-162-D	7/2/1999	CMS-162	3	4	IT							x				
Source Area soil	CMS-164-A	NORMAL	6/22/1999	CMS-164	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-165-A	NORMAL	6/29/1999	CMS-165	0	1	IT							x				
Source Area soil	CMS-166-A	NORMAL	6/29/1999	CMS-166	0	1	IT							x				
Source Area soil	CMS-167-A	NORMAL	6/29/1999	CMS-167	0	1	IT							x				
Source Area soil	CMS-168-A	NORMAL	6/25/1999	CMS-168	0	1	IT					x		x				
Source Area soil	CMS-168-B	NORMAL	6/25/1999	CMS-168	1	2	IT					x		x				
Source Area soil	CMS-168-C	NORMAL	6/25/1999	CMS-168	2	3	IT					x		x				
Source Area soil	CMS-169-A	NORMAL	6/25/1999	CMS-169	0	1	IT					x		x				
Source Area soil	CMS-170-A	NORMAL	6/24/1999	CMS-170	0	1	IT					x		x				
Source Area soil	CMS-170-B	Field Dup. CMS-170-B	6/24/1999	CMS-170	1	2	IT					x		x				
Source Area soil	CMS-171-A	NORMAL	6/24/1999	CMS-171	0	1	IT					x		x				
Source Area soil	CMS-172-A	NORMAL	6/29/1999	CMS-172	0	1	IT							x				
Source Area soil	CMS-173-A	NORMAL	6/28/1999	CMS-173	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-173-B	NORMAL	6/28/1999	CMS-173	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-175-A	NORMAL	6/25/1999	CMS-175	0	1	IT					x		x				
Source Area soil	CMS-175-B	NORMAL	6/25/1999	CMS-175	1	2	IT					x		x				
Source Area soil	CMS-175-C	NORMAL	6/25/1999	CMS-175	2	3	IT					x		x				
Source Area soil	CMS-175-D	NORMAL	6/25/1999	CMS-175	3	4	IT					x		x				
Source Area soil	CMS-232-A	NORMAL	6/29/1999	CMS-232	0	1	IT							x				
Source Area soil	CMS-232-B	NORMAL	6/29/1999	CMS-232	1	2	IT							x				
Source Area soil	CMS-237-A	NORMAL	6/23/1999	CMS-237	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-237-B	NORMAL	6/23/1999	CMS-237	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-237-C	NORMAL	6/23/1999	CMS-237	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-238-A	NORMAL	6/23/1999	CMS-238	0	1	IT					x		x				
Source Area soil	CMS-238-B	Field Dup. CMS-238-B	6/23/1999	CMS-238	1	2	IT					x		x				
Source Area soil	CMS-239-A	NORMAL	6/23/1999	CMS-239	0	1	IT					x		x				
Source Area soil	CMS-239-B	NORMAL	6/23/1999	CMS-239	1	2	IT					x		x				
Source Area soil	CMS-240-A	NORMAL	6/25/1999	CMS-240	0	1	IT					x		x				
Source Area soil	CMS-241-A	NORMAL	6/25/1999	CMS-241	0	1	IT					x		x				
Source Area soil	CMS-241-B	NORMAL	6/25/1999	CMS-241	1	2	IT					x		x				
Source Area soil	CMS-242-A	NORMAL	6/24/1999	CMS-242	0	1	IT					x		x				

Table B-1. List of Soil Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-242-B	NORMAL	6/24/1999	CMS-242	1	2	IT					x		x				
Source Area soil	CMS-400-A	NORMAL	6/21/1999	CMS-400	0	1	IT					x		x				
Source Area soil	CMS-400-B	NORMAL	6/21/1999	CMS-400	1	2	IT					x		x				
Source Area soil	CMS-400-C	NORMAL	6/21/1999	CMS-400	2	3	IT					x		x				
Source Area soil	CMS-400-D	NORMAL	6/21/1999	CMS-400	3	4	IT					x		x				
Source Area soil	CMS-400-E	NORMAL	6/21/1999	CMS-400	4	5	IT					x		x				
Source Area soil	CMS-400-F	NORMAL	6/21/1999	CMS-400	5	6	IT					x		x				
Source Area soil	CMS-401-A	NORMAL	6/22/1999	CMS-401	0	1	IT					x		x				
Source Area soil	CMS-401-B	NORMAL	6/22/1999	CMS-401	1	2	IT					x		x				
Source Area soil	CMS-401-C	NORMAL	6/22/1999	CMS-401	2	3	IT					x		x				
Source Area soil	CMS-401-D	NORMAL	6/22/1999	CMS-401	3	4	IT					x		x				
Source Area soil	CMS-402-A	NORMAL	6/22/1999	CMS-402	0	1	IT					x		x				
Source Area soil	CMS-402-B	NORMAL	6/22/1999	CMS-402	1	2	IT					x		x				
Source Area soil	CMS-402-C	NORMAL	6/22/1999	CMS-402	2	3	IT					x		x				
Source Area soil	CMS-402-D	NORMAL	6/22/1999	CMS-402	3	4	IT					x		x				
Source Area soil	CMS-402-E	NORMAL	6/22/1999	CMS-402	4	5	IT					x		x				
Source Area soil	CMS-402-F	NORMAL	6/22/1999	CMS-402	5	6	IT					x		x				
Source Area soil	CMS-403-A	NORMAL	6/22/1999	CMS-403	0	1	IT					x		x				
Source Area soil	CMS-403-B	NORMAL	6/22/1999	CMS-403	1	2	IT					x		x				
Source Area soil	CMS-403-C	NORMAL	6/22/1999	CMS-403	2	3	IT					x		x				
Source Area soil	CMS-403-D	NORMAL	6/22/1999	CMS-403	3	4	IT					x		x				
Source Area soil	CMS-403-E	NORMAL	6/22/1999	CMS-403	4	5	IT					x		x				
Source Area soil	CMS-404-A	Field Dup. CMS-404-A	6/22/1999	CMS-404	0	1	IT					x		x				
Source Area soil	CMS-404-A-QC	Field Dup. CMS-404-A	6/22/1999	CMS-404	0	1	IT							x				
Source Area soil	CMS-404-B	NORMAL	6/22/1999	CMS-404	1	2	IT					x		x				
Source Area soil	CMS-404-C	NORMAL	6/22/1999	CMS-404	2	3	IT					x		x				
Source Area soil	CMS-404-D	NORMAL	6/22/1999	CMS-404	3	4	IT					x		x				
Source Area soil	CMS-404-E	NORMAL	6/22/1999	CMS-404	4	5	IT					x		x				
Source Area soil	CMS-404-F	NORMAL	6/22/1999	CMS-404	5	6	IT					x		x				
Source Area soil	CMS-405-A	NORMAL	6/23/1999	CMS-405	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-405-B	Field Dup. CMS-405-B	6/23/1999	CMS-405	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-405-C	Field Dup. CMS-405-C	6/23/1999	CMS-405	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-405-C-QC	Field Dup. CMS-405-C	6/23/1999	CMS-405	2	3	IT							x				
Source Area soil	CMS-405-D	NORMAL	6/23/1999	CMS-405	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-405-E	NORMAL	6/23/1999	CMS-405	4	5	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-406-A	NORMAL	6/29/1999	CMS-406	0	1	IT					x		x				
Source Area soil	CMS-406-B	Field Dup. CMS-406-B	6/29/1999	CMS-406	1	2	IT					x		x				
Source Area soil	CMS-406-C	Field Dup. CMS-406-C	6/29/1999	CMS-406	2	3	IT					x		x				
Source Area soil	CMS-406-C-QC	Field Dup. CMS-406-C	6/29/1999	CMS-406	2	3	IT							x				
Source Area soil	CMS-406-D	NORMAL	6/29/1999	CMS-406	3	4	IT					x		x				
Source Area soil	CMS-407-A	NORMAL	6/28/1999	CMS-407	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-407-B	NORMAL	6/28/1999	CMS-407	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-407-C	NORMAL	6/28/1999	CMS-407	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-407-D	NORMAL	6/28/1999	CMS-407	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-408-A	NORMAL	6/28/1999	CMS-408	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-408-B	NORMAL	6/28/1999	CMS-408	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-408-C	NORMAL	6/28/1999	CMS-408	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-409-A	NORMAL	6/23/1999	CMS-409	0	1	IT					x		x				
Source Area soil	CMS-409-B	NORMAL	6/23/1999	CMS-409	1	2	IT					x		x				
Source Area soil	CMS-409-C	NORMAL	6/23/1999	CMS-409	2	3	IT					x		x				

Table B-1. List of Soil Samples ently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-409-D	NORMAL	6/23/1999	CMS-409	3	4	IT					x		x				
Source Area soil	CMS-409-E	Field Dup. CMS-409-E	6/23/1999	CMS-409	4	5	IT					x		x				
Source Area soil	CMS-409-F	Field Dup. CMS-409-F	6/23/1999	CMS-409	5	6	IT					x		x				
Source Area soil	CMS-409-F-QC	Field Dup. CMS-409-F	6/23/1999	CMS-409	5	6	IT							x				
Source Area soil	CMS-410-A	NORMAL	6/24/1999	CMS-410	0	1	IT					x		x				
Source Area soil	CMS-410-B	NORMAL	6/24/1999	CMS-410	1	2	IT					x		x				
Source Area soil	CMS-410-C	NORMAL	6/24/1999	CMS-410	2	3	IT					x		x				
Source Area soil	CMS-410-D	NORMAL	6/24/1999	CMS-410	3	4	IT					x		x				
Source Area soil	CMS-410-E	Field Dup. CMS-410-E	6/24/1999	CMS-410	4	5	IT					x		x				
Source Area soil	CMS-410-E-QC	Field Dup. CMS-410-E	6/24/1999	CMS-410	4	5	IT							x				
Source Area soil	CMS-410-F	NORMAL	6/24/1999	CMS-410	5	6	IT					x		x				
Source Area soil	CMS-411-A	NORMAL	6/24/1999	CMS-411	0	1	IT					x		x				
Source Area soil	CMS-411-B	NORMAL	6/24/1999	CMS-411	1	2	IT					x		x				
Source Area soil	CMS-411-C	NORMAL	6/24/1999	CMS-411	2	3	IT					x		x				
Source Area soil	CMS-411-D	NORMAL	6/24/1999	CMS-411	3	4	IT					x		x				
Source Area soil	CMS-411-E	NORMAL	6/24/1999	CMS-411	4	5	IT					x		x				
Source Area soil	CMS-412-A	NORMAL	6/25/1999	CMS-412	0	1	IT					x		x				
Source Area soil	CMS-412-B	NORMAL	6/25/1999	CMS-412	1	2	IT					x		x				
Source Area soil	CMS-412-C	NORMAL	6/25/1999	CMS-412	2	3	IT					x		x				
Source Area soil	CMS-412-D	NORMAL	6/25/1999	CMS-412	3	4	IT					x		x				
Source Area soil	CMS-413-A	NORMAL	6/25/1999	CMS-413	0	1	IT					x		x				
Source Area soil	CMS-413-B	NORMAL	6/25/1999	CMS-413	1	2	IT					x		x				
Source Area soil	CMS-413-C	NORMAL	6/25/1999	CMS-413	2	3	IT					x		x				
Source Area soil	CMS-414-A	NORMAL	6/25/1999	CMS-414	0	1	IT					x		x				
Source Area soil	CMS-414-B	NORMAL	6/25/1999	CMS-414	1	2	IT					x		x				
Source Area soil	CMS-414-C	NORMAL	6/25/1999	CMS-414	2	3	IT					x		x				
Source Area soil	CMS-414-D	NORMAL	6/25/1999	CMS-414	3	4	IT					x		x				
Source Area soil	CMS-415-A	NORMAL	6/25/1999	CMS-415	0	1	IT					x		x				
Source Area soil	CMS-415-B	NORMAL	6/25/1999	CMS-415	1	2	IT					x		x				
Source Area soil	CMS-415-C	NORMAL	6/25/1999	CMS-415	2	3	IT					x		x				
Source Area soil	CMS-415-D	NORMAL	6/25/1999	CMS-415	3	4	IT					x		x				
Source Area soil	CMS-416-A	NORMAL	6/25/1999	CMS-416	0	1	IT					x		x				
Source Area soil	CMS-416-B	Field Dup. CMS-416-B	6/25/1999	CMS-416	1	2	IT					x		x				
Source Area soil	CMS-416-C	NORMAL	6/25/1999	CMS-416	2	3	IT					x		x				
Source Area soil	CMS-416-D	Field Dup. CMS-416-D	6/25/1999	CMS-416	3	4	IT					x		x				
Source Area soil	CMS-416-D-QC	Field Dup. CMS-416-D	6/25/1999	CMS-416	3	4	IT							x				
Source Area soil	CMS-417-A	NORMAL	6/24/1999	CMS-417	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-417-B	NORMAL	6/24/1999	CMS-417	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-417-C	NORMAL	6/24/1999	CMS-417	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-417-D	NORMAL	6/24/1999	CMS-417	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-419-A	NORMAL	7/7/1999	CMS-419	0	1	IT					x		x				
Source Area soil	CMS-419-B	Field Dup. CMS-419-B	7/7/1999	CMS-419	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-419-B-QC	Field Dup. CMS-419-B	7/7/1999	CMS-419	1	2	IT							x				
Source Area soil	CMS-419-C	NORMAL	7/7/1999	CMS-419	2	3	IT					x		x				
Source Area soil	CMS-419-D	NORMAL	7/7/1999	CMS-419	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-419-E	NORMAL	7/7/1999	CMS-419	4	5	IT					x		x				
Source Area soil	CMS-419-F	NORMAL	7/7/1999	CMS-419	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-419-G	NORMAL	7/7/1999	CMS-419	6	7	IT					x		x				
Source Area soil	CMS-419-H	NORMAL	7/7/1999	CMS-419	7	8	IT	x	x	x		x	x	x				
Source Area soil	CMS-420-A	NORMAL	7/2/1999	CMS-420	0	1	IT					x		x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-420-B	Field Dup. CMS-420-B	7/2/1999	CMS-420	1	2	IT					x		x				
Source Area soil	CMS-420-C	Field Dup. CMS-420-C	7/2/1999	CMS-420	2	3	IT					x		x				
Source Area soil	CMS-420-C-QC	Field Dup. CMS-420-C	7/2/1999	CMS-420	2	3	IT							x				
Source Area soil	CMS-420-D	NORMAL	7/2/1999	CMS-420	3	4	IT					x		x				
Source Area soil	CMS-421-A	NORMAL	7/8/1999	CMS-421	0	1	IT					x		x				
Source Area soil	CMS-421-B	Field Dup. CMS-421-B	7/8/1999	CMS-421	1	2	IT					x		x				
Source Area soil	CMS-421-C	Field Dup. CMS-421-C	7/8/1999	CMS-421	2	3	IT					x		x				
Source Area soil	CMS-421-C-QC	Field Dup. CMS-421-C	7/8/1999	CMS-421	2	3	IT							x				
Source Area soil	CMS-421-D	NORMAL	7/8/1999	CMS-421	3	4	IT					x		x				
Source Area soil	CMS-421-E	NORMAL	7/8/1999	CMS-421	4	5	IT					x		x				
Source Area soil	CMS-421-F	NORMAL	7/8/1999	CMS-421	5	6	IT					x		x				
Source Area soil	CMS-421-G	NORMAL	7/8/1999	CMS-421	6	7	IT					x		x				
Source Area soil	CMS-421-H	NORMAL	7/8/1999	CMS-421	7	8	IT					x		x				
Source Area soil	CMS-422-A	NORMAL	7/2/1999	CMS-422	0	1	IT					x		x				
Source Area soil	CMS-422-B	NORMAL	7/2/1999	CMS-422	1	2	IT					x		x				
Source Area soil	CMS-422-C	NORMAL	7/2/1999	CMS-422	2	3	IT					x		x				
Source Area soil	CMS-422-D	NORMAL	7/2/1999	CMS-422	3	4	IT					x		x				
Source Area soil	CMS-423-A	NORMAL	7/7/1999	CMS-423	0	1	IT					x		x				
Source Area soil	CMS-423-B	NORMAL	7/7/1999	CMS-423	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-423-C	NORMAL	7/7/1999	CMS-423	2	3	IT					x		x				
Source Area soil	CMS-423-D	Field Dup. CMS-423-D	7/7/1999	CMS-423	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-423-E	NORMAL	7/7/1999	CMS-423	4	5	IT					x		x				
Source Area soil	CMS-423-F	NORMAL	7/7/1999	CMS-423	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-423-G	NORMAL	7/7/1999	CMS-423	6	7	IT					x		x				
Source Area soil	CMS-423-H	NORMAL	7/7/1999	CMS-423	7	8	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-424-A	NORMAL	7/2/1999	CMS-424	0	1	IT					x		x				
Source Area soil	CMS-424-B	NORMAL	7/2/1999	CMS-424	1	2	IT					x		x				
Source Area soil	CMS-424-C	NORMAL	7/2/1999	CMS-424	2	3	IT					x		x				
Source Area soil	CMS-424-D	NORMAL	7/2/1999	CMS-424	3	4	IT					x		x				
Source Area soil	CMS-424-E	NORMAL	7/2/1999	CMS-424	4	5	IT					x		x				
Source Area soil	CMS-424-F	NORMAL	7/2/1999	CMS-424	5	6	IT					x		x				
Source Area soil	CMS-424-G	NORMAL	7/2/1999	CMS-424	6	7	IT					x		x				
Source Area soil	CMS-424-H	NORMAL	7/2/1999	CMS-424	7	8	IT					x		x				
Source Area soil	CMS-425-A	NORMAL	7/8/1999	CMS-425	0	1	IT					x		x				
Source Area soil	CMS-425-B	NORMAL	7/8/1999	CMS-425	1	2	IT					x		x				
Source Area soil	CMS-425-C	NORMAL	7/8/1999	CMS-425	2	3	IT					x		x				
Source Area soil	CMS-425-D	NORMAL	7/8/1999	CMS-425	3	4	IT					x		x				
Source Area soil	CMS-425-E	Field Dup. CMS-425-E	7/8/1999	CMS-425	4	5	IT					x		x				
Source Area soil	CMS-425-E-QC	Field Dup. CMS-425-E	7/21/1999	CMS-425	4	5	IT							x				
Source Area soil	CMS-425-F	NORMAL	7/8/1999	CMS-425	5	6	IT					x		x				
Source Area soil	CMS-425-G	NORMAL	7/8/1999	CMS-425	6	7	IT					x		x				
Source Area soil	CMS-425-H	NORMAL	7/8/1999	CMS-425	7	8	IT					x		x				
Source Area soil	CMS-426-A	NORMAL	7/7/1999	CMS-426	0	1	IT					x		x				
Source Area soil	CMS-426-B	Field Dup. CMS-426-B	7/7/1999	CMS-426	1	2	IT					x		x				
Source Area soil	CMS-426-C	Field Dup. CMS-426-C	7/7/1999	CMS-426	2	3	IT					x		x				
Source Area soil	CMS-426-C-QC	Field Dup. CMS-426-C	7/7/1999	CMS-426	2	3	IT							x				
Source Area soil	CMS-426-D	NORMAL	7/7/1999	CMS-426	3	4	IT					x		x				
Source Area soil	CMS-426-E	NORMAL	7/7/1999	CMS-426	4	5	IT					x		x				
Source Area soil	CMS-426-F	NORMAL	7/7/1999	CMS-426	5	6	IT					x		x				
Source Area soil	CMS-426-G	NORMAL	7/7/1999	CMS-426	6	7	IT					x		x				

Table B-1. List of Soil Samples ently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-426-H	NORMAL	7/7/1999	CMS-426	7	8	IT					x		x				
Source Area soil	CMS-427-A	NORMAL	7/6/1999	CMS-427	0	1	IT					x		x				
Source Area soil	CMS-427-B	NORMAL	7/6/1999	CMS-427	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-427-C	NORMAL	7/6/1999	CMS-427	2	3	IT					x		x				
Source Area soil	CMS-427-D	NORMAL	7/6/1999	CMS-427	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-427-E	NORMAL	7/6/1999	CMS-427	4	5	IT					x		x				
Source Area soil	CMS-427-F	NORMAL	7/6/1999	CMS-427	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-427-G	NORMAL	7/6/1999	CMS-427	6	7	IT					x		x				
Source Area soil	CMS-427-H	NORMAL	7/6/1999	CMS-427	7	8	IT	x	x	x		x	x	x				
Source Area soil	CMS-428-A	NORMAL	7/20/1999	CMS-428	0	1	IT					x		x				
Source Area soil	CMS-428-B	NORMAL	7/20/1999	CMS-428	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-428-C	Field Dup. CMS-428-C	7/20/1999	CMS-428	2	3	IT					x		x				
Source Area soil	CMS-428-D	NORMAL	7/20/1999	CMS-428	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-428-E	Field Dup. CMS-428-E	7/20/1999	CMS-428	4	5	IT					x		x				
Source Area soil	CMS-428-E-QC	Field Dup. CMS-428-E	7/20/1999	CMS-428	4	5	IT							x				
Source Area soil	CMS-428-F	NORMAL	7/20/1999	CMS-428	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-429-A	NORMAL	7/8/1999	CMS-429	0	1	IT					x		x				
Source Area soil	CMS-429-B	NORMAL	7/8/1999	CMS-429	1	2	IT					x		x				
Source Area soil	CMS-429-C	NORMAL	7/8/1999	CMS-429	2	3	IT					x		x				
Source Area soil	CMS-429-D	NORMAL	7/8/1999	CMS-429	3	4	IT					x		x				
Source Area soil	CMS-429-E	NORMAL	7/8/1999	CMS-429	4	5	IT					x		x				
Source Area soil	CMS-429-F	NORMAL	7/7/1999	CMS-429	5	6	IT					x		x				
Source Area soil	CMS-429-G	NORMAL	7/7/1999	CMS-429	6	7	IT					x		x				
Source Area soil	CMS-429-H	NORMAL	7/8/1999	CMS-429	7	8	IT					x		x				
Source Area soil	CMS-430-A	NORMAL	7/9/1999	CMS-430	0	1	IT					x		x				
Source Area soil	CMS-430-B	NORMAL	7/9/1999	CMS-430	1	2	IT					x		x				
Source Area soil	CMS-430-C	NORMAL	7/9/1999	CMS-430	2	3	IT					x		x				
Source Area soil	CMS-431-A	NORMAL	7/9/1999	CMS-431	0	1	IT					x		x				
Source Area soil	CMS-431-B	NORMAL	7/9/1999	CMS-431	1	2	IT					x		x				
Source Area soil	CMS-431-C	NORMAL	7/9/1999	CMS-431	2	3	IT					x		x				
Source Area soil	CMS-432-A	NORMAL	7/9/1999	CMS-432	0	1	IT					x		x				
Source Area soil	CMS-432-B	Field Dup. CMS-432-B	7/9/1999	CMS-432	1	2	IT					x		x				
Source Area soil	CMS-432-C	Field Dup. CMS-432-C	7/9/1999	CMS-432	2	3	IT					x		x				
Source Area soil	CMS-432-C-QC	Field Dup. CMS-432-C	7/9/1999	CMS-432	2	3	IT							x				
Source Area soil	CMS-432-D	NORMAL	7/9/1999	CMS-432	3	4	IT					x		x				
Source Area soil	CMS-432-E	NORMAL	7/9/1999	CMS-432	4	5	IT					x		x				
Source Area soil	CMS-433-A	NORMAL	7/9/1999	CMS-433	0	1	IT					x		x				
Source Area soil	CMS-433-B	NORMAL	7/9/1999	CMS-433	1	2	IT					x		x				
Source Area soil	CMS-433-C	NORMAL	7/9/1999	CMS-433	2	3	IT					x		x				
Source Area soil	CMS-433-D	NORMAL	7/9/1999	CMS-433	3	4	IT					x		x				
Source Area soil	CMS-434-A	NORMAL	7/13/1999	CMS-434	0	1	IT							x				
Source Area soil	CMS-435-A	Field Dup. CMS-435-A	7/13/1999	CMS-435	0	1	IT							x				
Source Area soil	CMS-435-A-QC	Field Dup. CMS-435-A	7/13/1999	CMS-435	0	1	IT							x				
Source Area soil	CMS-436-A	NORMAL	7/13/1999	CMS-436	0	1	IT							x				
Source Area soil	CMS-436-B	NORMAL	7/13/1999	CMS-436	1	2	IT							x				
Source Area soil	CMS-437-A	NORMAL	7/13/1999	CMS-437	0	1	IT							x				
Source Area soil	CMS-437-B	NORMAL	7/13/1999	CMS-437	1	2	IT							x				
Source Area soil	CMS-437-C	NORMAL	7/13/1999	CMS-437	2	3	IT							x				
Source Area soil	CMS-437-D	NORMAL	7/13/1999	CMS-437	3	4	IT							x				
Source Area soil	CMS-438-A	NORMAL	7/13/1999	CMS-438	0	1	IT							x				

Table B-1. List of Soil Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-438-B	NORMAL	7/13/1999	CMS-438	1	2	IT						x					
Source Area soil	CMS-439-A	NORMAL	7/13/1999	CMS-439	0	1	IT						x					
Source Area soil	CMS-439-B	NORMAL	7/13/1999	CMS-439	1	2	IT						x					
Source Area soil	CMS-440-A	NORMAL	7/13/1999	CMS-440	0	1	IT						x					
Source Area soil	CMS-441-A	NORMAL	7/13/1999	CMS-441	0	1	IT						x					
Source Area soil	CMS-441-B	NORMAL	7/13/1999	CMS-441	1	2	IT						x					
Source Area soil	CMS-442-A	NORMAL	7/13/1999	CMS-442	0	1	IT						x					
Source Area soil	CMS-443-A	NORMAL	7/14/1999	CMS-443	0	1	IT						x					
Source Area soil	CMS-444-A	NORMAL	7/14/1999	CMS-444	0	1	IT						x					
Source Area soil	CMS-445-A	NORMAL	7/14/1999	CMS-445	0	1	IT						x					
Source Area soil	CMS-448-D	NORMAL	7/20/1999	CMS-448	3	4	IT					x	x					
Source Area soil	CMS-448-E	NORMAL	7/20/1999	CMS-448	4	5	IT					x	x					
Source Area soil	CMS-448-F	NORMAL	7/20/1999	CMS-448	5	6	IT					x	x					
Source Area soil	CMS-448-G	NORMAL	7/20/1999	CMS-448	6	7	IT					x	x					
Source Area soil	CMS-448-H	NORMAL	7/20/1999	CMS-448	7	8	IT					x	x					
Source Area soil	CMS-448-I	NORMAL	7/20/1999	CMS-448	8	9	IT					x	x					
Source Area soil	CMS-448-J	NORMAL	7/20/1999	CMS-448	9	10	IT					x	x					
Source Area soil	CMS-449-E	NORMAL	7/20/1999	CMS-449	4	5	IT					x	x					
Source Area soil	CMS-449-F	NORMAL	7/20/1999	CMS-449	5	6	IT	x	x	x	x	x	x					
Source Area soil	CMS-449-G	NORMAL	7/20/1999	CMS-449	6	7	IT					x	x					
Source Area soil	CMS-449-H	NORMAL	7/20/1999	CMS-449	7	8	IT	x	x	x	x	x	x					
Source Area soil	CMS-449-I	NORMAL	7/20/1999	CMS-449	8	9	IT					x	x					
Source Area soil	CMS-449-J	NORMAL	7/20/1999	CMS-449	9	10	IT	x	x	x	x	x	x					
Source Area soil	CMS-450-D	NORMAL	7/21/1999	CMS-450	3	4	IT					x	x					
Source Area soil	CMS-450-E	NORMAL	7/21/1999	CMS-450	4	5	IT					x	x					
Source Area soil	CMS-450-F	NORMAL	7/21/1999	CMS-450	5	6	IT					x	x					
Source Area soil	CMS-450-G	NORMAL	7/21/1999	CMS-450	6	7	IT					x	x					
Source Area soil	CMS-450-H	NORMAL	7/21/1999	CMS-450	7	8	IT					x	x					
Source Area soil	CMS-450-I	NORMAL	7/21/1999	CMS-450	8	9	IT					x	x					
Source Area soil	CMS-450-J	NORMAL	7/21/1999	CMS-450	9	10	IT					x	x					
Source Area soil	CMS-451-E	NORMAL	7/20/1999	CMS-451	4	5	IT					x	x					
Source Area soil	CMS-451-F	NORMAL	7/20/1999	CMS-451	5	6	IT	x	x	x	x	x	x					
Source Area soil	CMS-451-G	NORMAL	7/20/1999	CMS-451	6	7	IT					x	x					
Source Area soil	CMS-451-H	NORMAL	7/20/1999	CMS-451	7	8	IT	x	x	x	x	x	x					
Source Area soil	CMS-451-I	NORMAL	7/20/1999	CMS-451	8	9	IT					x	x					
Source Area soil	CMS-451-J	NORMAL	7/20/1999	CMS-451	9	10	IT	x	x	x	x	x	x					
Source Area soil	CMS-452-E	Field Dup. CMS-452-E	7/21/1999	CMS-452	4	5	IT					x	x					
Source Area soil	CMS-452-F	NORMAL	7/21/1999	CMS-452	5	6	IT					x	x					
Source Area soil	CMS-452-G	NORMAL	7/21/1999	CMS-452	6	7	IT					x	x					
Source Area soil	CMS-452-H	NORMAL	7/21/1999	CMS-452	7	8	IT					x	x					
Source Area soil	CMS-452-I	NORMAL	7/21/1999	CMS-452	8	9	IT					x	x					
Source Area soil	CMS-452-J	NORMAL	7/21/1999	CMS-452	9	10	IT					x	x					
Source Area soil	CMS-453-D	Field Dup. CMS-453-D	7/21/1999	CMS-453	3	4	IT					x	x					
Source Area soil	CMS-453-D-QC	Field Dup. CMS-453-D	7/21/1999	CMS-453	3	4	IT						x					
Source Area soil	CMS-453-E	NORMAL	7/21/1999	CMS-453	4	5	IT					x	x					
Source Area soil	CMS-453-F	NORMAL	7/21/1999	CMS-453	5	6	IT					x	x					
Source Area soil	CMS-453-G	NORMAL	7/21/1999	CMS-453	6	7	IT					x	x					
Source Area soil	CMS-453-H	NORMAL	7/21/1999	CMS-453	7	8	IT					x	x					
Source Area soil	CMS-453-I	NORMAL	7/21/1999	CMS-453	8	9	IT					x	x					
Source Area soil	CMS-453-J	NORMAL	7/21/1999	CMS-453	9	10	IT					x	x					

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CMS-454-B	NORMAL	7/21/1999	CMS-454	1	2	IT					x		x				
Source Area soil	CMS-454-C	NORMAL	7/21/1999	CMS-454	2	3	IT					x		x				
Source Area soil	CMS-454-D	NORMAL	7/21/1999	CMS-454	3	4	IT					x		x				
Source Area soil	CMS-454-E	NORMAL	7/21/1999	CMS-454	4	5	IT					x		x				
Source Area soil	CMS-454-F	NORMAL	7/21/1999	CMS-454	5	6	IT					x		x				
Source Area soil	CMS-455-C	NORMAL	7/19/1999	CMS-455	2	3	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-455-D	NORMAL	7/19/1999	CMS-455	3	4	IT					x		x				
Source Area soil	CMS-455-E	NORMAL	7/19/1999	CMS-455	4	5	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-455-F	Field Dup. CMS-455-F	7/19/1999	CMS-455	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-455-F-QC	Field Dup. CMS-455-F	7/19/1999	CMS-455	5	6	IT							x				
Source Area soil	CMS-455-G	NORMAL	7/19/1999	CMS-455	6	7	IT					x		x				
Source Area soil	CMS-455-H	NORMAL	7/19/1999	CMS-455	7	8	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-455-I	NORMAL	7/19/1999	CMS-455	8	9	IT					x		x				
Source Area soil	CMS-455-J	NORMAL	7/19/1999	CMS-455	9	10	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-456-A	NORMAL	7/20/1999	CMS-456	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-456-B	NORMAL	7/20/1999	CMS-456	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	CMS-481-A	NORMAL	7/30/1999	CMS-481	0	1	IT							x				
Source Area soil	CMS-482-A	NORMAL	7/30/1999	CMS-482	0	1	IT							x				
Source Area soil	CMS-500-A	Field Dup. CMS-500-A	8/12/1999	CMS-500	0	1	IT							x				
Source Area soil	CMS-501-A	NORMAL	8/12/1999	CMS-501	0	1	IT							x				
Source Area soil	CMS-502-A	NORMAL	8/12/1999	CMS-502	0	1	IT							x				
Source Area soil	CMS-503-A	NORMAL	8/12/1999	CMS-503	0	1	IT							x				
Source Area soil	CMS-504-A	Field Dup. CMS-504-A	8/12/1999	CMS-504	0	1	IT							x				
Source Area soil	CMS-504-A-QC	Field Dup. CMS-504-A	8/13/1999	CMS-504	0	1	IT							x				
Source Area soil	CMS-505-A	NORMAL	8/12/1999	CMS-505	0	1	IT							x				
Source Area soil	CMS-506-A	NORMAL	8/12/1999	CMS-506	0	1	IT							x				
Source Area soil	CMS-507-A	NORMAL	8/12/1999	CMS-507	0	1	IT							x				
Source Area soil	CMS-508-A	NORMAL	8/12/1999	CMS-508	0	1	IT							x				
Source Area soil	CMS-700-A	NORMAL	11/5/1999	CMS-700	0	1	IT					x		x				
Source Area soil	CMS-700-B	NORMAL	11/5/1999	CMS-700	1	2	IT					x		x				
Source Area soil	CMS-701-A	Field Dup. CMS-701-A	11/5/1999	CMS-701	0	1	IT					x		x				
Source Area soil	CMS-701-B	NORMAL	11/5/1999	CMS-701	1	2	IT					x		x				
Source Area soil	CMS-701-C	NORMAL	11/5/1999	CMS-701	2	3	IT					x		x				
Source Area soil	CMS-702-A	NORMAL	11/5/1999	CMS-702	0	1	IT	x				x		x				
Source Area soil	CMS-702-B	NORMAL	11/5/1999	CMS-702	1	2	IT					x		x				
Source Area soil	CMS-703-A	NORMAL	11/5/1999	CMS-703	0	1	IT	x				x		x				
Source Area soil	CMS-703-B	NORMAL	11/5/1999	CMS-703	1	2	IT					x		x				
Source Area soil	CMS-703-COMP	NORMAL	11/5/1999	CMS-703	0	2	IT		x	x	x		x					
Source Area soil	CMS-DU-111902A-01	DU	11/19/2002	CMS-4106	0	1	MACTEC							x				
Source Area soil	CMS-DU-112202A-01	DU	11/22/2002	CMS-4104	0	1	MACTEC							x				
Source Area soil	CM-SO-DUP-01	Field Dup. CM-SO-MW05-0102	6/18/2001	MW05S	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-DUP02	Field Dup. CM-SO-MW08-0204	12/26/2000	MW08S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-DUP02-0701	Field Dup. CM-SO-MW02-6466	7/2/2001	MW02S	64	66	TTNUS	x										
Source Area soil	CM-SO-DUP03	Field Dup. CM-SO-SB02-0204	1/3/2001	SB02	2	4	TTNUS		x		x	x	x					
Source Area soil	CM-SO-DUP03-0701	Field Dup. CM-SO-MW14-0102	7/13/2001	MW14M	1	2	TTNUS	x	x		x	x	x	x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CM-SO-DUP04	Field Dup. CM-SO-MW02-0406	1/5/2001	MW02S	4	6	TTNUS	x					x					
Source Area soil	CM-SO-DUP-04	Field Dup. CM-SO-MW04B-4244	8/2/2001	MW04B	42	44	TTNUS	x										
Source Area soil	CM-SO-DUP05	Field Dup. CM-SO-SB03-0406	1/9/2001	SB03	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-DUP-05	Field Dup. CM-SO-MW15D-0406	8/7/2001	MW15D	4	6	TTNUS	x						x				
Source Area soil	CM-SO-DUP05-0801	Field Dup. CM-SO-MW15D-0406	8/7/2001	MW15D	4	6	TTNUS		x		x	x	x					
Source Area soil	CM-SO-MW01-0102	NORMAL	12/28/2000	MW01S	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW01-0204	NORMAL	12/28/2000	MW01S	2	4	TTNUS	x	x		x	x		x				
Source Area soil	CM-SO-MW01-0406	NORMAL	12/28/2000	MW01S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW01-0608	NORMAL	12/28/2000	MW01S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW02-0204	NORMAL	1/5/2001	MW02S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW02-0406	Field Dup. CM-SO-MW02-0406	1/5/2001	MW02S	4	6	TTNUS	x						x				
Source Area soil	CM-SO-MW02-0608	NORMAL	1/5/2001	MW02S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW02-0810	NORMAL	1/5/2001	MW02S	8	10	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW02-1820	NORMAL	1/5/2001	MW02S	18	20	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW02-6163	NORMAL	6/26/2001	MW02S	61	63	TTNUS	x										
Source Area soil	CM-SO-MW02-6466	Field Dup. CM-SO-MW02-6466	7/2/2001	MW02S	64	66	TTNUS	x										
Source Area soil	CM-SO-MW02-7272.2	NORMAL	7/3/2001	MW02S	72	72.2	TTNUS	x										
Source Area soil	CM-SO-MW03-0406	NORMAL	12/27/2000	MW03S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW03-0608	NORMAL	12/27/2000	MW03S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW04-0204	NORMAL	6/12/2001	MW04D	2	4	TTNUS	x						x				
Source Area soil	CM-SO-MW04-0406	NORMAL	6/12/2001	MW04D	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW04-0608	NORMAL	6/12/2001	MW04D	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW04B-4244	Field Dup. CM-SO-MW04B-4244	8/2/2001	MW04B	42	44	TTNUS	x										
Source Area soil	CM-SO-MW05-0102	Field Dup. CM-SO-MW05-0102	6/18/2001	MW05S	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW05-0204	NORMAL	6/18/2001	MW05S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW05-0406	NORMAL	6/19/2001	MW05S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW05-0810	NORMAL	6/19/2001	MW05S	8	10	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW05-1012	NORMAL	6/19/2001	MW05S	10	12	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW06-0204	Field Dup. CM-SO-MW06-0204	12/19/2000	MW06S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW06-0406	NORMAL	12/19/2000	MW06S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW06-0608	NORMAL	12/19/2000	MW06S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW06-DUP01	Field Dup. CM-SO-MW06-0204	12/19/2000	MW06S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW07-0304	NORMAL	12/21/2000	MW07S	3	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW07-0406	NORMAL	12/21/2000	MW07S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW07-0608	NORMAL	12/21/2000	MW07S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW08-0102	NORMAL	12/26/2000	MW08S	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW08-0204	Field Dup. CM-SO-MW08-0204	12/26/2000	MW08S	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW08-0406	NORMAL	12/26/2000	MW08S	4	6	TTNUS	x	x		x	x	x	x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Source Area soil	CM-SO-MW08-0608	NORMAL	12/26/2000	MW08S	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW09-0406	NORMAL	12/18/2000	MW09S	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW09-1011	NORMAL	12/18/2000	MW09S	10	11	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW14-0102	Field Dup. CM-SO-MW14-0102	7/13/2001	MW14M	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW14-0204	NORMAL	7/13/2001	MW14M	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW14-0607	NORMAL	7/13/2001	MW14M	6	7	TTNUS	x										
Source Area soil	CM-SO-MW14-0608	NORMAL	7/13/2001	MW14M	6	8	TTNUS		x		x	x	x	x				
Source Area soil	CM-SO-MW14-0708	NORMAL	7/13/2001	MW14M	7	8	TTNUS	x										
Source Area soil	CM-SO-MW14-5252.75	NORMAL	7/18/2001	MW14M	52	52.75	TTNUS	x										
Source Area soil	CM-SO-MW15D-0204	NORMAL	8/7/2001	MW15D	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW15D-0406	Field Dup. CM-SO-MW15D-0406	8/7/2001	MW15D	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW15D-0608	NORMAL	8/7/2001	MW15D	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-MW15D-4850	NORMAL	8/8/2001	MW15D	48	50	TTNUS	x										
Source Area soil	CM-SO-SB02-0204	Field Dup. CM-SO-SB02-0204	1/3/2001	SB02	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB02-0406	NORMAL	1/3/2001	SB02	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB02-0608	NORMAL	1/3/2001	SB02	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB03-0204	NORMAL	1/9/2001	SB03	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB03-0406	Field Dup. CM-SO-SB03-0406	1/9/2001	SB03	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB03-0608	NORMAL	1/9/2001	SB03	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB03-1820	NORMAL	1/9/2001	SB03	18	20	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB-14-271-0102	NORMAL	6/21/2001	SB-14-271	1	2	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB-14-271-0204	NORMAL	6/21/2001	SB-14-271	2	4	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB-14-271-0406	NORMAL	6/21/2001	SB-14-271	4	6	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB-14-271-0608	NORMAL	6/21/2001	SB-14-271	6	8	TTNUS	x	x		x	x	x	x				
Source Area soil	CM-SO-SB-14-271-1416	NORMAL	6/21/2001	SB-14-271	14	16	TTNUS	x										
Source Area soil	CMS-SS-4101-1019-01	NORMAL	11/22/2002	CMS-4101	1	1.9	MACTEC							x				
Source Area soil	CMS-SS-4101-3042-01	NORMAL	11/22/2002	CMS-4101	3	4.2	MACTEC							x				
Source Area soil	CMS-SS-4102-0008-01	NORMAL	11/22/2002	CMS-4102	0	0.8	MACTEC							x				
Source Area soil	CMS-SS-4102-1019-01	NORMAL	11/22/2002	CMS-4102	1	1.9	MACTEC							x				
Source Area soil	CMS-SS-4102-3038-01	NORMAL	11/22/2002	CMS-4102	3	3.8	MACTEC							x				
Source Area soil	CMS-SS-4103-0010-01	NORMAL	11/22/2002	CMS-4103	0	1	MACTEC							x				
Source Area soil	CMS-SS-4104-0010-01	NORMAL	11/22/2002	CMS-4104	0	1	MACTEC							x				
Source Area soil	CMS-SS-4105-0010-01	NORMAL	11/20/2002	CMS-4105	0	1	MACTEC		x		x	x	x			x	x	x
Source Area soil	CMS-SS-4105-1015-01	NORMAL	11/20/2002	CMS-4105	1	1.5	MACTEC							x				
Source Area soil	CMS-SS-4105-3040-01	NORMAL	11/20/2002	CMS-4105	3	4	MACTEC							x				
Source Area soil	CMS-SS-4106-0010-01	NORMAL	11/19/2002	CMS-4106	0	1	MACTEC							x				
Source Area soil	CMS-SS-4106-1016-01	NORMAL	11/19/2002	CMS-4106	1	1.6	MACTEC							x				
Source Area soil	CMS-SS-4106-3036-01	NORMAL	11/19/2002	CMS-4106	3	3.6	MACTEC							x				
Source Area soil	CMS-SS-4107-1030-01	NORMAL	11/21/2002	CMS-4107	1	3	MACTEC							x				
Source Area soil	CMS-SS-4107-3040-01	NORMAL	11/21/2002	CMS-4107	3	4	MACTEC							x				
Source Area soil	CMS-SS-4108-0010-01	NORMAL	11/21/2002	CMS-4108	0	1	MACTEC							x				
Source Area soil	CMS-SS-4108-1030-01	NORMAL	11/21/2002	CMS-4108	1	3	MACTEC							x				
Source Area soil	CMS-SS-4108-3040-01	NORMAL	11/21/2002	CMS-4108	3	4	MACTEC							x				
Source Area soil	CMS-SS-4109-0010-01	NORMAL	11/18/2002	CMS-4109	0	1	MACTEC							x				
Source Area soil	CMS-SS-4109-1014-01	NORMAL	11/18/2002	CMS-4109	1	1.4	MACTEC							x				
Source Area soil	CMS-SS-4109-3038-01	NORMAL	11/18/2002	CMS-4109	3	3.8	MACTEC							x				

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Source Area soil	CMS-SS-4110-0010-01	NORMAL	11/19/2002	CMS-4110	0	1	MACTEC		x		x	x	x	x		x	x	x
Source Area soil	CMS-SS-4110-1015-01	NORMAL	11/19/2002	CMS-4110	1	1.5	MACTEC							x				
Source Area soil	CMS-SS-4110-3739-01	NORMAL	11/19/2002	CMS-4110	3.7	3.9	MACTEC							x				
Source Area soil	CMS-SS-4111-0009-01	NORMAL	11/21/2002	CMS-4111	0	0.9	MACTEC							x				
Source Area soil	CMS-SS-4111-1028-01	NORMAL	11/21/2002	CMS-4111	1	2.8	MACTEC							x				
Source Area soil	CMS-SS-4111-3046-01	NORMAL	11/21/2002	CMS-4111	3	4.5	MACTEC							x				
Source Area soil	CMW-DU-102799A	Field Dup. CMW-SD-2017-01	10/27/1999	CMW-SD-2017	0	0.5	TTNUS								x	x	x	x
Source Area soil	CMW-SD-2016-01	NORMAL	10/26/1999	CMW-SD-2016	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2017-01	Field Dup. CMW-SD-2017-01	10/27/1999	CMW-SD-2017	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2018-01	NORMAL	10/26/1999	CMW-SD-2018	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2019-01	NORMAL	10/26/1999	CMW-SD-2019	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2020-01	NORMAL	10/26/1999	CMW-SD-2020	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2021-01	NORMAL	10/26/1999	CMW-SD-2021	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Source Area soil	CMW-SD-2022-0.502-01	NORMAL	10/27/1999	CMW-SD-2022	0.5	2	TTNUS		x		x	x	x	x				
Source Area soil	CMW-SD-2022-022.5-01	NORMAL	10/27/1999	CMW-SD-2022	2	2.5	TTNUS		x		x	x	x	x				
Source Area soil	GEC-SS@CMS65	NORMAL	6/24/1999	CMS-065	0	10	GEC	x										
Source Area soil	GP01-FD	Field Dup. CMS-153-B	6/22/1999	CMS-153	1	2	IT					x		x				
Source Area soil	GP02-FD	Field Dup. CMS-404-A	6/22/1999	CMS-404	0	1	IT					x		x				
Source Area soil	GP03-FD	Field Dup. CMS-410-E	6/24/1999	CMS-410	4	5	IT					x		x				
Source Area soil	GP04-FD	Field Dup. CMS-405-B	6/23/1999	CMS-405	1	2	IT	x	x	x	x	x	x	x				
Source Area soil	GP05-FD	Field Dup. CMS-409-E	6/23/1999	CMS-409	4	5	IT					x		x				
Source Area soil	GP06-FD	Field Dup. CMS-416-B	6/25/1999	CMS-416	1	2	IT					x		x				
Source Area soil	GP07-FD	Field Dup. CMS-142-A	6/28/1999	CMS-142	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	GP08-FD	Field Dup. CMS-406-B	6/29/1999	CMS-406	1	2	IT					x		x				
Source Area soil	GP09-FD	Field Dup. CMS-060-A	6/30/1999	CMS-060	0	1	IT	x	x	x	x	x	x	x				
Source Area soil	GP10-FD	Field Dup. CMS-069-B	6/30/1999	CMS-069	1	2	IT							x				
Source Area soil	GP11-FD	Field Dup. CMS-420-B	7/2/1999	CMS-420	1	2	IT					x		x				
Source Area soil	GP12-FD	Field Dup. CMS-162-D	7/2/1999	CMS-162	3	4	IT					x		x				
Source Area soil	GP13-FD	Field Dup. CMS-423-D	7/7/1999	CMS-423	3	4	IT	x	x	x	x	x	x	x				
Source Area soil	GP14-FD	Field Dup. CMS-426-B	7/7/1999	CMS-426	1	2	IT					x		x				
Source Area soil	GP15-FD	Field Dup. CMS-421-B	7/8/1999	CMS-421	1	2	IT					x		x				
Source Area soil	GP16-FD	Field Dup. CMS-432-B	7/9/1999	CMS-432	1	2	IT					x		x				
Source Area soil	GP17-FD	Field Dup. CMS-455-F	7/19/1999	CMS-455	5	6	IT	x	x	x	x	x	x	x				
Source Area soil	GP18-FD	Field Dup. CMS-428-C	7/20/1999	CMS-428	2	3	IT					x		x				
Source Area soil	GP19-FD	Field Dup. CMS-453-D	7/21/1999	CMS-453	3	4	IT					x		x				
Source Area soil	GP20-FD	Field Dup. CMS-452-E	7/21/1999	CMS-452	4	5	IT					x		x				
Source Area soil	HA01-FD	Field Dup. CMS-162-A	6/22/1999	CMS-162	0	1	IT					x		x				
Source Area soil	HA02-FD	Field Dup. CMS-238-B	6/23/1999	CMS-238	1	2	IT					x		x				
Source Area soil	HA03-FD	Field Dup. CMS-170-B	6/24/1999	CMS-170	1	2	IT					x		x				
Source Area soil	HA04-FD	Field Dup. CMS-150-A	6/25/1999	CMS-150	0	1	IT							x				
Source Area soil	HA08-FD	Field Dup. CMS-435-A	7/13/1999	CMS-435	0	1	IT							x				
Source Area soil	HA09-FD	Field Dup. CMS-019-B	7/14/1999	CMS-019	1	2	IT							x				
Source Area soil	HA12-FD	Field Dup. CMS-464-A	7/27/1999	CMS-464	0	1	IT							x				
Source Area soil	HA16-FD	Field Dup. CMS-500-A	8/12/1999	CMS-500	0	1	IT							x				
Source Area soil	RES-SS-14-271-01	Field Dup. RES-SS-14-271-01	11/15/1999	RES-14-271-01	0	1	TTNUS		x		x	x	x					
Source Area soil	RES-SS-14-271-01A	NORMAL	12/2/1999	RES-14-271-01A	0	1	TTNUS							x				

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Source Area soil	RES-SS-14-272-01	Field Dup. RES-SS-14-272-01	11/18/1999	RES-14-272-01	0	1	TTNUS		x		x	x	x					
Source Area soil	RES-SS-14-302-01	NORMAL	11/18/1999	RES-14-302-01	0	1	TTNUS		x		x	x	x					
Source Area soil	RES-SS-14-303-01	NORMAL	11/15/1999	RES-14-303-01	0	1	TTNUS		x		x	x	x	x				
Source Area soil	RES-SS-14-303-02	NORMAL	11/15/1999	RES-14-303-02	0	1	TTNUS							x				
Source Area soil	RES-SS-14-333-01	NORMAL	11/15/1999	RES-14-333-01	0	1	TTNUS		x		x	x	x	x				
Source Area soil	RES-SS-14-333-02	NORMAL	11/15/1999	RES-14-333-02	0	1	TTNUS							x				
Source Area soil	RES-SS-14-333-03	NORMAL	11/15/1999	RES-14-333-03	0	1	TTNUS							x				
Source Area soil	RES-SS-DU-111599A	Field Dup. RES-SS-14-271-01	11/15/1999	RES-14-271-01	0	1	TTNUS		x		x	x	x					
Source Area soil	RES-SS-DU-111899A	Field Dup. RES-SS-14-272-01	11/18/1999	RES-14-272-01	0	1	TTNUS		x		x	x	x					
Source Area soil	SD-30	NORMAL	9/9/1998	SD-30	0	0.5	SPINA				x	x		x			x	
Source Area soil	SD-31	NORMAL	9/9/1998	SD-31	0	0.5	SPINA				x	x		x			x	
Source Area soil	SS-01	NORMAL	9/9/1998	SS-01	0	0	SPINA		x		x	x					x	
Source Area soil	SS-02	NORMAL	9/9/1998	SS-02	0	1.3	SPINA		x		x	x					x	
Source Area soil	SS-03	NORMAL	9/9/1998	SS-03	2.5	3.5	SPINA		x		x	x					x	
Source Area soil	SS-06	NORMAL	9/9/1998	SS-06	0	2	SPINA		x		x	x					x	
Source Area soil	SS-99-00	NORMAL	1/15/1999	SS-99-00	0	0.25	WESTON							x				
Source Area soil	SS-99-01	NORMAL	1/15/1999	SS-99-01	0	0.25	WESTON							x				
Source Area soil	SS-99-02	NORMAL	1/15/1999	SS-99-02	0	0.25	WESTON							x				
Source Area soil	SS-99-03	NORMAL	1/15/1999	SS-99-03	0	0.25	WESTON							x				
Source Area soil	SS-99-04	NORMAL	1/15/1999	SS-99-04	0	0.25	WESTON							x				
Source Area soil	SS-99-05	NORMAL	1/15/1999	SS-99-05	0	0.25	WESTON							x				
Source Area soil	SS-99-06	NORMAL	1/15/1999	SS-99-06	0	0.25	WESTON							x				
							Sample Number	146	154	74	148	423	146	763	7	9	15	9
Allendale soil	2108295	NORMAL	7/18/2002	06-DEL-100	0	2								x				
Allendale soil	2108303	NORMAL	7/19/2002	07-DEL-100	0	2								x				
Allendale soil	2108304	NORMAL	7/19/2002	07-DEL-202	0	2								x				
Allendale soil	2108305	NORMAL	7/19/2002	07-DEL-203	0	2								x				
Allendale soil	2108306	NORMAL	7/18/2002	07-DEL-201	0	2								x				
Allendale soil	2108307	NORMAL	7/19/2002	07-DEL-400	0	2								x				
Allendale soil	2108308	NORMAL	7/19/2002	07-DEL-300	0	2								x				
Allendale soil	2108310	NORMAL	7/19/2002	05-DEL-200	0	2								x				
Allendale soil	2108311	NORMAL	7/19/2002	05-DEL-100	0	2								x				
Allendale soil	2108313	NORMAL	7/19/2002	04-DEL-203	0	2								x				
Allendale soil	2108315	NORMAL	7/19/2002	04-DEL-202	0	2								x				
Allendale soil	2108316	NORMAL	7/19/2002	04-DEL-201	0	2								x				
Allendale soil	2108318	NORMAL	7/19/2002	04-DEL-100	0	2								x				
Allendale soil	2108319	NORMAL	7/19/2002	03/04-DEL-103	0	2								x				
Allendale soil	2108320	NORMAL	7/19/2002	03/04-DEL-101	0	2								x				
Allendale soil	2108321	NORMAL	7/19/2002	03/04-DEL-102	0	2								x				
Allendale soil	2108322	DU	7/19/2002	03/04-DEL-102	0	2								x				
Allendale soil	3428-CMS-018	NORMAL	2/17/1999	CMS-018	0	0.25	IT							x				
Allendale soil	3428-CMS-019	NORMAL	2/17/1999	CMS-019	0	0.25	IT							x				
Allendale soil	3428-CMS-184	NORMAL	2/17/1999	CMS-184	0	0.25	IT							x				
Allendale soil	3428-CMS-185	NORMAL	2/17/1999	CMS-185	0	0.25	IT							x				
Allendale soil	3428-CMS-189	NORMAL	2/17/1999	CMS-189	0	0.25	IT							x				

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Allendale soil	3428-CMS-197	NORMAL	2/17/1999	CMS-197	0	0.25	IT						x					
Allendale soil	CMS-019-A	NORMAL	7/14/1999	CMS-019	0	1	IT						x					
Allendale soil	CMS-019-B	Field Dup. CMS-019-B	7/14/1999	CMS-019	1	2	IT						x					
Allendale soil	CMS-019-B-QC	Field Dup. CMS-019-B	7/14/1999	CMS-019	1	2	IT						x					
Allendale soil	CMS-019-C	NORMAL	7/14/1999	CMS-019	2	3	IT						x					
Allendale soil	CMS-019-D	NORMAL	7/14/1999	CMS-019	3	4	IT						x					
Allendale soil	CMS-019-F	NORMAL	7/14/1999	CMS-019	5	6	IT						x					
Allendale soil	CMS-019-G	NORMAL	7/14/1999	CMS-019	6	7	IT						x					
Allendale soil	CMS-418-A	NORMAL	6/30/1999	CMS-418	0	1	IT	x	x	x	x	x	x	x				
Allendale soil	CMS-418-B	NORMAL	6/30/1999	CMS-418	1	2	IT	x	x	x	x	x	x	x				
Allendale soil	CMS-446-A	NORMAL	7/14/1999	CMS-446	0	1	IT						x					
Allendale soil	CMS-447-A	NORMAL	7/14/1999	CMS-447	0	1	IT						x					
Allendale soil	CMS-460-A	NORMAL	7/27/1999	CMS-460	0	1	IT						x					
Allendale soil	CMS-461-A	NORMAL	7/27/1999	CMS-461	0	1	IT						x					
Allendale soil	CMS-462-A	NORMAL	7/27/1999	CMS-462	0	1	IT						x					
Allendale soil	CMS-463-A	Field Dup. CMS-463-A	7/27/1999	CMS-463	0	1	IT						x					
Allendale soil	CMS-463-A-QC	Field Dup. CMS-463-A	7/27/1999	CMS-463	0	1	IT						x					
Allendale soil	CMS-464-A	Field Dup. CMS-464-A	7/27/1999	CMS-464	0	1	IT						x					
Allendale soil	CMS-466-A	NORMAL	7/27/1999	CMS-466	0	1	IT						x					
Allendale soil	CMS-469-A	NORMAL	7/27/1999	CMS-469	0	1	IT						x					
Allendale soil	CMS-473-A	NORMAL	7/29/1999	CMS-473	0	1	IT						x					
Allendale soil	CMS-474-A	NORMAL	7/29/1999	CMS-474	0	1	IT						x					
Allendale soil	CMS-474-B	NORMAL	7/29/1999	CMS-474	1	2	IT						x					
Allendale soil	CMS-474-C	NORMAL	7/29/1999	CMS-474	2	3	IT						x					
Allendale soil	CMS-475-A	NORMAL	7/29/1999	CMS-475	0	1	IT						x					
Allendale soil	CMS-478-A	NORMAL	7/29/1999	CMS-478	0	1	IT						x					
Allendale soil	CMS-479-A	NORMAL	7/29/1999	CMS-479	0	1	IT						x					
Allendale soil	CMS-480-A	NORMAL	7/29/1999	CMS-480	0	1	IT						x					
Allendale soil	CMS-485-A	NORMAL	7/30/1999	CMS-485	0	1	IT						x					
Allendale soil	CMS-486-A	NORMAL	7/30/1999	CMS-486	0	1	IT						x					
Allendale soil	CMS-488-A	NORMAL	7/30/1999	CMS-488	0	1	IT						x					
Allendale soil	CMS-491-A	NORMAL	7/30/1999	CMS-491	0	1	IT						x					
Allendale soil	CMS-492-A	NORMAL	7/30/1999	CMS-492	0	1	IT						x					
Allendale soil	CMS-497-A	NORMAL	8/12/1999	CMS-497	0	1	IT						x					
Allendale soil	CMS-498-A	NORMAL	8/12/1999	CMS-498	0	1	IT						x					
Allendale soil	CMS-499-A	NORMAL	8/12/1999	CMS-499	0	1	IT						x					
Allendale soil	RES-SS-14-210-02	NORMAL	11/16/1999	RES-14-210-02	0	1	TTNUS						x					
Allendale soil	RES-SS-14-210-03	NORMAL	11/16/1999	RES-14-210-03	0	1	TTNUS						x					
Allendale soil	RES-SS-14-365-02	NORMAL	11/15/1999	RES-14-365-02	0	1	TTNUS						x					
Allendale soil	RES-SS-14-365-03	NORMAL	11/15/1999	RES-14-365-03	0	1	TTNUS						x					
Allendale soil	RES-SS-14-366-03	NORMAL	11/15/1999	RES-14-366-03	0	1	TTNUS						x					
Allendale soil	RES-SS-14-399-02	NORMAL	11/17/1999	RES-14-399-02	0	1	TTNUS						x					
Allendale soil	RES-SS-14-421-01	NORMAL	11/19/1999	RES-14-421-01	0	1	TTNUS		x		x	x	x					
Allendale soil	RES-SS-14-422-02	NORMAL	12/2/1999	RES-14-422-02	0	1	TTNUS						x					
Allendale soil	RES-SS-14-425-02	NORMAL	12/2/1999	RES-14-425-02	0	1	TTNUS						x					
Allendale soil	RES-SS-14-425-03	NORMAL	12/2/1999	RES-14-425-03	0	1	TTNUS						x					
Allendale soil	SS-04	NORMAL	9/9/1998	SS-04	0	1.5	SPINA		x		x	x					x	
Allendale soil	SS-05	NORMAL	9/9/1998	SS-05	0	1.5	SPINA		x		x	x					x	
Allendale soil	2108294	NORMAL	7/18/2002	06-DEL-200	0	2							x					

Table B-1. List of Soil Samples ... antly in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
							Sample Number	2	5	2	5	5	3	68	0	0	2	0
Lyman Mill Soil	2108282	NORMAL	7/17/2002	12-DEL-101	0	1								x				
Lyman Mill Soil	2108283	NORMAL	7/17/2002	12-DEL-102	0	2								x				
Lyman Mill Soil	2108284	NORMAL	7/17/2002	12-DEL-103	0	1								x				
Lyman Mill Soil	2108286	NORMAL	7/17/2002	11-DEL-100	0	2								x				
Lyman Mill Soil	2108287	NORMAL	7/17/2002	12-DEL-200	0	1.5								x				
Lyman Mill Soil	2108288	NORMAL	7/17/2002	9-DEL-300	0	2								x				
Lyman Mill Soil	2108289	NORMAL	7/17/2002	9-DEL-100	0	2								x				
Lyman Mill Soil	2108290	NORMAL	7/17/2002	9-DEL-202	0	2								x				
Lyman Mill Soil	2108292	NORMAL	7/17/2002	9-DEL-203	0	2								x				
Lyman Mill Soil	2108293	NORMAL	7/17/2002	9-DEL-201	0	2								x				
Lyman Mill Soil	2108296	NORMAL	7/18/2002	10-DEL-302	0	2								x				
Lyman Mill Soil	2108297	NORMAL	7/18/2002	10-DEL-301	0	2								x				
Lyman Mill Soil	2108298	DU	7/18/2002	10-DEL-301	0	2								x				
Lyman Mill Soil	2108299	NORMAL	7/18/2002	10-DEL-100	0	2								x				
Lyman Mill Soil	2108300	NORMAL	7/18/2002	10-DEL-200	0	2								x				
Lyman Mill Soil	2108301	NORMAL	7/18/2002	10-DEL-303	0	2								x				
Lyman Mill Soil	LPX-DU-112202B-01	DU	11/22/2002	LPX-4112	0	0.5	MACTEC		x		x	x	x			x	x	x
Lyman Mill Soil	LPX-FP-4004-0000-01	NORMAL	7/19/2001	LPX-FP-4004	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Lyman Mill Soil	LPX-FP-4006-0000-01	NORMAL	7/19/2001	LPX-FP-4006	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Lyman Mill Soil	LPX-FP-4007-0000-01	NORMAL	7/19/2001	LPX-FP-4007	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Lyman Mill Soil	LPX-SS-4112-0005-01	NORMAL	11/22/2002	LPX-4112	0	0.5	MACTEC		x		x	x	x	x		x	x	x
Lyman Mill Soil	LPX-SS-4113-0005-01	NORMAL	11/22/2002	LPX-4113	0	0.5	MACTEC		x		x	x	x	x		x	x	x
Lyman Mill Soil	LPX-SS-4114-0005-01	NORMAL	11/22/2002	LPX-4114	0	0.5	MACTEC		x		x	x	x	x		x	x	x
Lyman Mill Soil	RES-SS-10-004-01	NORMAL	11/18/1999	RES-10-004-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-004-02	NORMAL	11/18/1999	RES-10-004-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-004-03	NORMAL	11/18/1999	RES-10-004-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-005-01	NORMAL	11/18/1999	RES-10-005-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-005-02	NORMAL	11/18/1999	RES-10-005-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-005-03	NORMAL	11/18/1999	RES-10-005-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-042-01	NORMAL	11/18/1999	RES-10-042-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-042-02	NORMAL	11/18/1999	RES-10-042-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-042-03	NORMAL	11/18/1999	RES-10-042-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-044-01	Field Dup. RES-SS-10-044-01	11/19/1999	RES-10-044-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-044-02	NORMAL	11/19/1999	RES-10-044-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-044-03	NORMAL	11/19/1999	RES-10-044-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-053-01	Field Dup. RES-SS-10-053-01	12/2/1999	RES-10-053-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-053-02	NORMAL	12/2/1999	RES-10-053-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-053-03	Field Dup. RES-SS-10-053-03	12/2/1999	RES-10-053-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-068-01	NORMAL	11/19/1999	RES-10-068-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-068-02	NORMAL	11/19/1999	RES-10-068-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-068-03	NORMAL	11/19/1999	RES-10-068-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-074-01	Field Dup. RES-SS-10-074-01	11/19/1999	RES-10-074-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-074-02	NORMAL	11/19/1999	RES-10-074-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-074-03	NORMAL	11/19/1999	RES-10-074-03	0	1	TTNUS							x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Lyman Mill Soil	RES-SS-10-075-01	Field Dup. RES-SS-10-075-01	11/19/1999	RES-10-075-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-075-02	NORMAL	11/19/1999	RES-10-075-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-075-03	NORMAL	11/19/1999	RES-10-075-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-076-01	NORMAL	11/19/1999	RES-10-076-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-076-02	NORMAL	11/19/1999	RES-10-076-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-076-03	NORMAL	11/19/1999	RES-10-076-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-604-01	Field Dup. RES-SS-10-604-01	11/18/1999	RES-10-604-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-10-604-02	NORMAL	11/18/1999	RES-10-604-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-10-604-03	NORMAL	11/18/1999	RES-10-604-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-011-01	NORMAL	12/2/1999	RES-11-011-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-011-02	NORMAL	12/2/1999	RES-11-011-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-011-03	Field Dup. RES-SS-11-011-03	12/2/1999	RES-11-011-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-012-01	NORMAL	12/2/1999	RES-11-012-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-012-02	NORMAL	12/2/1999	RES-11-012-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-012-03	NORMAL	12/2/1999	RES-11-012-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-328-01	Field Dup. RES-SS-11-328-01	11/18/1999	RES-11-328-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-328-02	NORMAL	11/18/1999	RES-11-328-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-328-03	NORMAL	11/18/1999	RES-11-328-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-396-02	NORMAL	11/17/1999	RES-11-396-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-396-03	NORMAL	11/17/1999	RES-11-396-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-419-01	NORMAL	11/19/1999	RES-11-419-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-419-02	NORMAL	11/19/1999	RES-11-419-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-419-03	NORMAL	11/19/1999	RES-11-419-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-420-01	NORMAL	11/17/1999	RES-11-420-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-420-02	NORMAL	11/17/1999	RES-11-420-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-420-03	Field Dup. RES-SS-11-420-03	11/17/1999	RES-11-420-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-420-04	NORMAL	11/17/1999	RES-11-420-04	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-422-01	NORMAL	11/17/1999	RES-11-422-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-422-02	NORMAL	11/17/1999	RES-11-422-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-422-03	NORMAL	11/17/1999	RES-11-422-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-423-01	NORMAL	11/16/1999	RES-11-423-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-423-02	NORMAL	11/16/1999	RES-11-423-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-423-03	NORMAL	11/16/1999	RES-11-423-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-424-01	NORMAL	11/16/1999	RES-11-424-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-424-02	NORMAL	11/16/1999	RES-11-424-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-424-03	NORMAL	11/16/1999	RES-11-424-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-425-02	NORMAL	11/17/1999	RES-11-425-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-425-03	Field Dup. RES-SS-11-425-03	11/17/1999	RES-11-425-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-426-01	NORMAL	11/17/1999	RES-11-426-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-426-02	NORMAL	11/17/1999	RES-11-426-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-426-03	NORMAL	11/17/1999	RES-11-426-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-427-01	NORMAL	11/16/1999	RES-11-427-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-427-02	NORMAL	11/16/1999	RES-11-427-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-427-03	NORMAL	11/16/1999	RES-11-427-03	0	1	TTNUS							x				

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Lyman Mill Soil	RES-SS-11-428-01	NORMAL	11/17/1999	RES-11-428-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-428-02	NORMAL	11/17/1999	RES-11-428-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-428-03	Field Dup. RES-SS-11-428-03	11/17/1999	RES-11-428-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-428-G	NORMAL	11/17/1999	RES-11-428-G	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-429-01	NORMAL	11/17/1999	RES-11-429-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-429-02	NORMAL	11/17/1999	RES-11-429-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-430-01	NORMAL	11/17/1999	RES-11-430-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-430-02	NORMAL	11/17/1999	RES-11-430-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-430-03	NORMAL	11/17/1999	RES-11-430-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-431-01	NORMAL	11/17/1999	RES-11-431-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-431-02	NORMAL	11/17/1999	RES-11-431-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-431-03	NORMAL	11/17/1999	RES-11-431-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-432-01	Field Dup. RES-SS-11-432-01	11/18/1999	RES-11-432-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-432-02	NORMAL	11/18/1999	RES-11-432-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-432-03	NORMAL	11/18/1999	RES-11-432-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-433-01	NORMAL	11/18/1999	RES-11-433-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-433-02	NORMAL	11/18/1999	RES-11-433-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-433-03	NORMAL	11/18/1999	RES-11-433-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-486-01	Field Dup. RES-SS-11-486-01	11/18/1999	RES-11-486-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-486-02	NORMAL	11/18/1999	RES-11-486-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-486-03	NORMAL	11/18/1999	RES-11-486-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-497-01	NORMAL	12/2/1999	RES-11-497-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-497-02	NORMAL	12/2/1999	RES-11-497-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-497-03	NORMAL	12/2/1999	RES-11-497-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-577-01	Field Dup. RES-SS-11-577-01	11/18/1999	RES-11-577-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-11-577-02	NORMAL	11/18/1999	RES-11-577-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-11-577-03	NORMAL	11/18/1999	RES-11-577-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-12-556-01	NORMAL	11/16/1999	RES-12-556-01	0	1	TTNUS		x		x	x	x	x				
Lyman Mill Soil	RES-SS-12-556-02	NORMAL	11/16/1999	RES-12-556-02	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-12-560-01	NORMAL	11/16/1999	RES-12-560-01	0	1	TTNUS		x		x	x	x					
Lyman Mill Soil	RES-SS-12-560-02	NORMAL	11/16/1999	RES-12-560-02	0	1	TTNUS		x		x	x	x					
Lyman Mill Soil	RES-SS-DU-111799A	Field Dup. RES-SS-11-425-03	11/17/1999	RES-11-425-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111799C	Field Dup. RES-SS-11-428-03	11/17/1999	RES-11-428-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111799E	Field Dup. RES-SS-11-420-03	11/17/1999	RES-11-420-03	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111899B	Field Dup. RES-SS-11-432-01	11/18/1999	RES-11-432-01	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111899C	Field Dup. RES-SS-11-486-01	11/18/1999	RES-11-486-01	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111899D	Field Dup. RES-SS-11-328-01	11/18/1999	RES-11-328-01	0	1	TTNUS							x				
Lyman Mill Soil	RES-SS-DU-111899E	Field Dup. RES-SS-11-577-01	11/18/1999	RES-11-577-01	0	1	TTNUS							x				

Table B-1. List of Soil Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Lyman Mill Soil	RES-SS-DU-111899F	Field Dup. RES-SS-10-604-01	11/18/1999	RES-10-604-01	0	1	TTNUS						x					
Lyman Mill Soil	RES-SS-DU-111999A	Field Dup. RES-SS-10-044-01	11/19/1999	RES-10-044-01	0	1	TTNUS		x		x	x	x					
Lyman Mill Soil	RES-SS-DU-111999B	Field Dup. RES-SS-10-074-01	11/19/1999	RES-10-074-01	0	1	TTNUS						x					
Lyman Mill Soil	RES-SS-DU-111999C	Field Dup. RES-SS-10-075-01	11/19/1999	RES-10-075-01	0	1	TTNUS						x					
Lyman Mill Soil	RES-SS-DU-120299A	Field Dup. RES-SS-10-053-03	12/2/1999	RES-10-053-03	0	1	TTNUS						x					
Lyman Mill Soil	RES-SS-DU-120299C	Field Dup. RES-SS-10-053-01	12/2/1999	RES-10-053-01	0	1	TTNUS		x		x	x	x					
Lyman Mill Soil	RES-SS-DU-120299D	Field Dup. RES-SS-11-011-03	12/2/1999	RES-11-011-03	0	1	TTNUS						x					
Lyman Mill Soil	SS-99-07	NORMAL	1/15/1999	SS-99-07	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-08	NORMAL	1/15/1999	SS-99-08	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-09	NORMAL	1/15/1999	SS-99-09	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-10	NORMAL	1/15/1999	SS-99-10	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-11	NORMAL	1/15/1999	SS-99-11	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-12	NORMAL	1/15/1999	SS-99-12	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-13	NORMAL	1/15/1999	SS-99-13	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-14	NORMAL	1/15/1999	SS-99-14	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-15	NORMAL	1/15/1999	SS-99-15	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-16	NORMAL	1/15/1999	SS-99-16	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-21	NORMAL	1/27/1999	SS-99-21	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-22	NORMAL	1/27/1999	SS-99-22	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-23	NORMAL	1/27/1999	SS-99-23	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-24	NORMAL	1/27/1999	SS-99-24	0	0.25	WESTON						x					
Lyman Mill Soil	SS-99-25	NORMAL	1/27/1999	SS-99-25	0	0.25	WESTON						x					
Sample Number					0			0	41	0	41	41	41	143	0	7	7	7

VOCs, Volatile organic compounds
SVOCs, Semi-volatile organic compounds
PCBs, Polychlorinated biphenyls
D/F, Dioxin/furans
AVS/SEM, Acid volatile sulfide/simultaneously extracted metals
GS, Grain size
TOC, Total organic carbon content
(1) Selected samples only analyzed for 2,3,7,8-TCDD; not all samples analyzed for HCX
(2) Geotechnical parameters generally include percent solids, specific gravity and water content
(3) Not used in the RI

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	Dioxin	AVS/SEM	GS	TOC	Ancillary (1)
Source Area groundwater	CM-GW-DUP01-01	Field Dup. CM-GW-MW01-01	2/21/2001	MW01S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-DUP01-01F	Field Dup. CM-GW-MW01-01F	2/21/2001	MW01S	TTNUS							x					
Source Area groundwater	CM-GW-MW01-01	Field Dup. CM-GW-MW01-01	2/21/2001	MW01S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW01-01F	Field Dup. CM-GW-MW01-01F	2/21/2001	MW01S	TTNUS							x					
Source Area groundwater	CM-GW-MW02-01	NORMAL	2/22/2001	MW02S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW02-01F	NORMAL	2/22/2001	MW02S	TTNUS							x					
Source Area groundwater	CM-GW-MW03-01	NORMAL	2/21/2001	MW03S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW03-01F	NORMAL	2/21/2001	MW03S	TTNUS							x					
Source Area groundwater	CM-GW-MW06-01	NORMAL	2/22/2001	MW06S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW06-01F	NORMAL	2/22/2001	MW06S	TTNUS							x					
Source Area groundwater	CM-GW-MW07-01	NORMAL	2/22/2001	MW07S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW07-01F	NORMAL	2/22/2001	MW07S	TTNUS							x					
Source Area groundwater	CM-GW-MW08-01	NORMAL	2/21/2001	MW08S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW08-01F	NORMAL	2/21/2001	MW08S	TTNUS							x					
Source Area groundwater	CM-GW-MW09-01	NORMAL	2/21/2001	MW09S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CM-GW-MW09-01F	NORMAL	2/21/2001	MW09S	TTNUS							x					
Source Area groundwater	CMS-DU-102302A-03	DU	10/23/2002	MW06S	MACTEC	x											
Source Area groundwater	CMS-DU-102402A-03	DU	10/24/2002	MW05S	MACTEC	x											
Source Area groundwater	CMS-GW-DUP01F-02	Field Dup. CMS-GW-MW04SF-02	8/14/2001	MW04S	TTNUS							x					
Source Area groundwater	CMS-GW-DUP02-02	Field Dup. CMS-GW-MW01S-02	8/16/2001	MW01S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-DUP02F-02	Field Dup. CMS-GW-MW01SF-02	8/16/2001	MW01S	TTNUS							x					
Source Area groundwater	CMS-GW-DUP03-02	Field Dup. CMS-GW-MW12B-02	8/22/2001	MW12B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-DUP03F-02	Field Dup. CMS-GW-MW12BF-02	8/22/2001	MW12B	TTNUS							x					
Source Area groundwater	CMS-GW-DUP04-02	Field Dup. CMS-GW-MW10D-02	8/23/2001	MW10D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-DUP04F-02	Field Dup. CMS-GW-MW10DF-02	8/23/2001	MW10D	TTNUS							x					
Source Area groundwater	CMS-GW-DUP1-02	Field Dup. CMS-GW-MW04S-02	8/14/2001	MW04S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-GEC1-03	NORMAL	10/23/2002	GEC1	MACTEC	x											
Source Area groundwater	CMS-GW-GEC2-02	NORMAL	8/21/2001	GEC2	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-GEC2-03	NORMAL	10/23/2002	GEC2	MACTEC	x											
Source Area groundwater	CMS-GW-GEC2F-02	NORMAL	8/21/2001	GEC2	TTNUS							x					
Source Area groundwater	CMS-GW-GEC3-03	NORMAL	10/24/2002	GEC3	MACTEC	x											
Source Area groundwater	CMS-GW-GEC4-03	NORMAL	10/23/2002	GEC4	MACTEC	x											
Source Area groundwater	CMS-GW-GEC5-03	NORMAL	10/23/2002	GEC5	MACTEC	x											
Source Area groundwater	CMS-GW-GEC6-02	NORMAL	8/21/2001	GEC6	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-GEC6-03	NORMAL	10/23/2002	GEC6	MACTEC	x											
Source Area groundwater	CMS-GW-GEC6F-02	NORMAL	8/21/2001	GEC6	TTNUS							x					
Source Area groundwater	CMS-GW-GEC7-03	NORMAL	10/23/2002	GEC7	MACTEC	x											

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	Dioxin	AVS/SEM	GS	TOC	Ancillary (1)
Source Area groundwater	CMS-GW-MW01S-02	Field Dup. CMS-GW-MW01S-02	8/16/2001	MW01S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW01S-03	NORMAL	10/24/2002	MW01S	MACTEC	x											
Source Area groundwater	CMS-GW-MW01SF-02	Field Dup. CMS-GW-MW01SF-02	8/16/2001	MW01S	TTNUS						x						
Source Area groundwater	CMS-GW-MW02D-02	NORMAL	8/13/2001	MW02D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW02D-03	NORMAL	10/22/2002	MW02D	MACTEC	x											
Source Area groundwater	CMS-GW-MW02DF-02	NORMAL	8/13/2001	MW02D	TTNUS						x						
Source Area groundwater	CMS-GW-MW02M-02	NORMAL	8/13/2001	MW02M	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW02M-03	NORMAL	10/22/2002	MW02M	MACTEC	x											
Source Area groundwater	CMS-GW-MW02MF-02	NORMAL	8/13/2001	MW02M	TTNUS						x						
Source Area groundwater	CMS-GW-MW02S-02	NORMAL	8/13/2001	MW02S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW02S-03	NORMAL	10/22/2002	MW02S	MACTEC	x											
Source Area groundwater	CMS-GW-MW02SF-02	NORMAL	8/13/2001	MW02S	TTNUS						x						
Source Area groundwater	CMS-GW-MW03S-02	NORMAL	8/16/2001	MW03S	TTNUS					x			x			x	x
Source Area groundwater	CMS-GW-MW03S-03	NORMAL	11/21/2002	MW03S	MACTEC	x											
Source Area groundwater	CMS-GW-MW03SF-02	NORMAL	8/16/2001	MW03S	TTNUS						x						
Source Area groundwater	CMS-GW-MW04B-02	NORMAL	8/14/2001	MW04B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW04B-03	NORMAL	10/22/2002	MW04B	MACTEC	x											
Source Area groundwater	CMS-GW-MW04BF-02	NORMAL	8/14/2001	MW04B	TTNUS						x						
Source Area groundwater	CMS-GW-MW04D-02	NORMAL	8/14/2001	MW04D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW04D-03	NORMAL	10/22/2002	MW04D	MACTEC	x											
Source Area groundwater	CMS-GW-MW04DF-02	NORMAL	8/14/2001	MW04D	TTNUS						x						
Source Area groundwater	CMS-GW-MW04S-02	Field Dup. CMS-GW-MW04S-02	8/14/2001	MW04S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW04S-03	NORMAL	10/22/2002	MW04S	MACTEC	x											
Source Area groundwater	CMS-GW-MW04SF-02	Field Dup. CMS-GW-MW04SF-02	8/14/2001	MW04S	TTNUS						x						
Source Area groundwater	CMS-GW-MW05S-02 (2)	NORMAL	8/15/2001	MW05S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW05S-03	NORMAL	10/24/2002	MW05S	MACTEC	x											
Source Area groundwater	CMS-GW-MW05S-04	NORMAL	11/21/2002	MW05S	MACTEC							x					
Source Area groundwater	CMS-GW-MW05S-04 DU	DU	11/21/2002	MW05S	MACTEC							x					
Source Area groundwater	CMS-GW-MW05SF-02	NORMAL	8/15/2001	MW05S	TTNUS						x						
Source Area groundwater	CMS-GW-MW06S-02	NORMAL	8/15/2001	MW06S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW06S-03	NORMAL	10/23/2002	MW06S	MACTEC	x											
Source Area groundwater	CMS-GW-MW06SF-02	NORMAL	8/15/2001	MW06S	TTNUS						x						
Source Area groundwater	CMS-GW-MW07D-02	NORMAL	8/15/2001	MW07D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW07D-03	NORMAL	10/23/2002	MW07D	MACTEC	x											
Source Area groundwater	CMS-GW-MW07DF-02	NORMAL	8/15/2001	MW07D	TTNUS						x						
Source Area groundwater	CMS-GW-MW07S-02	NORMAL	8/15/2001	MW07S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW07S-03	NORMAL	10/23/2002	MW07S	MACTEC	x											
Source Area groundwater	CMS-GW-MW07SF-02	NORMAL	8/15/2001	MW07S	TTNUS						x						
Source Area groundwater	CMS-GW-MW08S-02	NORMAL	8/15/2001	MW08S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW08S-03	NORMAL	10/22/2002	MW08S	MACTEC	x											
Source Area groundwater	CMS-GW-MW08SF-02	NORMAL	8/15/2001	MW08S	TTNUS						x						
Source Area groundwater	CMS-GW-MW09S-02	NORMAL	8/15/2001	MW09S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW09S-03	NORMAL	10/22/2002	MW09S	MACTEC	x											
Source Area groundwater	CMS-GW-MW09SF-02	NORMAL	8/15/2001	MW09S	TTNUS						x						
Source Area groundwater	CMS-GW-MW10B-02	NORMAL	8/23/2001	MW10B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW10B-03	NORMAL	10/22/2002	MW10B	MACTEC	x											

Table B-2. List of Groundwater Sam[illegible] Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	Dioxin	AVS/SEM	GS	TOC	Ancillary (1)
Source Area groundwater	CMS-GW-MW10BF-02	NORMAL	8/23/2001	MW10B	TTNUS						x						
Source Area groundwater	CMS-GW-MW10D-02	Field Dup. CMS-GW-MW10D-02	8/23/2001	MW10D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW10D-03	NORMAL	10/22/2002	MW10D	MACTEC	x											
Source Area groundwater	CMS-GW-MW10DF-02	Field Dup. CMS-GW-MW10DF-02	8/23/2001	MW10D	TTNUS						x						
Source Area groundwater	CMS-GW-MW11B-02	NORMAL	8/22/2001	MW11B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW11B-03	NORMAL	10/23/2002	MW11B	MACTEC	x											
Source Area groundwater	CMS-GW-MW11BF-02	NORMAL	8/22/2001	MW11B	TTNUS						x						
Source Area groundwater	CMS-GW-MW11M-02	NORMAL	8/22/2001	MW11M	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW11M-03	NORMAL	10/23/2002	MW11M	MACTEC	x											
Source Area groundwater	CMS-GW-MW11MF-02	NORMAL	8/22/2001	MW11M	TTNUS						x						
Source Area groundwater	CMS-GW-MW11S-02	NORMAL	8/22/2001	MW11S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW11S-03	NORMAL	10/24/2002	MW11S	MACTEC	x											
Source Area groundwater	CMS-GW-MW11SF-02	NORMAL	8/22/2001	MW11S	TTNUS						x						
Source Area groundwater	CMS-GW-MW12B-02	Field Dup. CMS-GW-MW12B-02	8/22/2001	MW12B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW12B-03	NORMAL	10/24/2002	MW12B	MACTEC	x											
Source Area groundwater	CMS-GW-MW12BF-02	Field Dup. CMS-GW-MW12BF-02	8/22/2001	MW12B	TTNUS						x						
Source Area groundwater	CMS-GW-MW12D-02	NORMAL	8/22/2001	MW12D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW12D-03	NORMAL	10/24/2002	MW12D	MACTEC	x											
Source Area groundwater	CMS-GW-MW12DF-02	NORMAL	8/22/2001	MW12D	TTNUS						x						
Source Area groundwater	CMS-GW-MW13B-02	NORMAL	8/23/2001	MW13B	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW13B-03	NORMAL	10/22/2002	MW13B	MACTEC	x											
Source Area groundwater	CMS-GW-MW13BF-02	NORMAL	8/23/2001	MW13B	TTNUS						x						
Source Area groundwater	CMS-GW-MW13D-02	NORMAL	8/23/2001	MW13D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW13D-03	NORMAL	10/22/2002	MW13D	MACTEC	x											
Source Area groundwater	CMS-GW-MW13DF-02	NORMAL	8/23/2001	MW13D	TTNUS						x						
Source Area groundwater	CMS-GW-MW13S-02	NORMAL	8/23/2001	MW13S	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW13S-03	NORMAL	10/22/2002	MW13S	MACTEC	x											
Source Area groundwater	CMS-GW-MW13SF-02	NORMAL	8/23/2001	MW13S	TTNUS						x						
Source Area groundwater	CMS-GW-MW14M-02	NORMAL	8/21/2001	MW14M	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW14M-03	NORMAL	10/23/2002	MW14M	MACTEC	x											
Source Area groundwater	CMS-GW-MW14MF-02	NORMAL	8/21/2001	MW14M	TTNUS						x						
Source Area groundwater	CMS-GW-MW15D-02	NORMAL	8/21/2001	MW15D	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-MW15D-03	NORMAL	10/23/2002	MW15D	MACTEC	x											
Source Area groundwater	CMS-GW-MW15DF-02	NORMAL	8/21/2001	MW15D	TTNUS						x						
Source Area groundwater	CMS-GW-TMW3-02	NORMAL	8/23/2001	TMW3	TTNUS	x	x		x	x	x		x			x	x
Source Area groundwater	CMS-GW-TMW3F-02	NORMAL	8/23/2001	TMW3	TTNUS						x						
Source Area groundwater	CMS-MW03S-02	NORMAL	8/16/2001	MW03S	TTNUS	x	x		x	x							
Source Area groundwater	GEC-1	NORMAL	3/22/1999	GEC1	GEC	x	x			x	x						
Source Area groundwater	GEC-2	NORMAL	3/22/1999	GEC2	GEC	x	x			x	x						
Source Area groundwater	GEC-3	NORMAL	3/22/1999	GEC3	GEC	x	x										
Source Area groundwater	GEC-4	NORMAL	3/22/1999	GEC4	GEC	x	x										
Source Area groundwater	GEC-5	NORMAL	3/22/1999	GEC5	GEC	x	x			x	x						
Source Area groundwater	GEC-6	NORMAL	3/22/1999	GEC6	GEC	x	x			x	x						
Source Area groundwater	GEC-7	NORMAL	3/22/1999	GEC7	GEC	x	x										

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	Dioxin	AVS/SEM	GS	TOC	Ancillary (1)
Source Area groundwater	S-1-Groundwater (3)	NORMAL	7/24/2000	S-1	Town of North Providence	x					x						
Source Area groundwater	S-2-Groundwater (3)	NORMAL	7/24/2000	S-2	Town of North Providence	x					x						
Source Area groundwater	S-3-Groundwater (3)	NORMAL	7/24/2000	S-3	Town of North Providence	x					x						
Source Area groundwater	S-4-Groundwater (3)	NORMAL	7/24/2000	S-4	Town of North Providence	x					x						
Source Area groundwater	S-5-Groundwater (3)	NORMAL	7/24/2000	S-5	Town of North Providence	x					x						
					Sample Number	88	48	0	41	45	50	41	43	0	0	41	41

VOCs, Volatile organic compounds
SVOCs, Semi-volatile organic compounds
PCBs, Polychlorinated biphenyls
AVS/SEM, Acid volatile sulfide/simultaneously extracted metals
GS, Grain size
TOC, Total organic carbon content
(1) Ancillary parameters generally include alkalinity and sulfide
(2) Sample also analyzed for HCX
(3) Not used in the RI

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Upstream Sediment	DAM001-SD	NORMAL	10/23/1998	Esmond Dam	0	0.33	SPINA		x		x	x	x	x			x	
Upstream Sediment	GMP-SD-5002-0000-01	NORMAL	7/11/2001	GMP-SD-5002	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Upstream Sediment	GMP-SD-5007-0000-01	NORMAL	7/9/2001	GMP-SD-5007	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Upstream Sediment	RCC-BK-3001X-01	Field Dup. RCC-BK-3001X-01	10/22/1999	RCC-BK-3001	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-BK-3001Y-01	NORMAL	10/22/1999	RCC-BK-3001	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-BK-3001Z-01	NORMAL	10/22/1999	RCC-BK-3001	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-BK-3002X-01	NORMAL	10/22/1999	RCC-BK-3002	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-BK-3002Y-01	NORMAL	10/22/1999	RCC-BK-3002	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-BK-3002Z-01	NORMAL	10/22/1999	RCC-BK-3002	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-DU-102299A	Field Dup. RCC-BK-3001X-01	10/22/1999	RCC-BK-3001	0	0.5	TTNUS		x		x	x	x	x				
Upstream Sediment	RCC-FP-3001-01	NORMAL	11/10/1999	RCC-FP-3001	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Upstream Sediment	RCC-FP-3002-01	NORMAL	11/10/1999	RCC-FP-3002	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Upstream Sediment	RCC-SD-3001-01	NORMAL	11/10/1999	RCC-SD-3001	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Upstream Sediment	RCC-SD-3002-01	Field Dup. RCC-SD-3002-01	11/10/1999	RCC-SD-3002	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Upstream Sediment	RCC-SD-3003-01	NORMAL	11/10/1999	RCC-SD-3003	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Upstream Sediment	RCC-SD-DU-111099B	Field Dup. RCC-SD-3002-01	11/10/1999	RCC-SD-3002	0	0.5	TTNUS		x		x	x	x					
Upstream Sediment	RWR-FP-5001-0000-01	NORMAL	7/17/2001	RWR-FP-5001	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Upstream Sediment	RWR-FP-5002-0000-01	NORMAL	7/16/2001	RWR-FP-5002	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Upstream Sediment	RWR-FP-5003-0000-01	NORMAL	7/17/2001	RWR-FP-5003	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Upstream Sediment	RWR-FP-5004-0000-01	NORMAL	7/19/2001	RWR-FP-5004	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Upstream Sediment	RWR-SD-5003-0000-01	NORMAL	7/12/2001	RWR-SD-5003	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Upstream Sediment	RWR-SD-5004-0000-01	NORMAL	7/12/2001	RWR-SD-5004	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Upstream Sediment	SD-32	NORMAL	9/9/1998	SD-32	0	0.5	SPINA				x	x		x			x	
Upstream Sediment	SD-33	NORMAL	9/9/1998	SD-33	0	0.25	SPINA				x	x		x			x	
Upstream Sediment	SD-34	NORMAL	9/9/1998	SD-34	0	0.25	SPINA				x	x		x			x	
Upstream Sediment	SD-35	NORMAL	9/9/1998	SD-35	0	0.25	SPINA		x		x	x		x			x	
Upstream Sediment	SD-36	NORMAL	9/9/1998	SD-36	0	0.25	SPINA		x		x	x		x			x	
Upstream Sediment	SD-37	NORMAL	9/9/1998	SD-37	0	0.5	SPINA		x		x	x		x			x	
Upstream Sediment	SD-38	NORMAL	9/9/1998	SD-38	0	0.5	SPINA		x		x	x		x			x	
Upstream Sediment	SD-39	NORMAL	9/9/1998	SD-39	0	0.25	SPINA		x		x	x		x			x	
							Sample Number	0	24	0	30	30	22	28	9	13	22	13
Allendale sediment	3428-CMS-020	NORMAL	2/17/1999	CMS-020	0	0.25	IT							x				
Allendale sediment	3428-CMS-021	Field Dup. 3428-CMS-021	2/17/1999	CMS-021	0	0.25	IT							x				
Allendale sediment	3428-CMS-021D	Field Dup. 3428-CMS-021	2/17/1999	CMS-021	0	0.25	IT							x				
Allendale sediment	3428-CMS-022	NORMAL	2/17/1999	CMS-022	0	0.25	IT							x				
Allendale sediment	3428-CMS-023	NORMAL	2/17/1999	CMS-023	0	0.25	IT							x				
Allendale sediment	3428-CMS-024	NORMAL	2/17/1999	CMS-024	0	0.25	IT							x				
Allendale sediment	3428-CMS-025	NORMAL	2/17/1999	CMS-025	0	0.25	IT							x				
Allendale sediment	3428-CMS-174	NORMAL	2/17/1999	CMS-174	0	0.25	IT							x				
Allendale sediment	3428-CMS-176	NORMAL	2/17/1999	CMS-176	0	0.25	IT							x				
Allendale sediment	3428-CMS-177	NORMAL	2/17/1999	CMS-177	0	0.25	IT							x				
Allendale sediment	3428-CMS-178	Field Dup. 3428-CMS-178	2/17/1999	CMS-178	0	0.25	IT							x				
Allendale sediment	3428-CMS-178D	Field Dup. 3428-CMS-178	2/17/1999	CMS-178	0	0.25	IT							x				
Allendale sediment	3428-CMS-179	NORMAL	2/17/1999	CMS-179	0	0.25	IT							x				
Allendale sediment	3428-CMS-180	NORMAL	2/17/1999	CMS-180	0	0.25	IT							x				
Allendale sediment	3428-CMS-181	NORMAL	2/17/1999	CMS-181	0	0.25	IT							x				
Allendale sediment	3428-CMS-182	Field Dup. 3428-CMS-182	2/17/1999	CMS-182	0	0.25	IT							x				

Table B-3. List of Sediment Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	3428-CMS-182D	Field Dup. 3428-CMS-182	2/17/1999	CMS-182	0	0.25	IT						x					
Allendale sediment	3428-CMS-183	NORMAL	2/17/1999	CMS-183	0	0.25	IT						x					
Allendale sediment	3428-CMS-186	NORMAL	2/17/1999	CMS-186	0	0.25	IT						x					
Allendale sediment	3428-CMS-187	NORMAL	2/17/1999	CMS-187	0	0.25	IT						x					
Allendale sediment	3428-CMS-188	NORMAL	2/17/1999	CMS-188	0	0.25	IT						x					
Allendale sediment	3428-CMS-190	NORMAL	2/17/1999	CMS-190	0	0.25	IT						x					
Allendale sediment	3428-CMS-191	Field Dup. 3428-CMS-191	2/17/1999	CMS-191	0	0.25	IT						x					
Allendale sediment	3428-CMS-191D	Field Dup. 3428-CMS-191	2/17/1999	CMS-191	0	0.25	IT						x					
Allendale sediment	3428-CMS-192	NORMAL	2/17/1999	CMS-192	0	0.25	IT						x					
Allendale sediment	3428-CMS-194	NORMAL	2/17/1999	CMS-194	0	0.25	IT						x					
Allendale sediment	3428-CMS-195	NORMAL	2/17/1999	CMS-195	0	0.25	IT						x					
Allendale sediment	3428-CMS-196	NORMAL	2/17/1999	CMS-196	0	0.25	IT						x					
Allendale sediment	3428-CMS-199	NORMAL	2/17/1999	CMS-199	0	0.25	IT						x					
Allendale sediment	3428-CMS-200	NORMAL	2/17/1999	CMS-200	0	0.25	IT						x					
Allendale sediment	3428-CMS-201	NORMAL	2/17/1999	CMS-201	0	0.25	IT						x					
Allendale sediment	3428-CMS-202	NORMAL	2/17/1999	CMS-202	0	0.25	IT						x					
Allendale sediment	3428-CMS-203	NORMAL	2/17/1999	CMS-203	0	0.25	IT						x					
Allendale sediment	3428-CMS-204	Field Dup. 3428-CMS-204	2/17/1999	CMS-204	0	0.25	IT						x					
Allendale sediment	3428-CMS-204D	Field Dup. 3428-CMS-204	2/17/1999	CMS-204	0	0.25	IT						x					
Allendale sediment	3428-CMS-208	NORMAL	2/17/1999	CMS-208	0	0.25	IT						x					
Allendale sediment	3428-CMS-209	NORMAL	2/17/1999	CMS-209	0	0.25	IT						x					
Allendale sediment	3428-CMS-210	NORMAL	2/17/1999	CMS-210	0	0.25	IT						x					
Allendale sediment	3428-CMS-211	NORMAL	2/17/1999	CMS-211	0	0.25	IT						x					
Allendale sediment	3428-CMS-212	NORMAL	2/17/1999	CMS-212	0	0.25	IT						x					
Allendale sediment	3428-CMS-213	NORMAL	2/17/1999	CMS-213	0	0.25	IT						x					
Allendale sediment	3428-CMS-214	NORMAL	2/17/1999	CMS-214	0	0.25	IT						x					
Allendale sediment	3428-CMS-215	NORMAL	2/17/1999	CMS-215	0	0.25	IT						x					
Allendale sediment	3428-CMS-216	NORMAL	2/16/1999	CMS-216e	0	0.25	IT						x					
Allendale sediment	3428-CMS-224	NORMAL	2/16/1999	CMS-224	0	0.25	IT						x					
Allendale sediment	AD-01-A	Field Dup. AD-01-A	7/22/1999	AD-01	0	1	IT		x		x	x	x	x			x	
Allendale sediment	AD-01-A-D	Field Dup. AD-01-A	7/22/1999	AD-01	0	1	IT										x	
Allendale sediment	AD-01-B	Field Dup. AD-01-B	7/22/1999	AD-01	9	10	IT		x		x	x	x	x			x	
Allendale sediment	AD-01-B-D	Field Dup. AD-01-B	7/22/1999	AD-01	9	10	IT										x	
Allendale sediment	AD-01-C	Field Dup. AD-01-C	7/22/1999	AD-01	10.7	11.7	IT		x			x	x	x			x	
Allendale sediment	AD-01-C-D	Field Dup. AD-01-C	7/22/1999	AD-01	10.7	11.7	IT										x	
Allendale sediment	AD-01-FD	Field Dup. AD-01-FD	7/19/1999	AD-01	0	1	IT		x		x	x	x	x				
Allendale sediment	AD-01-FD2	Field Dup. AD-01-FD	7/19/1999	AD-01	0	1	IT										x	
Allendale sediment	AD-01-FD3	Field Dup. AD-01-FD	7/19/1999	AD-01	0	1	IT										x	
Allendale sediment	AD-02-A	Field Dup. AD-02-A	7/21/1999	AD-02	0	1	IT		x		x	x	x	x			x	
Allendale sediment	AD-02-A-D	Field Dup. AD-02-A	7/21/1999	AD-02	0	1	IT										x	
Allendale sediment	AD-02-B	Field Dup. AD-02-B	7/21/1999	AD-02	7	9	IT		x		x	x	x	x			x	
Allendale sediment	AD-02-B-D	Field Dup. AD-02-B	7/21/1999	AD-02	7	9	IT										x	
Allendale sediment	AD-02-C	Field Dup. AD-02-C	7/21/1999	AD-02	11	12	IT		x		x	x	x	x			x	
Allendale sediment	AD-02-C-D	Field Dup. AD-02-C	7/21/1999	AD-02	11	12	IT										x	
Allendale sediment	AD-03-A	Field Dup. AD-03-A	7/20/1999	AD-03	0	1	IT		x		x	x	x	x			x	
Allendale sediment	AD-03-A-D	Field Dup. AD-03-A	7/20/1999	AD-03	0	1	IT										x	
Allendale sediment	AD-03-C	Field Dup. AD-03-C	7/20/1999	AD-03	6	7	IT		x		x	x	x	x			x	
Allendale sediment	AD-03-C-D	Field Dup. AD-03-C	7/20/1999	AD-03	6	7	IT										x	

Table B-3. List of Sediment Samp[illegible]urrently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	AD-04-A	Field Dup. AD-04-A	7/19/1999	AD-04	0	1	IT		x		x	x	x	x			x	
Allendale sediment	AD-04-A-D	Field Dup. AD-04-A	7/19/1999	AD-04	0	1	IT										x	
Allendale sediment	AD-04-A-QC	Field Dup. AD-04-A	7/19/1999	AD-04	0	1	IT						x					
Allendale sediment	AD-04-B	Field Dup. AD-04-B	7/19/1999	AD-04	2	3	IT		x		x	x	x	x			x	
Allendale sediment	AD-04-B-D	Field Dup. AD-04-B	7/19/1999	AD-04	2	3	IT										x	
Allendale sediment	AD-04-C	Field Dup. AD-04-C	7/19/1999	AD-04	9	10	IT		x		x	x	x	x			x	
Allendale sediment	AD-04-C-D	Field Dup. AD-04-C	7/19/1999	AD-04	9	10	IT										x	
Allendale sediment	AP01-FD	Field Dup. CMS-607-A	9/29/1999	CMS-607	0	0.5	IT					x		x				
Allendale sediment	AP02-FD	Field Dup. CMS-611-A	9/30/1999	CMS-611	0	0.5	IT					x		x				
Allendale sediment	AP03-FD	Field Dup. CMS-621-A	10/1/1999	CMS-621	0	0.5	IT					x		x				
Allendale sediment	APB-BK-2003X-01	Field Dup. APB-BK-2003X-01	10/21/1999	APB-BK-2003	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	APB-BK-2003Y-01	NORMAL	10/21/1999	APB-BK-2003	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	APB-BK-2003Z-01	NORMAL	10/21/1999	APB-BK-2003	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	APB-DU-102199B	Field Dup. APB-BK-2003X-01	10/21/1999	APB-BK-2003	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	APB-FP-2028-0.502-01	NORMAL	10/28/1999	APB-FP-2028	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	APB-FP-2028-000.5-01	NORMAL	10/28/1999	APB-FP-2028	0	0.5	TTNUS		x		x	x	x		x	x	x	x
Allendale sediment	APB-FP-2028-023.5-01	NORMAL	10/28/1999	APB-FP-2028	2	3.5	TTNUS		x		x	x	x	x				
Allendale sediment	APB-FP-2031-01	NORMAL	10/28/1999	APB-FP-2031	0	0.5	TTNUS		x		x	x	x		x	x	x	x
Allendale sediment	APB-FP-2032-01	NORMAL	10/28/1999	APB-FP-2032	0	0.5	TTNUS		x		x	x	x		x	x	x	x
Allendale sediment	APB-FP-2033-0.502-01	NORMAL	10/28/1999	APB-FP-2033	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	APB-FP-2033-000.5-01	NORMAL	10/28/1999	APB-FP-2033	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	APB-SD-2029-0.502-01	NORMAL	10/29/1999	APB-SD-2029	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	APB-SD-2029-000.5-01	Field Dup. APB-SD-2029-000.5-01	10/29/1999	APB-SD-2029	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	APB-SD-2029-0203-01	NORMAL	10/29/1999	APB-SD-2029	2	3	TTNUS		x		x	x	x	x				
Allendale sediment	APB-SD-2030-01	NORMAL	10/22/1999	APB-FP-2030	0	0.5	TTNUS		x		x	x	x		x	x	x	x
Allendale sediment	APB-SD-2034-01	NORMAL	11/3/1999	APB-SD-2034	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	APB-SD-2037-01	NORMAL	10/22/1999	APB-SD-2037	0	0.5	TTNUS		x		x	x	x		x	x	x	x
Allendale sediment	APB-SD-4008-0000-01	NORMAL	7/9/2001	APB-SD-4008	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Allendale sediment	APB-SD-4009-0000-01	NORMAL	7/9/2001	APB-SD-4009	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Allendale sediment	APB-SD-4010-0000-01	NORMAL	7/10/2001	APB-SD-4010	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Allendale sediment	APB-SD-DU-102999A	Field Dup. APB-SD-2029-000.5-01	10/29/1999	APB-SD-2029	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	APC-DU-110399B	Field Dup. APC-SD-2036-01	11/3/1999	APC-SD-2036	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	APC-SD-2035-0.502-01	NORMAL	11/3/1999	APC-SD-2035	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	APC-SD-2035-000.5-01	NORMAL	11/3/1999	APC-SD-2035	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	APC-SD-2035-0204-01	NORMAL	11/3/1999	APC-SD-2035	2	4	TTNUS		x		x	x	x	x				
Allendale sediment	APC-SD-2035-0405-01	NORMAL	11/3/1999	APC-SD-2035	4	5	TTNUS		x		x	x	x	x				
Allendale sediment	APC-SD-2036-01	Field Dup. APC-SD-2036-01	11/3/1999	APC-SD-2036	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	CMS-021-A	NORMAL	7/14/1999	CMS-021	0	1	IT							x				
Allendale sediment	CMS-021-B	NORMAL	7/14/1999	CMS-021	1	2	IT							x				
Allendale sediment	CMS-021-C	NORMAL	7/14/1999	CMS-021	2	3	IT							x				
Allendale sediment	CMS-021-D	NORMAL	7/15/1999	CMS-021	3	4	IT							x				
Allendale sediment	CMS-021-E	NORMAL	7/15/1999	CMS-021	4	5	IT							x				
Allendale sediment	CMS-021-F	NORMAL	7/15/1999	CMS-021	5	6	IT							x				
Allendale sediment	CMS-022-A	NORMAL	7/14/1999	CMS-022	0	1	IT							x				
Allendale sediment	CMS-022-B	NORMAL	7/14/1999	CMS-022	1	2	IT							x				
Allendale sediment	CMS-022-C	NORMAL	7/14/1999	CMS-022	2	3	IT							x				
Allendale sediment	CMS-022-D	NORMAL	7/14/1999	CMS-022	3	4	IT							x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	CMS-023-A	NORMAL	7/14/1999	CMS-023	0	1	IT						x					
Allendale sediment	CMS-023-B	Field Dup. CMS-023-B	7/14/1999	CMS-023	1	2	IT						x					
Allendale sediment	CMS-023-B-QC	Field Dup. CMS-023-B	7/14/1999	CMS-023	1	2	IT						x					
Allendale sediment	CMS-023-C	NORMAL	7/14/1999	CMS-023	2	3	IT						x					
Allendale sediment	CMS-024-A	NORMAL	7/14/1999	CMS-024	0	1	IT						x					
Allendale sediment	CMS-024-B	NORMAL	7/14/1999	CMS-024	1	2	IT						x					
Allendale sediment	CMS-025-A	NORMAL	7/14/1999	CMS-025	0	1	IT						x					
Allendale sediment	CMS-025-B	NORMAL	7/14/1999	CMS-025	1	2	IT						x					
Allendale sediment	CMS-177-A	Field Dup. CMS-177-A	6/25/1999	CMS-177	0	1	IT					x						
Allendale sediment	CMS-177-A-QC	Field Dup. CMS-177-A	6/25/1999	CMS-177	0	1	IT						x					
Allendale sediment	CMS-182-A	NORMAL	7/7/1999	CMS-182	0	1	IT						x					
Allendale sediment	CMS-186-A	NORMAL	7/6/1999	CMS-186	0	1	IT						x					
Allendale sediment	CMS-186-B	NORMAL	7/6/1999	CMS-186	1	2	IT						x					
Allendale sediment	CMS-187-A	NORMAL	7/6/1999	CMS-187	0	1	IT						x					
Allendale sediment	CMS-187-B	NORMAL	7/6/1999	CMS-187	1	2	IT						x					
Allendale sediment	CMS-188-A	NORMAL	7/6/1999	CMS-188	0	1	IT						x					
Allendale sediment	CMS-191-A	Field Dup. CMS-191-A	7/7/1999	CMS-191	0	1	IT						x					
Allendale sediment	CMS-191-A-QC	Field Dup. CMS-191-A	7/7/1999	CMS-191	0	1	IT						x					
Allendale sediment	CMS-192-A	NORMAL	6/30/1999	CMS-192	0	1	IT	x	x	x	x	x	x	x				
Allendale sediment	CMS-195-A	NORMAL	7/7/1999	CMS-195	0	1	IT						x					
Allendale sediment	CMS-195-B	NORMAL	7/7/1999	CMS-195	1	2	IT						x					
Allendale sediment	CMS-196-A	NORMAL	7/7/1999	CMS-196	0	1	IT						x					
Allendale sediment	CMS-200-A	NORMAL	7/7/1999	CMS-200	0	1	IT						x					
Allendale sediment	CMS-202-A	NORMAL	7/7/1999	CMS-202	0	1	IT						x					
Allendale sediment	CMS-203-A	NORMAL	7/7/1999	CMS-203	0	1	IT						x					
Allendale sediment	CMS-204-A	NORMAL	7/7/1999	CMS-204	0	1	IT						x					
Allendale sediment	CMS-208-A	NORMAL	7/8/1999	CMS-208	0	1	IT						x					
Allendale sediment	CMS-208-B	NORMAL	7/8/1999	CMS-208	1	2	IT						x					
Allendale sediment	CMS-209-A	NORMAL	7/8/1999	CMS-209	0	1	IT						x					
Allendale sediment	CMS-210-A	NORMAL	7/12/1999	CMS-210	0	1	IT						x					
Allendale sediment	CMS-210-B	NORMAL	7/12/1999	CMS-210	1	2	IT						x					
Allendale sediment	CMS-212-A	NORMAL	7/12/1999	CMS-212	0	1	IT						x					
Allendale sediment	CMS-213-A	NORMAL	7/8/1999	CMS-213	0	1	IT						x					
Allendale sediment	CMS-213-B	NORMAL	7/8/1999	CMS-213	1	2	IT						x					
Allendale sediment	CMS-214-A	NORMAL	7/12/1999	CMS-214	0	1	IT						x					
Allendale sediment	CMS-214-B	Field Dup. CMS-214-B	7/12/1999	CMS-214	1	2	IT						x					
Allendale sediment	CMS-214-B-QC	Field Dup. CMS-214-B	7/12/1999	CMS-214	1	2	IT						x					
Allendale sediment	CMS-215-A	Field Dup. CMS-215-A	6/30/1999	CMS-215	0	1	IT	x	x	x	x	x	x					
Allendale sediment	CMS-215-A-1	Field Dup. CMS-215-A-1	7/22/1999	CMS-215	0	1	IT						x					
Allendale sediment	CMS-215-B-1	Field Dup. CMS-215-B-1	7/22/1999	CMS-215	1	2	IT						x					
Allendale sediment	CMS-215-C-1	Field Dup. CMS-215-C-1	7/22/1999	CMS-215	2	3	IT						x					
Allendale sediment	CMS-215-C-1-QC	Field Dup. CMS-215-C-1	7/22/1999	CMS-215	2	3	IT						x					
Allendale sediment	CMS-215-D-1	NORMAL	7/22/1999	CMS-215	3	4	IT						x					
Allendale sediment	CMS-465-A	NORMAL	7/27/1999	CMS-465	0	1	IT						x					
Allendale sediment	CMS-467-A	NORMAL	7/27/1999	CMS-467	0	1	IT						x					
Allendale sediment	CMS-470-A	NORMAL	7/27/1999	CMS-470	0	1	IT						x					
Allendale sediment	CMS-470-B	NORMAL	7/27/1999	CMS-470	1	2	IT						x					
Allendale sediment	CMS-471-A	NORMAL	7/27/1999	CMS-471	0	1	IT						x					

Table B-3. List of Sediment Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	DIF, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	CMS-471-B	NORMAL	7/27/1999	CMS-471	1	2	IT						x					
Allendale sediment	CMS-471-C	NORMAL	7/29/1999	CMS-471	2	3	IT						x					
Allendale sediment	CMS-472-A	NORMAL	7/29/1999	CMS-472	0	1	IT						x					
Allendale sediment	CMS-477-A	NORMAL	7/29/1999	CMS-477	0	1	IT						x					
Allendale sediment	CMS-477-B	Field Dup. CMS-477-B	7/29/1999	CMS-477	1	2	IT						x					
Allendale sediment	CMS-477-C	Field Dup. CMS-477-C	7/29/1999	CMS-477	2	3	IT						x					
Allendale sediment	CMS-477-C-QC	Field Dup. CMS-477-C	7/29/1999	CMS-477	2	3	IT						x					
Allendale sediment	CMS-484-A	NORMAL	7/30/1999	CMS-484	0	1	IT						x					
Allendale sediment	CMS-484-B	Field Dup. CMS-484-B	7/30/1999	CMS-484	1	2	IT						x					
Allendale sediment	CMS-484-C	Field Dup. CMS-484-C	7/30/1999	CMS-484	2	3	IT						x					
Allendale sediment	CMS-484-C-QC	Field Dup. CMS-484-C	7/30/1999	CMS-484	2	3	IT						x					
Allendale sediment	CMS-487-A	NORMAL	7/30/1999	CMS-487	0	1	IT						x					
Allendale sediment	CMS-487-B	NORMAL	7/30/1999	CMS-487	1	2	IT						x					
Allendale sediment	CMS-487-C	NORMAL	7/30/1999	CMS-487	2	3	IT						x					
Allendale sediment	CMS-489-A	NORMAL	7/30/1999	CMS-489	0	1	IT						x					
Allendale sediment	CMS-490-A	NORMAL	7/30/1999	CMS-490	0	1	IT						x					
Allendale sediment	CMS-490-B	Field Dup. CMS-490-B	7/30/1999	CMS-490	1	2	IT						x					
Allendale sediment	CMS-490-B-QC	Field Dup. CMS-490-B	7/30/1999	CMS-490	1	2	IT						x					
Allendale sediment	CMS-493-A	NORMAL	7/30/1999	CMS-493	0	1	IT						x					
Allendale sediment	CMS-493-B	NORMAL	7/30/1999	CMS-493	1	2	IT						x					
Allendale sediment	CMS-493-C	NORMAL	7/30/1999	CMS-493	2	3	IT						x					
Allendale sediment	CMS-494-A	NORMAL	8/12/1999	CMS-494	0	1	IT						x					
Allendale sediment	CMS-495-A	NORMAL	8/12/1999	CMS-495	0	1	IT						x					
Allendale sediment	CMS-496-A	NORMAL	8/12/1999	CMS-496	0	1	IT						x					
Allendale sediment	CMS-600-A	NORMAL	9/29/1999	CMS-600	0	0.5	IT					x	x					
Allendale sediment	CMS-601-A	NORMAL	9/29/1999	CMS-601	0	0.5	IT					x	x					
Allendale sediment	CMS-602-A	Field Dup. CMS-602-A	9/29/1999	CMS-602	0	0.5	IT					x	x					
Allendale sediment	CMS-602-A-QC	Field Dup. CMS-602-A	9/29/1999	CMS-602	0	0.5	IT						x					
Allendale sediment	CMS-603-A	NORMAL	9/30/1999	CMS-603	0	0.5	IT					x	x					
Allendale sediment	CMS-604-A	NORMAL	10/1/1999	CMS-604	0	0.5	IT					x	x					
Allendale sediment	CMS-605-A	NORMAL	9/29/1999	CMS-605	0	1	IT					x	x					
Allendale sediment	CMS-605-B	NORMAL	9/29/1999	CMS-605	1	2	IT					x	x					
Allendale sediment	CMS-605-C	NORMAL	9/29/1999	CMS-605	2	3	IT					x	x					
Allendale sediment	CMS-605-D	NORMAL	9/29/1999	CMS-605	3	4	IT					x	x					
Allendale sediment	CMS-605-E	NORMAL	9/29/1999	CMS-605	4	5	IT					x	x					
Allendale sediment	CMS-606-A	NORMAL	9/29/1999	CMS-606	0	0.5	IT					x	x					
Allendale sediment	CMS-607-A	Field Dup. CMS-607-A	9/29/1999	CMS-607	0	0.5	IT					x	x					
Allendale sediment	CMS-608-A	NORMAL	9/29/1999	CMS-608	0	0.5	IT					x	x					
Allendale sediment	CMS-609-A	NORMAL	9/29/1999	CMS-609	0	0.5	IT					x	x					
Allendale sediment	CMS-610-A	NORMAL	10/1/1999	CMS-610	0	0.5	IT					x	x					
Allendale sediment	CMS-611-A	Field Dup. CMS-611-A	9/30/1999	CMS-611	0	0.5	IT					x	x					
Allendale sediment	CMS-611-A-QC	Field Dup. CMS-611-A	9/30/1999	CMS-611	0	0.5	IT						x					
Allendale sediment	CMS-612-A	NORMAL	9/30/1999	CMS-612	0	0.5	IT					x	x					
Allendale sediment	CMS-613-A	NORMAL	9/30/1999	CMS-613	0	0.5	IT					x	x					
Allendale sediment	CMS-614-A	NORMAL	9/29/1999	CMS-614	0	0.5	IT					x	x					
Allendale sediment	CMS-615-A	NORMAL	9/29/1999	CMS-615	0	1	IT					x	x					
Allendale sediment	CMS-615-B	NORMAL	9/29/1999	CMS-615	1	1.5	IT					x	x					
Allendale sediment	CMS-616-A	NORMAL	9/29/1999	CMS-616	0	0.5	IT					x	x					

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	CMS-617-A	Field Dup. CMS-617-A	10/1/1999	CMS-617	0	0.5	IT				x		x					
Allendale sediment	CMS-617-A-QC	Field Dup. CMS-617-A	10/1/1999	CMS-617	0	0.5	IT						x					
Allendale sediment	CMS-618-A	NORMAL	10/1/1999	CMS-618	0	0.5	IT				x		x					
Allendale sediment	CMS-619-A	NORMAL	10/1/1999	CMS-619	0	0.5	IT				x		x					
Allendale sediment	CMS-620-A	NORMAL	10/1/1999	CMS-620	0	0.5	IT				x		x					
Allendale sediment	CMS-621-A	Field Dup. CMS-621-A	10/1/1999	CMS-621	0	0.5	IT				x		x					
Allendale sediment	CMS-622-A	NORMAL	10/5/1999	CMS-622	0	0.5	IT				x		x					
Allendale sediment	CMS-623-A	NORMAL	10/5/1999	CMS-623	0	0.5	IT				x		x					
Allendale sediment	CMS-624-A	NORMAL	10/1/1999	CMS-624	0	0.5	IT				x		x					
Allendale sediment	CMS-625-A	NORMAL	10/1/1999	CMS-625	0	0.5	IT				x		x					
Allendale sediment	CMS-626-A	NORMAL	10/1/1999	CMS-626	0	0.5	IT				x		x					
Allendale sediment	CMS-627-A	NORMAL	10/5/1999	CMS-627	0	0.5	IT				x		x					
Allendale sediment	CMS-628-A	NORMAL	9/29/1999	CMS-628	0	1	IT				x		x					
Allendale sediment	CMS-628-B	NORMAL	9/29/1999	CMS-628	1	2	IT				x							
Allendale sediment	CMS-628-C	NORMAL	9/29/1999	CMS-628	2	3	IT				x							
Allendale sediment	CMS-628-D	NORMAL	9/29/1999	CMS-628	3	4	IT				x							
Allendale sediment	CMS-629-A	NORMAL	10/1/1999	CMS-629	0	0.5	IT				x		x					
Allendale sediment	CMS-630-A	NORMAL	10/1/1999	CMS-630	0	0.5	IT				x		x					
Allendale sediment	CMS-631-A	NORMAL	10/5/1999	CMS-631	0	0.5	IT				x		x					
Allendale sediment	CMS-632-A	NORMAL	10/5/1999	CMS-632	0	0.5	IT				x		x					
Allendale sediment	CMS-633-A	NORMAL	10/5/1999	CMS-633	0	0.5	IT				x		x					
Allendale sediment	CMS-634-A	NORMAL	10/5/1999	CMS-634	0	0.5	IT				x		x					
Allendale sediment	CMS-DU-072001	Field Dup. CMS-FP-4001-0000-01	7/20/2001	CMS-FP-4001	0	0.5	HARDING ESE		x		x	x		x		x		x
Allendale sediment	CMS-FP-4001-0000-01	NORMAL	7/18/2001	CMS-FP-4001	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Allendale sediment	CMS-FP-4002-0000-01	NORMAL	7/18/2001	CMS-FP-4002	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Allendale sediment	CMS-FP-4003-0000-01	NORMAL	7/19/2001	CMS-FP-4003	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Allendale sediment	CMS-FP-4005-0000-01	NORMAL	7/20/2001	CMS-FP-4005	0	0.5	HARDING ESE		x		x	x	x	x		x	x	x
Allendale sediment	CMS-SD-4003-0000-01	NORMAL	7/12/2001	CMS-SD-4003	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Allendale sediment	CMS-SD-4006-0000-01	NORMAL	7/12/2001	CMS-SD-4006	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Allendale sediment	CMS-SD-4007-0000-01	NORMAL	7/12/2001	CMS-SD-4007	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Allendale sediment	CMS-SD-4204-0005-0010	NORMAL	5/6/2003	CMS-SD-4204	0.05	0.1	USACE WES						x					
Allendale sediment	CMS-SD-4204-0005-01	NORMAL	5/6/2003	CMS-SD-4204	0	0.5	USACE WES										x	
Allendale sediment	CMS-SD-4204-0005-01/CMS-SD-4204-0510-01	NORMAL	5/6/2003	CMS-SD-4204	0	1	USACE WES									x		x
Allendale sediment	CMS-SD-4204-0055-0060	NORMAL	5/6/2003	CMS-SD-4204	0.55	0.6	USACE WES						x					
Allendale sediment	CMS-SD-4204-0200-0210	NORMAL	5/6/2003	CMS-SD-4204	2	2.1	USACE WES						x					
Allendale sediment	CMS-SD-4204-0510-01	NORMAL	5/6/2003	CMS-SD-4204	0.5	1	USACE WES										x	
Allendale sediment	CMS-SD-4204-1015-01	NORMAL	5/6/2003	CMS-SD-4204	1	1.5	USACE WES										x	
Allendale sediment	CMS-SD-4204-1518-01	NORMAL	5/6/2003	CMS-SD-4204	1.5	1.8	USACE WES										x	
Allendale sediment	CMS-SD-4204-1823-01	NORMAL	5/6/2003	CMS-SD-4204	1.8	2.3	USACE WES										x	
Allendale sediment	CMS-SD-4205-0005-01	NORMAL	5/6/2003	CMS-SD-4205	0	0.5	USACE WES										x	
Allendale sediment	CMS-SD-4205-0510-01	NORMAL	5/6/2003	CMS-SD-4205	0.5	1	USACE WES										x	
Allendale sediment	CMS-SD-4205-1017-01	NORMAL	5/6/2003	CMS-SD-4205	1	1.7	USACE WES										x	
Allendale sediment	CMS-SD-4206-0005-01	NORMAL	5/6/2003	CMS-SD-4206	0	0.5	USACE WES										x	
Allendale sediment	CMS-SD-4206-0035-0045	NORMAL	5/6/2003	CMS-SD-4206	0.35	0.45	USACE WES						x					
Allendale sediment	CMS-SD-4206-0105-0115	NORMAL	5/6/2003	CMS-SD-4206	1.05	1.15	USACE WES						x					
Allendale sediment	CMS-SD-4206-0140-0145	NORMAL	5/6/2003	CMS-SD-4206	1.4	1.45	USACE WES						x					

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	CMS-SD-4206-0510-01	NORMAL	5/6/2003	CMS-SD-4206	0.5	1	USACE WES										x	
Allendale sediment	CMS-SD-4206-0510-01/CMS-SD-4206-1015-01	NORMAL	5/6/2003	CMS-SD-4206	0.5	1.5	USACE WES									x		x
Allendale sediment	CMS-SD-4206-1015-01	NORMAL	5/6/2003	CMS-SD-4206	1	1.5	USACE WES										x	
Allendale sediment	CMS-SD-4207-0005-01	NORMAL	5/6/2003	CMS-SD-4207	0	0.5	USACE WES										x	
Allendale sediment	CMS-SD-4207-0510-01	NORMAL	5/6/2003	CMS-SD-4207	0.5	1	USACE WES									x		
Allendale sediment	CMS-SD-4208-0007-01	NORMAL	5/7/2003	CMS-SD-4208	0	0.7	USACE WES									x	x	
Allendale sediment	CMS-SD-4209-0005-01	NORMAL	5/7/2003	CMS-SD-4209	0	0.5	USACE WES									x	x	x
Allendale sediment	CMS-SD-4209-0035-0045	NORMAL	5/7/2003	CMS-SD-4209	0.35	0.4	USACE WES						x					
Allendale sediment	CMS-SD-4209-0065-0075	NORMAL	5/7/2003	CMS-SD-4209	0.65	0.7	USACE WES						x					
Allendale sediment	CMS-SD-4209-0160-0170	NORMAL	5/7/2003	CMS-SD-4209	1.6	1.7	USACE WES						x					
Allendale sediment	CMS-SD-4209-0510-01	NORMAL	5/7/2003	CMS-SD-4209	0.5	1	USACE WES									x	x	x
Allendale sediment	CMS-SD-4209-1015-01	NORMAL	5/7/2003	CMS-SD-4209	1	1.5	USACE WES										x	
Allendale sediment	CMS-SD-4209-1523-01	NORMAL	5/7/2003	CMS-SD-4209	1.5	2.3	USACE WES										x	
Allendale sediment	CMS-SD-4209-2836-01	NORMAL	5/7/2003	CMS-SD-4209	2.8	3.6	USACE WES										x	
Allendale sediment	CMS-SD-4210-0005-01	NORMAL	5/7/2003	CMS-SD-4210	0	0.5	USACE WES									x	x	x
Allendale sediment	CMS-SD-4210-0030-0040	NORMAL	5/7/2003	CMS-SD-4210	0.3	0.4	USACE WES						x					
Allendale sediment	CMS-SD-4210-0080-0090	NORMAL	5/7/2003	CMS-SD-4210	0.8	0.9	USACE WES						x					
Allendale sediment	CMS-SD-4210-0200-0210	NORMAL	5/7/2003	CMS-SD-4210	2	2.1	USACE WES						x					
Allendale sediment	CMS-SD-4210-0510-01	NORMAL	5/7/2003	CMS-SD-4210	0.5	1	USACE WES										x	
Allendale sediment	CMS-SD-4210-1015-01	NORMAL	5/7/2003	CMS-SD-4210	1	1.5	USACE WES										x	
Allendale sediment	CMS-SD-4210-1518-01	NORMAL	5/7/2003	CMS-SD-4210	1.5	1.8	USACE WES										x	x
Allendale sediment	CMS-SD-4210-1824-01	NORMAL	5/7/2003	CMS-SD-4210	1.8	2.4	USACE WES										x	
Allendale sediment	CMS-SD-4211-0005-01	NORMAL	5/7/2003	CMS-SD-4211	0	0.5	USACE WES									x	x	x
Allendale sediment	CMS-SD-4211-0510-01	NORMAL	5/7/2003	CMS-SD-4211	0.5	1	USACE WES										x	
Allendale sediment	CMS-SD-4211-1014-01	NORMAL	5/7/2003	CMS-SD-4211	1	1.4	USACE WES										x	
Allendale sediment	CMS-SD-4211-1421-01	NORMAL	5/7/2003	CMS-SD-4211	1.4	2.1	USACE WES										x	
Allendale sediment	CMS-SD-4211-2125-01	NORMAL	5/7/2003	CMS-SD-4211	2.1	2.5	USACE WES										x	
Allendale sediment	CMS-SD-4211-2534-01	NORMAL	5/7/2003	CMS-SD-4211	2.5	3.4	USACE WES									x		
Allendale sediment	CMS-SD-4212-0000-0010	NORMAL	5/7/2003	CMS-SD-4212	0	0.1	USACE WES						x					
Allendale sediment	CMS-SD-4212-0007-01	NORMAL	5/7/2003	CMS-SD-4212	0	0.7	USACE WES									x	x	x
Allendale sediment	CMS-SD-4212-0055-0065	NORMAL	5/7/2003	CMS-SD-4212	0.55	0.65	USACE WES						x					
Allendale sediment	CMS-SD-4212-0125-0135	NORMAL	5/7/2003	CMS-SD-4212	1.25	1.35	USACE WES						x					
Allendale sediment	CMS-SD-4212-0725-01	NORMAL	5/7/2003	CMS-SD-4212	0.7	2.5	USACE WES										x	
Allendale sediment	CMS-SD-4213-0005-01	NORMAL	5/7/2003	CMS-SD-4213	0	0.5	USACE WES										x	
Allendale sediment	CMS-SD-4213-0005-01/CMS-SD-4213-0508-01	NORMAL	5/7/2003	CMS-SD-4213	0	0.8	USACE WES									x		x
Allendale sediment	CMS-SD-4213-0035-0045	NORMAL	5/7/2003	CMS-SD-4213	0.35	0.45	USACE WES						x					
Allendale sediment	CMS-SD-4213-0055-0065	NORMAL	5/7/2003	CMS-SD-4213	0.55	0.65	USACE WES						x					
Allendale sediment	CMS-SD-4213-0115-0125	NORMAL	5/7/2003	CMS-SD-4213	1.15	1.25	USACE WES						x					
Allendale sediment	CMS-SD-4213-0508-01	NORMAL	5/7/2003	CMS-SD-4213	0.5	0.8	USACE WES										x	
Allendale sediment	CMS-SD-4213-0825-01	NORMAL	5/7/2003	CMS-SD-4213	0.8	2.5	USACE WES									x	x	x
Allendale sediment	CMS-SD-4214-0005-01	NORMAL	5/7/2003	CMS-SD-4214	0	0.5	USACE WES									x	x	
Allendale sediment	CMS-SD-4214-0511-01	NORMAL	5/7/2003	CMS-SD-4214	0.5	1.1	USACE WES										x	x
Allendale sediment	CMS-SD-4214-1122-01	NORMAL	5/7/2003	CMS-SD-4214	1.1	2.2	USACE WES										x	
Allendale sediment	CMS-SD-4215-0012-01	NORMAL	5/7/2003	CMS-SD-4215	0	1.2	USACE WES									x	x	x
Allendale sediment	CMS-SD-4215-1218-01	NORMAL	5/7/2003	CMS-SD-4215	1.2	1.8	USACE WES										x	
Allendale sediment	CMS-SD-4215-1828-01	NORMAL	5/7/2003	CMS-SD-4215	1.8	2.8	USACE WES										x	

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Allendale sediment	CMS-SD-4216-0020-01	NORMAL	5/7/2003	CMS-SD-4216	0	2	USACE WES									x	x	x
Allendale sediment	CMS-SD-4216-2023-01	NORMAL	5/7/2003	CMS-SD-4216	2	2.3	USACE WES										x	
Allendale sediment	CMS-SD-4216-2332-01	NORMAL	5/7/2003	CMS-SD-4216	2.3	3.2	USACE WES										x	
Allendale sediment	CMS-SD-4217-0004-01	NORMAL	5/7/2003	CMS-SD-4217	0	0.4	USACE WES									x	x	x
Allendale sediment	CMS-SD-4217-0409-01	NORMAL	5/7/2003	CMS-SD-4217	0.4	0.9	USACE WES									x	x	
Allendale sediment	CMS-SD-4217-0913-01	NORMAL	5/7/2003	CMS-SD-4217	0.9	1.3	USACE WES										x	
Allendale sediment	CMS-SD-4217-1320-01	NORMAL	5/7/2003	CMS-SD-4217	1.3	2	USACE WES										x	x
Allendale sediment	CMS-SD-4217-2034-01	NORMAL	5/7/2003	CMS-SD-4217	2	3.4	USACE WES										x	
Allendale sediment	CMS-SD-4218-0010-01	NORMAL	5/7/2003	CMS-SD-4218	0	1	USACE WES									x	x	x
Allendale sediment	CMS-SD-4218-0035-0045	NORMAL	5/7/2003	CMS-SD-4218	0.35	0.45	USACE WES						x					
Allendale sediment	CMS-SD-4218-0070-0080	NORMAL	5/7/2003	CMS-SD-4218	0.7	0.8	USACE WES						x					
Allendale sediment	CMS-SD-4218-0150-0160	NORMAL	5/7/2003	CMS-SD-4218	1.5	1.6	USACE WES						x					
Allendale sediment	CMS-SD-4218-1016-01	NORMAL	5/7/2003	CMS-SD-4218	1	1.6	USACE WES										x	
Allendale sediment	CMS-SD-4218-1621-01	NORMAL	5/7/2003	CMS-SD-4218	1.6	2.1	USACE WES										x	
Allendale sediment	CMS-SD-4218-2127-01	NORMAL	5/7/2003	CMS-SD-4218	2.1	2.7	USACE WES										x	
Allendale sediment	CMS-SD-4218-2737-01	NORMAL	5/7/2003	CMS-SD-4218	2.7	3.7	USACE WES										x	
Allendale sediment	CMS-SD-4219-0010-01	NORMAL	5/7/2003	CMS-SD-4219	0	1	USACE WES									x	x	x
Allendale sediment	CMS-SD-4219-0035-0045	NORMAL	5/7/2003	CMS-SD-4219	0.35	0.45	USACE WES						x					
Allendale sediment	CMS-SD-4219-0075-0085	NORMAL	5/7/2003	CMS-SD-4219	0.75	0.85	USACE WES						x					
Allendale sediment	CMS-SD-4219-0145-0155	NORMAL	5/7/2003	CMS-SD-4219	1.45	1.55	USACE WES						x					
Allendale sediment	CMS-SD-4219-1017-01	NORMAL	5/7/2003	CMS-SD-4219	1	1.7	USACE WES										x	x
Allendale sediment	CMS-SD-4219-1727-01	NORMAL	5/7/2003	CMS-SD-4219	1.7	2.7	USACE WES									x	x	
Allendale sediment	CMS-SD-4220-0006-01	NORMAL	5/7/2003	CMS-SD-4220	0	0.6	USACE WES									x	x	x
Allendale sediment	CMS-SD-4220-0030-0040	NORMAL	5/7/2003	CMS-SD-4220	0.3	0.4	USACE WES						x					
Allendale sediment	CMS-SD-4220-0060-0070	NORMAL	5/7/2003	CMS-SD-4220	0.6	0.7	USACE WES						x					
Allendale sediment	CMS-SD-4220-0120-0130	NORMAL	5/7/2003	CMS-SD-4220	1.2	1.3	USACE WES						x					
Allendale sediment	CMS-SD-4220-0609-01	NORMAL	5/7/2003	CMS-SD-4220	0.6	0.9	USACE WES										x	
Allendale sediment	CMS-SD-4220-0921-01	NORMAL	5/7/2003	CMS-SD-4220	0.9	2.1	USACE WES										x	
Allendale sediment	CMS-SD-4221-0006-01	NORMAL	5/8/2003	CMS-SD-4221	0	0.6	USACE WES										x	
Allendale sediment	CMS-SD-4221-0626-01	NORMAL	5/8/2003	CMS-SD-4221	0.6	2.6	USACE WES									x	x	x
Allendale sediment	CMS-SD-4222-0007-01	NORMAL	5/8/2003	CMS-SD-4222	0	0.7	USACE WES									x	x	x
Allendale sediment	CMS-SD-4222-0025-0035	NORMAL	5/8/2003	CMS-SD-4222	0.25	0.35	USACE WES						x					
Allendale sediment	CMS-SD-4222-0085-0095	NORMAL	5/8/2003	CMS-SD-4222	0.85	0.95	USACE WES						x					
Allendale sediment	CMS-SD-4222-0125-0135	NORMAL	5/8/2003	CMS-SD-4222	1.25	1.35	USACE WES						x					
Allendale sediment	CMS-SD-4222-0710-01	NORMAL	5/8/2003	CMS-SD-4222	0.7	1	USACE WES										x	
Allendale sediment	CMS-SD-4222-1025-01	NORMAL	5/8/2003	CMS-SD-4222	1	2.5	USACE WES									x	x	x
Allendale sediment	CMS-SD-4223-0004-01	NORMAL	5/8/2003	CMS-SD-4223	0	0.4	USACE WES										x	x
Allendale sediment	CMS-SD-4223-1011-01	NORMAL	5/8/2003	CMS-SD-4223	1	1.1	USACE WES										x	
Allendale sediment	CMW-FP-2026-0.502-01	NORMAL	10/28/1999	CMW-FP-2026	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	CMW-FP-2026-000.5-01	Field Dup. CMW-FP-2026-000.5-01	10/28/1999	CMW-FP-2026	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	CMW-FP-2026-0204-01	NORMAL	10/28/1999	CMW-FP-2026	2	4	TTNUS		x			x	x	x				
Allendale sediment	CMW-FP-2027-01	NORMAL	10/28/1999	CMW-FP-2027	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	CMW-SD-2023-01	NORMAL	10/27/1999	CMW-SD-2023	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	CMW-SD-2024-01	NORMAL	10/27/1999	CMW-SD-2024	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale sediment	CMW-SD-2025-0.502-01	NORMAL	10/28/1999	CMW-SD-2025	0.5	2	TTNUS		x		x	x	x	x				
Allendale sediment	CMW-SD-2025-000.5-01	NORMAL	10/28/1999	CMW-SD-2025	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x

Table B-3. List of Sediment Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	CMW-SD-DU-102899A	Field Dup. CMW-FP-2026-000.5-01	10/28/1999	CMW-FP-2026	0	0.5	TTNUS		x		x	x	x	x				
Allendale sediment	DAM002-SD	NORMAL	10/23/1998	Allendale Dam	0	0.33	SPINA		x		x	x	x	x			x	
Allendale sediment	HA06-FD	Field Dup. CMS-191-A	7/7/1999	CMS-191	0	1	IT							x				
Allendale sediment	HA07-FD	Field Dup. CMS-214-B	7/12/1999	CMS-214	1	2	IT							x				
Allendale sediment	HA10-FD	Field Dup. CMS-023-B	7/14/1999	CMS-023	1	2	IT							x				
Allendale sediment	HA11-FD	Field Dup. CMS-215-B-1	7/22/1999	CMS-215	1	2	IT							x				
Allendale sediment	HA13-FD	Field Dup. CMS-477-B	7/29/1999	CMS-477	1	2	IT							x				
Allendale sediment	HA14-FD	Field Dup. CMS-484-B	7/30/1999	CMS-484	1	2	IT							x				
Allendale sediment	HA15-FD	Field Dup. CMS-490-B	7/30/1999	CMS-490	1	2	IT							x				
Allendale sediment	RES-SS-12-239-01	NORMAL	11/16/1999	RES-12-239-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-240-01	Field Dup. RES-SS-12-240-01	11/16/1999	RES-12-240-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-12-240-02	NORMAL	11/16/1999	RES-12-240-02	0	1	TTNUS							x				
Allendale sediment	RES-SS-12-550-01	NORMAL	11/16/1999	RES-12-550-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-551-01	NORMAL	11/16/1999	RES-12-551-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-552-01	NORMAL	11/16/1999	RES-12-552-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-553-01	Field Dup. RES-SS-12-553-01	11/16/1999	RES-12-553-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-554-01	NORMAL	11/16/1999	RES-12-554-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-12-555-01	Field Dup. RES-SS-12-555-01	11/16/1999	RES-12-555-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-210-01	NORMAL	11/16/1999	RES-14-210-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-334-01	NORMAL	11/15/1999	RES-14-334-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-14-365-01	NORMAL	11/15/1999	RES-14-365-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-366-01	NORMAL	11/15/1999	RES-14-366-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-366-02	NORMAL	11/15/1999	RES-14-366-02	0	1	TTNUS							x				
Allendale sediment	RES-SS-14-398-01	NORMAL	11/15/1999	RES-14-398-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-14-399-01	NORMAL	11/15/1999	RES-14-399-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-419-01	NORMAL	11/19/1999	RES-14-419-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-14-420-01	NORMAL	11/19/1999	RES-14-420-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-14-422-01	NORMAL	12/2/1999	RES-14-422-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-424-01	NORMAL	12/2/1999	RES-14-424-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-424-02	NORMAL	12/2/1999	RES-14-424-02	0	1	TTNUS							x				
Allendale sediment	RES-SS-14-425-01	NORMAL	12/2/1999	RES-14-425-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-430-01	Field Dup. RES-SS-14-430-01	11/17/1999	RES-14-430-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-14-448-01	NORMAL	11/15/1999	RES-14-448-01	0	1	TTNUS		x		x	x	x	x				
Allendale sediment	RES-SS-14-449-01	NORMAL	12/2/1999	RES-14-449-01	0	1	TTNUS		x			x	x	x				
Allendale sediment	RES-SS-14-449-02	NORMAL	12/2/1999	RES-14-449-02	0	1	TTNUS							x				
Allendale sediment	RES-SS-14-449-03	Field Dup. RES-SS-14-449-03	12/2/1999	RES-14-449-03	0	1	TTNUS							x				
Allendale sediment	RES-SS-DU-111699A	Field Dup. RES-SS-12-553-01	11/16/1999	RES-12-553-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-DU-111699B	Field Dup. RES-SS-12-555-01	11/16/1999	RES-12-555-01	0	1	TTNUS							x				
Allendale sediment	RES-SS-DU-111699C	Field Dup. RES-SS-12-240-01	11/16/1999	RES-12-240-01	0	1	TTNUS							x				
Allendale sediment	RES-SS-DU-111799D	Field Dup. RES-SS-14-430-01	11/17/1999	RES-14-430-01	0	1	TTNUS		x		x	x	x					
Allendale sediment	RES-SS-DU-120299B	Field Dup. RES-SS-14-449-03	12/2/1999	RES-14-449-03	0	1	TTNUS							x				
Allendale sediment	SD-20	NORMAL	9/9/1998	SD-20	0	0.25	SPINA				x	x		x			x	
Allendale sediment	SD-21	NORMAL	9/9/1998	SD-21	0.5	2	SPINA				x	x		x			x	
Allendale sediment	SD-22	NORMAL	9/9/1998	SD-22	0	0.25	SPINA				x	x		x			x	
Allendale sediment	SD-23	NORMAL	9/9/1998	SD-23	0	0.25	SPINA				x	x		x			x	
Allendale sediment	SD-24	NORMAL	9/9/1998	SD-24	0	0.25	SPINA				x	x		x			x	
Allendale sediment	SD-25	NORMAL	9/9/1998	SD-25	0	0.25	SPINA				x	x		x			x	
Allendale sediment	SD-26	NORMAL	9/9/1998	SD-26	0	0.5	SPINA				x	x		x			x	

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Allendale sediment	SD-27	NORMAL	9/9/1998	SD-27	0	0.5	SPINA				x	x		x			x	
Allendale sediment	SD-28	NORMAL	9/9/1998	SD-28	0	0.5	SPINA				x	x		x			x	
Allendale sediment	SD-29	NORMAL	9/9/1998	SD-29	0	0.5	SPINA				x	x		x			x	
Allendale Sediment	WRC-SD-2009-01	NORMAL	11/1/1999	WRC-SD-2009	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale Sediment	WRC-SD-2010-01	NORMAL	11/2/1999	WRC-SD-2010	0	0.5	TTNUS		x		x	x	x	x	x	x	x	
Allendale Sediment	WRC-SD-2011-0.51.5-01	NORMAL	11/2/1999	WRC-SD-2011	0.5	1.5	TTNUS		x		x	x	x	x				
Allendale Sediment	WRC-SD-2011-000.5-01	NORMAL	11/2/1999	WRC-SD-2011	0	0.5	TTNUS		x		x	x	x	x	x	x	x	
Allendale Sediment	WRC-SD-2012-01	NORMAL	11/2/1999	WRC-SD-2012	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Allendale Sediment	WRC-SD-2013-000.5-01	NORMAL	11/1/1999	WRC-SD-2013	0	0.5	TTNUS		x		x	x	x	x	x	x	x	
Allendale sediment	WRC-SD-2014-01	NORMAL	11/1/1999	WRC-SD-2014	0	0.5	TTNUS		x		x	x	x	x	x	x	x	
Allendale sediment	WRC-SD-2015-01	NORMAL	11/1/1999	WRC-SD-2015	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
							Sample Number	2	88	2	98	148	90	296	29	58	133	53
Oxbow floodplain soil	LPX-SD-4401-0005-01	NORMAL	21-Jun-04	LPX-SD-4401	0.0	0.5	BATTELLE						x	x				
Oxbow floodplain soil	LPX-SD-4402-0005-01	NORMAL	21-Jun-04	LPX-SD-4402	0.0	0.5	BATTELLE				x	x	x	x			x	
Oxbow floodplain soil	LPX-SD-4403-0005-01	NORMAL	21-Jun-04	LPX-SD-4403	0.0	0.5	BATTELLE							x				
Oxbow floodplain soil	LPX-SD-4404-0005-01	NORMAL	21-Jun-04	LPX-SD-4404	0.0	0.5	BATTELLE				x	x	x	x			x	
Oxbow floodplain soil	LPX-SD-4405-0005-01	NORMAL	21-Jun-04	LPX-SD-4405	0.0	0.5	BATTELLE							x				
Oxbow floodplain soil	LPX-SD-4406-0005-01	NORMAL	21-Jun-04	LPX-SD-4406	0.0	0.5	BATTELLE							x				
Oxbow floodplain soil	LPX-SD-4407-0005-01	NORMAL	21-Jun-04	LPX-SD-4407	0.0	0.5	BATTELLE				x	x	x	x			x	
Oxbow floodplain soil	LPX-DU-062104A	DUPLICATE	21-Jun-04	LPX-SD-4401	0.0	0.5	BATTELLE						x					
Oxbow floodplain soil	LPX-DU-062104B	DUPLICATE	21-Jun-04	LPX-SD-4402	0.0	0.5	BATTELLE				x	x		x			x	
							Sample Number	0	0	0	4	4	5	9	0	0	4	0
Lyman Mill sediment	06199 (3)	NORMAL		Water St.	0	0	SPINA					x		x				
Lyman Mill sediment	3428-CMS-217	Field Dup. 3428-CMS-217	2/16/1999	CMS-217	0	0.25	IT							x				
Lyman Mill sediment	3428-CMS-217D	Field Dup. 3428-CMS-217	2/16/1999	CMS-217	0	0.25	IT							x				
Lyman Mill sediment	3428-CMS-218	NORMAL	2/16/1999	CMS-218	0	0.25	IT							x				
Lyman Mill sediment	3428-CMS-219	NORMAL	2/16/1999	CMS-219	0	0.25	IT							x				
Lyman Mill sediment	AD-05-A	Field Dup. AD-05-A	7/20/1999	AD-05	0	1	IT		x		x	x	x	x			x	
Lyman Mill sediment	AD-05-A-D	Field Dup. AD-05-A	7/20/1999	AD-05	0	1	IT										x	
Lyman Mill sediment	CMS-457-A	NORMAL	7/22/1999	CMS-457	0	1	IT							x				
Lyman Mill sediment	CMS-458-A	NORMAL	7/22/1999	CMS-458	0	1	IT							x				
Lyman Mill sediment	CMS-459-A	NORMAL	7/22/1999	CMS-459	0	1	IT							x				
Lyman Mill sediment	CMS-468-A	NORMAL	7/27/1999	CMS-468	0	1	IT							x				
Lyman Mill sediment	DAM003-SD	NORMAL	10/23/1998	Lymansville Dam	0	0.33	SPINA		x		x	x	x	x			x	
Lyman Mill sediment	LPX-BK-2006X-01	NORMAL	10/21/1999	LPX-BK-2006	0	0.5	TTNUS		x				x	x				
Lyman Mill sediment	LPX-BK-2006Y-01	NORMAL	10/21/1999	LPX-BK-2006	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-BK-2006Z-01	NORMAL	10/21/1999	LPX-BK-2006	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-BK-2008X-01	NORMAL	10/21/1999	LPX-BK-2008	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-BK-2008Y-01	NORMAL	10/21/1999	LPX-BK-2008	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-BK-2008Z-01	NORMAL	10/21/1999	LPX-BK-2008	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-DU-110499A	Field Dup. LPX-SD-2053-000.5-01	11/4/1999	LPX-SD-2053	0	0.5	TTNUS		x		x	x	x	x			x	
Lyman Mill sediment	LPX-SD-071601-A	Field Dup. LPX-SD-4013-0000-01	7/16/2001	LPX-SD-4013	0	0.5	HARDING ESE		x		x	x	x	x	x	x	x	x

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Lyman Mill sediment	LPX-SD-2045-01	NORMAL	11/8/1999	LPX-SD-2045	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2045B-02	NORMAL	7/25/2001	LPX-SD-2045B	0	0.3	TTNUS		x		x		x	x				
Lyman Mill sediment	LPX-SD-2046-0.502-01	NORMAL	11/8/1999	LPX-SD-2046	0.5	2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2046-000.5-01	NORMAL	11/8/1999	LPX-SD-2046	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2046-0204-01	NORMAL	11/8/1999	LPX-SD-2046	2	4	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2047-01	NORMAL	11/8/1999	LPX-SD-2047	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2048-0.502-01	NORMAL	11/9/1999	LPX-SD-2048	0.5	2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2048-000.5-01	Field Dup. LPX-SD-2048-000.5-01	11/9/1999	LPX-SD-2048	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2048-0204-01	NORMAL	11/9/1999	LPX-SD-2048	2	4	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2049-01	NORMAL	11/5/1999	LPX-SD-2049	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2050-01	NORMAL	11/5/1999	LPX-SD-2050	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2051-01	NORMAL	11/4/1999	LPX-SD-2051	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2052-0.504-01	NORMAL	11/4/1999	LPX-SD-2052	0.5	4	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2052-000.5-01	NORMAL	11/4/1999	LPX-SD-2052	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2053-0.502-01	NORMAL	11/4/1999	LPX-SD-2053	0.5	2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2053-000.5-01	Field Dup. LPX-SD-2053-000.5-01	11/4/1999	LPX-SD-2053	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-2053-0204-01	NORMAL	11/4/1999	LPX-SD-2053	2	4	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-2072-01	NORMAL	7/25/2001	LPX-SD-2072	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	LPX-SD-4001-0000-01	NORMAL	7/12/2001	LPX-SD-4001	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-4002-0000-01	NORMAL	7/12/2001	LPX-SD-4002	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-4004-0000-01	NORMAL	7/12/2001	LPX-SD-4004	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Lyman Mill sediment	LPX-SD-4011-0000-01	NORMAL	7/10/2001	LPX-SD-4011	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Lyman Mill sediment	LPX-SD-4012-0000-01	NORMAL	7/10/2001	LPX-SD-4012	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Lyman Mill sediment	LPX-SD-4013-0000-01	NORMAL	7/10/2001	LPX-SD-4013	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Lyman Mill sediment	LPX-SD-4013-DUP	Field Dup. LPX-SD-4013-0000-01	7/10/2001	LPX-SD-4013	0	0.5	HARDING ESE		x									x
Lyman Mill sediment	LPX-SD-4201-0010-01	NORMAL	5/8/2003	LPX-SD-4201	0	1	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4201-0035-0045	NORMAL	5/8/2003	LPX-SD-4201	0.35	0.45	USACE WES						x					
Lyman Mill sediment	LPX-SD-4201-0095-0105	NORMAL	5/8/2003	LPX-SD-4201	0.95	1.05	USACE WES						x					
Lyman Mill sediment	LPX-SD-4201-0125-0135	NORMAL	5/8/2003	LPX-SD-4201	1.25	1.35	USACE WES						x					
Lyman Mill sediment	LPX-SD-4201-1031-01	NORMAL	5/8/2003	LPX-SD-4201	1	3.1	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4201-3136-01	NORMAL	5/8/2003	LPX-SD-4201	3.1	3.6	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4201-3942-01	NORMAL	5/8/2003	LPX-SD-4201	3.9	4.2	USACE WES										x	
Lyman Mill sediment	LPX-SD-4202-0005-01	NORMAL	5/8/2003	LPX-SD-4202	0	0.5	USACE WES									x	x	
Lyman Mill sediment	LPX-SD-4202-3637-01	NORMAL	5/8/2003	LPX-SD-4202	3.6	3.7	USACE WES										x	
Lyman Mill sediment	LPX-SD-4202-4042-01	NORMAL	5/8/2003	LPX-SD-4202	4	4.2	USACE WES										x	
Lyman Mill sediment	LPX-SD-4203-0012-01	NORMAL	5/8/2003	LPX-SD-4203	0	1.2	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4203-1225-01	NORMAL	5/8/2003	LPX-SD-4203	1.2	2.5	USACE WES										x	
Lyman Mill sediment	LPX-SD-4203-3135-01	NORMAL	5/8/2003	LPX-SD-4203	3.1	3.5	USACE WES										x	
Lyman Mill sediment	LPX-SD-4203-3537-01	NORMAL	5/8/2003	LPX-SD-4203	3.5	3.7	USACE WES										x	
Lyman Mill sediment	LPX-SD-4204-0018-01	NORMAL	5/8/2003	LPX-SD-4204	0	1.8	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4204-1824-01	NORMAL	5/8/2003	LPX-SD-4204	1.8	2.4	USACE WES										x	
Lyman Mill sediment	LPX-SD-4204-2427-01	NORMAL	5/8/2003	LPX-SD-4204	2.4	2.7	USACE WES										x	
Lyman Mill sediment	LPX-SD-4204-3438-01	NORMAL	5/8/2003	LPX-SD-4204	3.4	3.8	USACE WES										x	
Lyman Mill sediment	LPX-SD-4205-0015-01	NORMAL	5/8/2003	LPX-SD-4205	0	1.5	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4205-1523-01	NORMAL	5/8/2003	LPX-SD-4205	1.5	2.3	USACE WES									x	x	x

Table B-3. List of Sediment Samples Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Lyman Mill sediment	LPX-SD-4205-2333-01	NORMAL	5/8/2003	LPX-SD-4205	2.3	3.3	USACE WES										x	
Lyman Mill sediment	LPX-SD-4206-0009-01	NORMAL	5/8/2003	LPX-SD-4206	0	0.9	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4206-1118-01	NORMAL	5/8/2003	LPX-SD-4206	1.1	1.8	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4206-1823-01	NORMAL	5/8/2003	LPX-SD-4206	1.8	2.3	USACE WES									x		
Lyman Mill sediment	LPX-SD-4207-0000-0010	NORMAL	5/8/2003	LPX-SD-4207	0	0.1	USACE WES						x					
Lyman Mill sediment	LPX-SD-4207-0009-01	NORMAL	5/8/2003	LPX-SD-4207	0	0.9	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4207-0110-0120	NORMAL	5/8/2003	LPX-SD-4207	1.1	1.2	USACE WES						x					
Lyman Mill sediment	LPX-SD-4207-0920-01	NORMAL	5/8/2003	LPX-SD-4207	0.9	2	USACE WES										x	
Lyman Mill sediment	LPX-SD-4208-0000-0010	NORMAL	5/9/2003	LPX-SD-4208	0	0.1	USACE WES						x					
Lyman Mill sediment	LPX-SD-4208-0011-01	NORMAL	5/9/2003	LPX-SD-4208	0	1.1	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4208-0120-0130	NORMAL	5/9/2003	LPX-SD-4208	1.2	1.3	USACE WES						x					
Lyman Mill sediment	LPX-SD-4208-0190-0200	NORMAL	5/9/2003	LPX-SD-4208	1.9	2	USACE WES						x					
Lyman Mill sediment	LPX-SD-4208-1125-01	NORMAL	5/9/2003	LPX-SD-4208	1.1	2.5	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4209-0000-0010	NORMAL	5/9/2003	LPX-SD-4209	0	0.1	USACE WES						x					
Lyman Mill sediment	LPX-SD-4209-0008-01	NORMAL	5/9/2003	LPX-SD-4209	0	0.8	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4209-0145-0155	NORMAL	5/9/2003	LPX-SD-4209	1.45	1.55	USACE WES						x					
Lyman Mill sediment	LPX-SD-4209-0812-01	NORMAL	5/9/2003	LPX-SD-4209	0.8	1.2	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4209-1226-01	NORMAL	5/9/2003	LPX-SD-4209	1.2	2.6	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4209-2634-01	NORMAL	5/9/2003	LPX-SD-4209	2.6	3.4	USACE WES											x
Lyman Mill sediment	LPX-SD-4210-0015-01	NORMAL	5/9/2003	LPX-SD-4210	0	1.5	USACE WES									x	x	x
Lyman Mill sediment	LPX-SD-4210-1523-01	NORMAL	5/9/2003	LPX-SD-4210	1.5	2.3	USACE WES										x	x
Lyman Mill sediment	LPX-SD-4210-2328-01	NORMAL	5/9/2003	LPX-SD-4210	2.3	2.8	USACE WES										x	
Lyman Mill sediment	LPX-SD-DU-110999A	Field Dup. LPX-SD-2048-000.5-01	11/9/1999	LPX-SD-2048	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	SD-10	NORMAL	9/9/1998	SD-10	0	0.5	SPINA		x		x	x		x			x	
Lyman Mill sediment	SD-11	NORMAL	9/9/1998	SD-11	0	1	SPINA		x		x	x		x			x	
Lyman Mill sediment	SD-12	NORMAL	9/9/1998	SD-12	0	1	SPINA		x		x	x		x			x	
Lyman Mill sediment	SD-13	NORMAL	9/9/1998	SD-13	0	1	SPINA		x		x	x		x			x	
Lyman Mill sediment	SD-14	NORMAL	9/9/1998	SD-14	0	0.5	SPINA		x		x	x		x			x	
Lyman Mill sediment	SD-15	NORMAL	9/9/1998	SD-15	0	0.5	SPINA				x	x		x			x	
Lyman Mill sediment	SD-16	NORMAL	9/9/1998	SD-16	0	0.5	SPINA				x	x		x			x	
Lyman Mill sediment	SD-17	NORMAL	9/9/1998	SD-17	0	0.5	SPINA				x	x		x			x	
Lyman Mill sediment	SD-18	NORMAL	9/9/1998	SD-18	0	0.25	SPINA				x	x		x			x	
Lyman Mill sediment	SD-19	NORMAL	9/9/1998	SD-19	0	0.25	SPINA				x	x		x			x	
Lyman Mill sediment	WRL-BK-2004X-01	NORMAL	10/21/1999	WRL-BK-2004	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-BK-2004Y-01	NORMAL	10/21/1999	WRL-BK-2004	0	0.5	TTNUS		x				x	x				
Lyman Mill sediment	WRL-BK-2004Z-01	NORMAL	10/21/1999	WRL-BK-2004	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-BK-2005X-01	NORMAL	10/21/1999	WRL-BK-2005	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-BK-2005Y-01	NORMAL	10/21/1999	WRL-BK-2005	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-BK-2005Z-01	NORMAL	10/21/1999	WRL-BK-2005	0	0.5	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-DU-102599A	Field Dup. WRL-SD-2040-01	10/25/1999	WRL-SD-2040	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-071201-A	Field Dup. WRL-SD-4005-0000-01	7/12/2001	WRL-SD-4005	0	0.5	HARDING ESE						x		x			
Lyman Mill sediment	WRL-SD-2038-01	NORMAL	10/25/1999	WRL-SD-2038	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2039-01	NORMAL	10/25/1999	WRL-SD-2039	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2040-01	Field Dup. WRL-SD-2040-01	10/25/1999	WRL-SD-2040	0	0.5	TTNUS		x		x	x	x	x	x	x	x	
Lyman Mill sediment	WRL-SD-2041-01	NORMAL	10/25/1999	WRL-SD-2041	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2041-02	Field Dup. WRL-SD-2041-02	7/24/2001	WRL-SD-2041	0	0.2	TTNUS		x		x	x	x	x				

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Lyman Mill sediment	WRL-SD-2042-01	NORMAL	11/2/1999	WRL-SD-2042	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2042-02	NORMAL	7/24/2001	WRL-SD-2042	0	0.3	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-SD-2043-01	NORMAL	11/8/1999	WRL-SD-2043	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2043-02	NORMAL	7/25/2001	WRL-SD-2043	0	0.2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-SD-2044-0.502-01	NORMAL	11/9/1999	WRL-SD-2044	0.5	2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-SD-2044-000.5-01	NORMAL	11/9/1999	WRL-SD-2044	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-2044-0203-01	NORMAL	11/9/1999	WRL-SD-2044	2	3	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-SD-2071-01	NORMAL	7/24/2001	WRL-SD-2071	0	0.2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRL-SD-4005-0000-01	NORMAL	7/12/2001	WRL-SD-4005	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Lyman Mill sediment	WRL-SD-DUP01-02	Field Dup. WRL-SD-2041-02	7/24/2001	WRL-SD-2041	0	0.2	TTNUS		x		x	x	x	x				
Lyman Mill sediment	WRM-SD-2054-01	NORMAL	12/2/1999	WRM-SD-2054	0	0.5	TTNUS		x		x	x	x	x				
							Sample Number	0	60	0	66	66	59	84	27	39	70	44
Assaumpset sediment	RAB-SD-2069-01	NORMAL	9/18/2000	RAB-SD-2069	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Assaumpset sediment	RAB-SD-2070-01	NORMAL	9/18/2000	RAB-SD-2070	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Assaumpset sediment	RAB-SD-3004-01	NORMAL	11/10/1999	RAB-SD-3004	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Assaumpset sediment	RAB-SD-5004-0000-01	NORMAL	7/12/2001	RAB-SD-5004	0	0.5	HARDING ESE				x	x	x	x	x	x	x	x
Assaumpset sediment	RAB-SD-5008-0000-01	NORMAL	7/9/2001	RAB-SD-5008	0	0.5	HARDING ESE		x		x	x	x		x	x	x	x
Assaumpset sediment	RAB-FP-3004-01	NORMAL	11/10/1999	RAB-FP-3004	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
							Sample Number	0	5	0	6	6	6	5	6	6	6	6
Manton Sediment	WRM-SD-2054-01	NORMAL	12/2/1999	WRM-SD-2054	0	0.5	TTNUS		x		x	x	x	x				
Manton Sediment	CMS-DU-091900A	Field Dup. WRM-SD-2056-01	9/19/2000	WRM-SD-2056	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	CMS-DU-092100A	Field Dup. MAP-SD-2061-01	9/21/2000	MAP-SD-2061	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	DAM004-SD	Field Dup. DAM004-SD	10/23/1998	Manton Dam	0	0.33	SPINA		x		x	x	x	x			x	
Manton Sediment	DAM04A-SD	Field Dup. DAM004-SD	10/23/1998	Manton Dam	0	0.33	SPINA		x		x	x	x	x			x	
Manton Sediment	MAP-SD-2058-01	NORMAL	9/20/2000	MAP-SD-2058	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	MAP-SD-2059-01	NORMAL	9/20/2000	MAP-SD-2059	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	MAP-SD-2060-01	NORMAL	9/20/2000	MAP-SD-2060	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	MAP-SD-2061-01	Field Dup. MAP-SD-2061-01	9/21/2000	MAP-SD-2061	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	WRM-SD-2055-01	NORMAL	9/20/2000	WRM-SD-2055	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	WRM-SD-2056-01	Field Dup. WRM-SD-2056-01	9/19/2000	WRM-SD-2056	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	WRM-SD-2057-01	NORMAL	9/20/2000	WRM-SD-2057	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Manton Sediment	WRM-SD-2062-01	NORMAL	9/19/2000	WRM-SD-2062	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
							Sample Number	0	13	0	13	13	13	13	10	10	12	10
Downstream of Manton sediment	DAM005 SD	NORMAL	10/23/1998	Dyerville Dam	0	0.33	SPINA		x		x	x	x	x			x	

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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	TOP_OF_SAMPLE	BOTTOM_OF_SAMPLE	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	D/F, HCX (1)	AVS/SEM	GS	TOC	Ancillary (2)
Downstream of Manton sediment	DAM006-SD	NORMAL	10/23/1998	Olneyville Dam	0	0.33	SPINA		x		x	x	x	x			x	
Downstream of Manton sediment	DAM007-SD	NORMAL	10/23/1998	Lonigan Dam	0	0.33	SPINA		x		x	x	x	x			x	
Downstream of Manton sediment	DYP-SD-2065-01	NORMAL	9/19/2000	DYP-SD-2065	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Downstream of Manton sediment	DYP-SD-2066-01	NORMAL	9/19/2000	DYP-SD-2066	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Downstream of Manton sediment	SD-01	NORMAL	9/9/1998	SD-01	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-02	NORMAL	9/9/1998	SD-02	0	0.25	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-03	NORMAL	9/9/1998	SD-03	0	0.25	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-04	NORMAL	9/9/1998	SD-04	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-05	NORMAL	9/9/1998	SD-05	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-06	NORMAL	9/9/1998	SD-06	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-07	NORMAL	9/9/1998	SD-07	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-08	NORMAL	9/9/1998	SD-08	0	0.25	SPINA		x		x	x		x			x	
Downstream of Manton sediment	SD-09	NORMAL	9/9/1998	SD-09	0	0.5	SPINA		x		x	x		x			x	
Downstream of Manton sediment	WRD-SD-2063-01	NORMAL	9/20/2000	WRD-SD-2063	0	0.5	TTNUS		x		x	x	x	x	x	x	x	x
Downstream of Manton sediment	06205 (3)	NORMAL		Lonigin Dam	0	0.33	SPINA					x		x				
Sample Number					0			15	0	15	16	6	16	3	3	15	3	

VOCs, Volatile organic compounds
SVOCs, Semi-volatile organic compounds
PCBs, Polychlorinated biphenyls
D/F, Dioxin/furans
AVS/SEM, Acid volatile sulfide/simultaneously extracted metals
GS, Grain size
TOC, Total organic carbon content
(1) Selected samples only analyzed for 2,3,7,8-TCDD; not all samples analyzed for HCX
(2) Ancillary parameters generally include geotechnical parameters such as Atterberg Limits, percent moisture, organic matter, and ash, percent
(3) Not used in the RI

Table B-4. List of Surface Water Sa[illegible]s Currently in the CMRP Database
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RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	D/F, HCX	AVS/SEM	GS	TOC	Ancillary (1)
Upstream surface water	DAM001-SW	NORMAL	10/23/1998	Esmond Dam	SPINA												x
Upstream surface water	RCC-SW-3001-01	NORMAL	11/10/1999	RCC-SD-3001	TTNUS		x		x	x	x		x				
Upstream surface water	RCC-SW-3001-01F	NORMAL	11/10/1999	RCC-SD-3001	TTNUS							x					
Upstream surface water	RCC-SW-3002-01	Field Dup. RCC-SW-3002-01	11/10/1999	RCC-SD-3002	TTNUS		x		x	x	x		x				
Upstream surface water	RCC-SW-3002-01F	NORMAL	11/10/1999	RCC-SD-3002	TTNUS							x					
Upstream surface water	RCC-SW-3003-01	NORMAL	11/10/1999	RCC-SD-3003	TTNUS		x		x	x	x		x				
Upstream surface water	RCC-SW-3003-01F	NORMAL	11/10/1999	RCC-SD-3003	TTNUS							x					
Upstream surface water	RCC-SW-DU-111099A	Field Dup. RCC-SW-3002-01	11/10/1999	RCC-SD-3002	TTNUS						x						
Upstream surface water	RWR-SW-5001-01	NORMAL	7/17/2001	RWR-SW-5001	HARDING ESE	x	x		x	x	x	x				x	x
Upstream surface water	RWR-SW-5002-01	NORMAL	7/17/2001	RWR-SW-5002	HARDING ESE	x	x		x	x	x	x				x	x
					Sample Number	2	5	0	5	5	6	5	3	0	0	2	3
Source Area surface water	CMW-SW-2016-01	NORMAL	10/26/1999	CMW-SD-2016	TTNUS		x		x	x	x		x				
Source Area surface water	CMW-SW-2016-01F	NORMAL	10/26/1999	CMW-SD-2016	TTNUS							x					
Source Area surface water	CMW-SW-2019-01	NORMAL	10/26/1999	CMW-SD-2019	TTNUS		x		x	x	x		x				
Source Area surface water	CMW-SW-2019-01F	NORMAL	10/26/1999	CMW-SD-2019	TTNUS							x					
Source Area surface water	CMW-SW-2020-01	NORMAL	10/26/1999	CMW-SD-2020	TTNUS		x		x	x	x		x				
Source Area surface water	CMW-SW-2020-01F	NORMAL	10/26/1999	CMW-SD-2020	TTNUS							x					
Source Area surface water	CMW-SW-2021-01	NORMAL	10/26/1999	CMW-SD-2021	TTNUS		x		x	x	x		x				
Source Area surface water	CMW-SW-2021-01F	NORMAL	10/26/1999	CMW-SD-2021	TTNUS							x					
Source Area surface water	CMW-SW-2022-01	NORMAL	10/27/1999	CMW-SD-2022	TTNUS		x		x	x	x						
Source Area surface water	CMW-SW-2022-01F	NORMAL	10/27/1999	CMW-SD-2022	TTNUS							x					
					Sample Number	0	5	0	5	5	5	5	4	0	0	0	0
Allendale surface water	WRC-SW-2009-01	NORMAL	11/1/1999	WRC-SD-2009	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2009-01F	NORMAL	11/1/1999	WRC-SD-2009	TTNUS							x					
Allendale surface water	WRC-SW-2010-01	NORMAL	11/2/1999	WRC-SD-2010	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2010-01F	NORMAL	11/2/1999	WRC-SD-2010	TTNUS							x					
Allendale surface water	WRC-SW-2011-01	Field Dup. WRC-SW-2011-01	11/2/1999	WRC-SD-2011	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2011-01F	NORMAL	11/2/1999	WRC-SD-2011	TTNUS							x					
Allendale surface water	WRC-SW-2012-01	NORMAL	11/2/1999	WRC-SD-2012	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2012-01F	NORMAL	11/2/1999	WRC-SD-2012	TTNUS							x					
Allendale surface water	WRC-SW-2013-01	NORMAL	11/1/1999	WRC-SD-2013	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2013-01F	NORMAL	11/1/1999	WRC-SD-2013	TTNUS							x					
Allendale surface water	WRC-SW-DU-110299A	Field Dup. WRC-SW-2011-01	11/2/1999	WRC-SD-2011	TTNUS						x						
Allendale surface water	APB-SW-2029-01	NORMAL	10/29/1999	APB-SD-2029	TTNUS		x		x	x	x		x				
Allendale surface water	APB-SW-2029-01F	NORMAL	10/29/1999	APB-SD-2029	TTNUS							x					
Allendale surface water	APB-SW-2034-01	NORMAL	11/3/1999	APB-SD-2034	TTNUS		x		x	x	x		x				
Allendale surface water	APB-SW-2034-01F	NORMAL	11/3/1999	APB-SD-2034	TTNUS							x					
Allendale surface water	APC-DU-110399A	Field Dup. APC-SW-2036-01	11/3/1999	APC-SD-2036	TTNUS		x		x	x			x				

Table B-4. List of Surface Water Samples Currently in the CMRP Database
CMRP Remedial Investigation Report

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	D/F, HCX	AVS/SEM	GS	TOC	Ancillary (1)
Allendale surface water	APC-SW-2035-01	NORMAL	11/3/1999	APC-SD-2035	TTNUS		x		x	x	x		x				
Allendale surface water	APC-SW-2035-01F	NORMAL	11/3/1999	APC-SD-2035	TTNUS							x					
Allendale surface water	APC-SW-2036-01	Field Dup. APC-SW-2036-01	11/3/1999	APC-SD-2036	TTNUS		x		x	x	x		x				
Allendale surface water	APC-SW-2036-01F	NORMAL	11/3/1999	APC-SD-2036	TTNUS							x					
Allendale surface water	CMW-DU-102799B	Field Dup. CMW-SW-2023-01	10/27/1999	CMW-SD-2023	TTNUS		x		x	x			x				
Allendale surface water	CMW-SW-2023-01	Field Dup. CMW-SW-2023-01	10/27/1999	CMW-SD-2023	TTNUS		x		x	x	x		x				
Allendale surface water	CMW-SW-2023-01F	Field Dup. CMW-SW-2023-01F	10/27/1999	CMW-SD-2023	TTNUS							x					
Allendale surface water	CMW-SW-2024-01	NORMAL	10/27/1999	CMW-SD-2024	TTNUS		x		x	x	x		x				
Allendale surface water	CMW-SW-2024-01F	NORMAL	10/27/1999	CMW-SD-2024	TTNUS							x					
Allendale surface water	CMW-SW-2025-01	NORMAL	10/28/1999	CMW-SD-2025	TTNUS		x		x	x	x		x				
Allendale surface water	CMW-SW-2025-01F	NORMAL	10/28/1999	CMW-SD-2025	TTNUS							x					
Allendale surface water	CMW-SW-DU-102799B	Field Dup. CMW-SW-2023-01F	10/27/1999	CMW-SD-2023	TTNUS						x						
Allendale surface water	DAM002-SW	NORMAL	10/23/1998	Allendale Dam	SPINA												x
Allendale surface water	WRC-SW-2014-01	NORMAL	11/1/1999	WRC-SD-2014	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2014-01F	NORMAL	11/1/1999	WRC-SD-2014	TTNUS							x					
Allendale surface water	WRC-SW-2015-01	NORMAL	11/1/1999	WRC-SD-2015	TTNUS		x		x	x	x		x				
Allendale surface water	WRC-SW-2015-01F	NORMAL	11/1/1999	WRC-SD-2015	TTNUS							x					
Allendale surface water	WRC-SW-4001-01	NORMAL	7/16/2001	WRC-SW-4001	HARDING ESE	x	x		x	x	x	x				x	x
Allendale surface water	WRC-SW-4002-01	NORMAL	7/16/2001	WRC-SW-4002	HARDING ESE	x	x		x	x	x	x				x	x
Allendale surface water	WRC-SW-4003-01	NORMAL	7/16/2001	WRC-SW-4003	HARDING ESE	x	x		x	x	x	x				x	x
Allendale surface water	WRC-SW-4004-01	NORMAL	7/16/2001	WRC-SW-4004	HARDING ESE	x	x		x	x	x	x				x	x
					Sample Number	4	20	0	20	20	20	18	16	0	0	4	5
Lyman Mill surface water	DAM003-SW	NORMAL	10/23/1998	Lymansville Dam	SPINA												x
Lyman Mill surface water	LPX-DU-110499B	Field Dup. LPX-SW-2051-01	11/4/1999	LPX-SD-2051	TTNUS						x						
Lyman Mill surface water	LPX-SW-2045-01	Field Dup. LPX-SW-2045-01	11/8/1999	LPX-SD-2045	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2045-01F	NORMAL	11/8/1999	LPX-SD-2045	TTNUS							x					
Lyman Mill surface water	LPX-SW-2046-01	NORMAL	11/8/1999	LPX-SD-2046	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2046-01F	NORMAL	11/8/1999	LPX-SD-2046	TTNUS							x					
Lyman Mill surface water	LPX-SW-2047-01	NORMAL	11/8/1999	LPX-SD-2047	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2047-01F	NORMAL	11/8/1999	LPX-SD-2047	TTNUS							x					
Lyman Mill surface water	LPX-SW-2048-01	NORMAL	11/9/1999	LPX-SD-2048	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2048-01F	NORMAL	11/9/1999	LPX-SD-2048	TTNUS							x					
Lyman Mill surface water	LPX-SW-2049-01	NORMAL	11/5/1999	LPX-SD-2049	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2049-01F	NORMAL	11/5/1999	LPX-SD-2049	TTNUS							x					
Lyman Mill surface water	LPX-SW-2050-01	NORMAL	11/4/1999	LPX-SD-2050	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2050-01F	NORMAL	11/4/1999	LPX-SD-2050	TTNUS							x					
Lyman Mill surface water	LPX-SW-2051-01	Field Dup. LPX-SW-2051-01	11/4/1999	LPX-SD-2051	TTNUS						x		x				

Table B-4. List of Surface Water Sa[illegible]s Currently in the CMRP Database
CMRP Remedial Investigation Report

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	D/F, HCX	AVS/SEM	GS	TOC	Ancillary (1)
Lyman Mill surface water	LPX-SW-2051-01A	NORMAL	11/9/1999	LPX-SD-2051	TTNUS		x		x	x							
Lyman Mill surface water	LPX-SW-2051-01F	NORMAL	11/4/1999	LPX-SD-2051	TTNUS							x					
Lyman Mill surface water	LPX-SW-2052-01	NORMAL	11/4/1999	LPX-SD-2052	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2052-01F	NORMAL	11/4/1999	LPX-SD-2052	TTNUS							x					
Lyman Mill surface water	LPX-SW-2053-01	NORMAL	11/4/1999	LPX-SD-2053	TTNUS		x		x	x	x		x				
Lyman Mill surface water	LPX-SW-2053-01F	NORMAL	11/4/1999	LPX-SD-2053	TTNUS							x					
Lyman Mill surface water	LPX-SW-DU-110899A	Field Dup. LPX-SW-2045-01	11/8/1999	LPX-SD-2045	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-DU-071701-A	Field Dup. WRL-SW-4005-01	7/17/2001	WRL-SW-4005	HARDING ESE	x	x		x	x	x	x				x	x
Lyman Mill surface water	WRL-DU-102599B	Field Dup. WRL-SW-2040-01	10/25/1999	WRL-SD-2040	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-DU-102599BF	Field Dup. WRL-SW-2040-01F	10/25/1999	WRL-SD-2040	TTNUS							x					
Lyman Mill surface water	WRL-SW-2039-01	NORMAL	10/25/1999	WRL-SD-2039	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2039-01F	NORMAL	10/25/1999	WRL-SD-2039	TTNUS							x					
Lyman Mill surface water	WRL-SW-2040-01	Field Dup. WRL-SW-2040-01	10/25/1999	WRL-SD-2040	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2040-01F	Field Dup. WRL-SW-2040-01F	10/25/1999	WRL-SD-2040	TTNUS							x					
Lyman Mill surface water	WRL-SW-2041-01	NORMAL	10/25/1999	WRL-SD-2041	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2041-01F	NORMAL	10/25/1999	WRL-SD-2041	TTNUS							x					
Lyman Mill surface water	WRL-SW-2042-01	NORMAL	11/2/1999	WRL-SD-2042	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2042-01F	NORMAL	11/2/1999	WRL-SD-2042	TTNUS							x					
Lyman Mill surface water	WRL-SW-2043-01	NORMAL	11/8/1999	WRL-SD-2043	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2043-01F	NORMAL	11/8/1999	WRL-SD-2043	TTNUS							x					
Lyman Mill surface water	WRL-SW-2044-01	NORMAL	11/9/1999	WRL-SD-2044	TTNUS		x		x	x	x		x				
Lyman Mill surface water	WRL-SW-2044-01F	NORMAL	11/9/1999	WRL-SD-2044	TTNUS							x					
Lyman Mill surface water	WRL-SW-4004-01	NORMAL	7/17/2001	WRL-SW-4004	HARDING ESE	x	x		x	x	x	x				x	x
Lyman Mill surface water	WRL-SW-4005-01	NORMAL	7/17/2001	WRL-SW-4005	HARDING ESE	x	x		x	x	x	x				x	x
					Sample Number	3	20	0	20	20	21	19	17	0	0	3	4
Assaumpset surface water	RAB-SW-3004-01	NORMAL	11/10/1999	RAB-SD-3004	TTNUS		x		x	x	x		x				
Assaumpset surface water	RAB-SW-3004-01F	NORMAL	11/10/1999	RAB-SD-3004	TTNUS							x					
Assaumpset surface water	RAB-SW-5004-01	NORMAL	7/17/2001	RAB-SW-5004	HARDING ESE	x	x		x	x	x	x				x	x
					Sample Number	1	2	0	2	2	2	2	1	0	0	1	1
Manton surface water	DAM004-SW	Field Dup. DAM004-SW	10/23/1998	Manton Dam	SPINA												x
Manton surface water	DAM04A-SW	Field Dup. DAM004-SW	10/23/1998	Manton Dam	SPINA												x
					Sample Number	0	0	0	0	0	0	0	0	0	0	0	2

Table B-4. List of Surface Water Samples Currently in the CMRP Database
CMRP Remedial Investigation Report

RI_SAMPLE_GROUP	NSAMPLE	FIELD_QC_TYPE	SAMP_DATE	BORING	DATASOURCE	VOCs	SVOCs	Herbicides	Pesticides	PCBs	Metals	Metals, Dissolved	D/F, HCX	AVS/SEM	GS	TOC	Ancillary (1)
Downstream of Manton surface water	DAM005-SW	NORMAL	10/23/1998	Dyerville Dam	SPINA												x
Downstream of Manton surface water	DAM006-SW	NORMAL	10/23/1998	Olneyville Dam	SPINA												x
Downstream of Manton surface water	DAM007-SW	NORMAL	10/23/1998	Lonigan Dam	SPINA												x
					Sample Number	0	0	0	0	0	0	0	0	0	0	0	3

VOCs, Volatile organic compounds
SVOCs, Semi-volatile organic compounds
PCBs, Polychlorinated biphenyls
D/F, Dioxin/furans
AVS/SEM, Acid volatile sulfide/simultaneously extracted metals
GS, Grain size
TOC, Total organic carbon content
(1) Ancillary parameters varied by sample, but generally included temperature, nutrients, total suspended solids, biochemical oxygen demand, hardness and pH

Appendix C

APPENDIX C

STATISTICAL SUMMARIES

Abbreviations

MIN	Minimum
MAX	Maximum
Lnrm	log normal
Norm	normal
A. Mean	arithmetic mean
A. StDev	arithmetic standard deviation
G. Mean	geometric mean
G. StDev	geometric standard deviation
No. Detected	Number detected
No. Obs	Number of observations
ng/kg	nanograms per kilogram
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
pct	percent
J	Quantitation approximate
EMPC	Estimated Maximum Possible Concentration
JN	*(not defined in project documents)*
NJ	*(not defined in project documents)*
JN_2	*(not defined in project documents)*
NJ_2	*(not defined in project documents)*
*	From dilution analysis
NJ_1	*(not defined in project documents)*
EB	Equipment Blank Contamination
J_5	Estimate (1)
J_12	Estimate (1)
J_3	Estimate (1)
J_1	Estimate (1)
J_4	Estimate (1)
JTB	Quantitation approximate, Holding time exceeded, Blank contamination (2)
$	From dilution analysis
EB$	Equipment Blank Contamination, From dilution analysis
J$	Quantitation approximate, From dilution analysis
P	*(not defined in project documents)*
&	*(not defined in project documents)*
J_2	Estimate (1)
J_7	Estimate (1)
JEB	Quantitation approximate, Equipment Blank Contamination
J$EB	Quantitation approximate, From dilution analysis, Equipment Blank Contamination
$J	From dilution analysis, Quantitation approximate
J&	*(not defined in project documents)*
EB*	Equipment Blank Contamination, From dilution analysis
B	Blank Contamination

(1) Qualifier description provided in the project documents, but the description varied across data sets. The J qualifier indicates that the value is considered an estimate. The 1, 2, 3, 4, 5 or 7 codes indicate why the value is considered an estimate, usually due to chromatography, calibration, and/or unacceptable results from the laboratory-based QC samples.

(2) Qualifier not defined in project documents. Description for J assumed based on documented definition; description for T and B assumed based on standard descriptions for these qualifiers.

Table C-1. Source Area Soil Statistical Summary CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	113	102	90	Lnrm	0.39			46.52	12.82	56.8	43119	43119		CMS-4111	CMS-SS-4111-1028-01
1,2,3,4,6,7,8-HpCDF	ng/kg	113	99	88	Lnrm	0.085			13.44	8.29	13.68	1934.62	1934.62		CMS-4111	CMS-SS-4111-1028-01
1,2,3,4,7,8,9-HpCDF	ng/kg	113	72	64	Lnrm	0.1			0.96	6.57	1.8	1715	57	J	MW06S	CM-SO-MW06-0204
1,2,3,4,7,8-HxCDD	ng/kg	113	73	65	Lnrm	0.045			0.81	6.10	0.89	1326.11	1326.11		CMS-4111	CMS-SS-4111-1028-01
1,2,3,4,7,8-HxCDF	ng/kg	112	93	83	Lnrm	0.035			3.79	6.32	3.76	248	248		MW08S	CM-SO-MW08-0102
1,2,3,6,7,8-HxCDD	ng/kg	113	89	79	Lnrm	0.05			3.40	6.78	3.32	3006.54	3006.54		CMS-4111	CMS-SS-4111-1028-01
1,2,3,6,7,8-HxCDF	ng/kg	113	89	79	Lnrm	0.035			2.23	7.10	2.3	141.86	141.86		CMS-4111	CMS-SS-4111-1028-01
1,2,3,7,8,9-HxCDD	ng/kg	113	82	73	Lnrm	0.045			2.59	6.82	2.58	3674.85	3674.85		CMS-4111	CMS-SS-4111-1028-01
1,2,3,7,8,9-HxCDF	ng/kg	111	45	41	None	0.02					0.845	1290	20.4		CMW-SD-2022	CMW-SD-2022-0.502-01
1,2,3,7,8-PeCDD	ng/kg	113	71	63	Lnrm	0.07			0.94	6.22	1.1	1100	943.35		CMS-4111	CMS-SS-4111-1028-01
1,2,3,7,8-PeCDF	ng/kg	106	63	59	Lnrm	0.05			0.84	13.40	1.1	1765	151.03	J	SD-30	SD-30
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	75	67	89	Lnrm	0.311			189.5	22.14	125.84	93773	93773	J	SD-30	SD-30
1,2,7,8-TCDD	ng/kg	4	1	25	None	30					40	2300	2300		GEC-4	B-4, S-2
2,3,4,6,7,8-HxCDF	ng/kg	112	85	76	Lnrm	0.14			1.94	9.39	3.035	2165	131.02		CMS-4111	CMS-SS-4111-1028-01
2,3,4,7,8-PeCDF	ng/kg	113	89	79	Lnrm	0.1			2.38	5.41	2.9	110.45	110.45		CMS-4111	CMS-SS-4111-1028-01
2,3,7,8-TCDD	ng/kg	744	512	69	Lnrm	0.15			44.16	229.77	100.5	140000	140000	J	CMS-240	CMS-240-A
													140000	J	CMS-451	CMS-451-F
2,3,7,8-TCDF	ng/kg	113	96	85	Lnrm	0.1			3.06	6.81	3.43	587.64	587.64	J	SD-30	SD-30
OCDD	ng/kg	113	106	94	Lnrm	0.485			294.6	15.21	431.35	115707	115707		CMS-4111	CMS-SS-4111-1028-01
OCDF	ng/kg	113	94	83	Lnrm	0.09			21.87	11.66	26.6	1343	1343	J	CMS-4109	CMS-SS-4109-0010-01
PCDD/Fs	ng/kg	30	29	97	None	99.5		13124			733.5	50100	50100		CMW-SD-2019	CMW-SD-2019-01
TEQ	ng/kg	759	758	100	Lnrm	0.000079			117.7	15.49	101	140000	140000		CMS-240	CMS-240-A
													140000		CMS-451	CMS-451-F
Total HpCDD	ng/kg	111	99	89	Lnrm	0.44			73.52	14.88	92.4	75504.01	75504	J	CMS-4111	CMS-SS-4111-1028-01
Total HpCDF	ng/kg	111	98	88	Lnrm	0.09			25.79	9.88	29.27	2975.16	2975	J	CMS-4111	CMS-SS-4111-1028-01
Total HxCDD	ng/kg	115	95	83	Lnrm	0.045			24.33	12.85	26.7	22886	22886	J	CMS-4111	CMS-SS-4111-1028-01
Total HxCDF	ng/kg	115	102	89	Lnrm	0.04			41.05	9.62	47.15	3204	3204	J	CMS-4111	CMS-SS-4111-1028-01
Total PeCDD	ng/kg	115	87	76	Lnrm	0.075			6.33	8.45	9.18	2645	2645	J	CMS-4111	CMS-SS-4111-1028-01
Total PeCDF	ng/kg	111	99	89	Lnrm	0.08			37.69	9.63	56.2	3672.5	3673	J	CMS-4111	CMS-SS-4111-1028-01
Total TCDD	ng/kg	117	109	93	Lnrm	0.16			63.02	14.23	50	11550	11550	J	MW05S	CM-SO-MW05-0406
Total TCDF	ng/kg	111	96	86	Lnrm	0.115			24.79	12.06	33	6560	6560	EMPC	MW08S	CM-SO-MW08-0102
Metals																
Aluminum	mg/kg	142	142	100	Lnrm	1260			4906	1.67	5030	14200	14200		RES-14-271-01	RES-SS-DU-111599A
Antimony	mg/kg	135	45	33	None	0.08					2.2	27.8	27.8	J	CMS-417	CMS-417-A
Arsenic	mg/kg	145	137	94	Lnrm	0.27			3.40	2.32	3.5	49.3	49.3		CMS-118	CMS-118-C
Barium	mg/kg	145	145	100	Lnrm	8.4			51.91	2.90	40.2	1010	1010	J	CMS-417	CMS-417-B
Beryllium	mg/kg	141	106	75	Lnrm	0.025			0.41	2.53	0.44	3.9	3.9		CMS-419	CMS-419-H
Cadmium	mg/kg	142	93	65	Lnrm	0.03			0.32	3.72	0.365	180	180		CMS-417	CMS-417-B
Calcium	mg/kg	140	137	98	Lnrm	208.5			1407	2.42	1290	18100	18100	J	CMS-405	CMS-405-B
Chromium	mg/kg	145	145	100	Lnrm	1.9			16.56	3.33	12.1	350	350	J	CMS-417	CMS-417-B
Cobalt	mg/kg	142	142	100	Lnrm	0.97			4.08	2.19	3.8	93.3	93.3	J	MW08S	CM-SO-MW08-0204
Copper	mg/kg	142	133	94	Lnrm	1.15			21.79	4.24	21.25	934	934		CMS-417	CMS-417-B
Cyanide	mg/kg	73	11	15	None	0.255					0.32	8.2	8.2		CMS-417	CMS-417-A
Iron	mg/kg	142	142	100	Lnrm	3200			12191	1.89	11500	72000	72000		CMS-237	CMS-237-B
Lead	mg/kg	145	145	100	Lnrm	2.2			53.78	5.39	61	3160	3160	J	CMS-405	CMS-405-D
Magnesium	mg/kg	140	140	100	Lnrm	372			1140	1.81	1075	10100	10100		RES-14-271-01	RES-SS-DU-111599A
Manganese	mg/kg	142	142	100	Lnrm	35.7			193.7	2.22	189	6420	6420		CMS-419	CMS-419-F
Mercury	mg/kg	141	88	62	Lnrm	0.01			0.08	6.91	0.097	7.4	7.4		CMS-417	CMS-417-A
Methyl Mercury	mg/kg	2	2	100	None	0.000513		0.0034			0.00289	0.00526	0.00526		CMS-4110	CMS-SS-4110-0010-01
Molybdenum	mg/kg	75	73	97	Lnrm	0.34			2.56	2.66	2.4	35.6	35.6		CMS-164	CMS-164-A
Nickel	mg/kg	142	141	99	Lnrm	0.65			8.32	2.48	7.2	74.3	74.3		CMS-456	CMS-456-B
Potassium	mg/kg	140	138	99	Lnrm	127.5			640.0	1.87	552	4380	4380		RES-14-271-01	RES-SS-DU-111599A
Selenium	mg/kg	141	73	52	Lnrm	0.17			0.50	1.35	0.81	18.7	15.1	J	CMS-118	CMS-118-C
Silver	mg/kg	142	47	33	None	0.0425					0.55	35.5	35.5		CMS-237	CMS-237-B
Sodium	mg/kg	140	93	66	Lnrm	9.95			102.3	2.18	122	845	845	J	RES-14-333-01	RES-SS-14-333-01
Thallium	mg/kg	142	22	15	None	0.155					12.55	330	13.4		SB02	CM-SO-SB02-0406

Table C-1. Source Area Soil Statistical Summary CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Vanadium	mg/kg	142	141	99	Lnrm	1.25			14.56	2.16	14.65	210	210	J	MW15D	CM-SO-MW15D-0204
Zinc	mg/kg	142	142	100	Lnrm	9			94.34	3.70	72.35	3330	3330		CMS-237	CMS-237-B
Semi-volatile Organic Compounds																
.beta.-amyrin	µg/kg	1	1	100	None	350					350	350	350	JN	SB02	CM-SO-SB02-0608
1,1'-biphenyl	µg/kg	63	12	19	None	41					200	2500	1607	J	CMS-4105	CMS-SS-4105-0010-01
1,1'-biphenyl, 2,2',3,4,4',5'-hexachloro	µg/kg	1	1	100	None	2237					2237	2237	2237	NJ	MW06S	CM-SO-MW06-0204
1,1'-biphenyl,2,2',4,4',6-pentachloro-	µg/kg	1	1	100	None	87					87	87	87	JN	MW14M	CM-SO-DUP03-0701
1,1'-biphenyl,2,2',4,4'-tetrachloro-	µg/kg	1	1	100	None	570					570	570	570	JN	SB02	CM-SO-DUP03
1,1'-biphenyl,2',3,4,5,5'-pentachloro-	µg/kg	1	1	100	None	460					460	460	460	JN	SB02	CM-SO-SB02-0406
1,1'-biphenyl,2,3,4,5,6-pentachloro-	µg/kg	2	2	100	None	340		1380			1315.5	2291	2291	NJ	MW06S	CM-SO-MW06-DUP01
1,1'-biphenyl,2,4,4',6-tetrachloro-	µg/kg	1	1	100	None	740					740	740	740	JN	SB02	CM-SO-SB02-0204
1,1'-biphenyl,pentachloro-	µg/kg	2	2	100	None	500		42.43			530	560	560	JN	SB02	CM-SO-SB02-0608
1,2,4-trichlorobenzene	µg/kg	220	22	10	None	0.34					137.5	340000	340000		CMS-417	CMS-417-A
1,2-benzenedicarboxylic Acid, Decyl Octy	µg/kg	1	1	100	None	1069					1069	1069	1069	NJ	MW06S	CM-SO-MW06-0204
1,2-benzenedicarboxylic Acid, Diisooctyl	µg/kg	1	1	100	None	513.5					513.5	513.5	513.5	NJ	MW06S	CM-SO-MW06-0204
1,2-dichlorobenzene	µg/kg	221	37	17	None	0.47					150	2800000	2800000		CMS-417	CMS-417-B
1,3-dichlorobenzene	µg/kg	220	7	3	None	0.18					150	65000	13000	J	CMS-419	CMS-419-B
1,4-dichlorobenzene	µg/kg	221	24	11	None	0.6					150	40000	40000	J	CMS-417	CMS-417-B
11h-benzo[a]fluorene	µg/kg	3	3	100	None	365.2		179.4			443.4	707.5	707.5	NJ	MW01S	CM-SO-MW01-0204
11h-benzo[b]fluorene_total	µg/kg	7	7	100	Lnrm	79.84			398.7	2.91	475.8	1590	1590	JN_2	SB03	CM-SO-SB03-0204
16-octadecenal	µg/kg	1	1	100	None	100					100	100	100	NJ	SB-14-271	CM-SO-SB-14-271-0204
1-decene_total	µg/kg	4	4	100	None	227		1799			945	4231	4231	NJ_1	MW08S	CM-SO-DUP02
1-docosanol	µg/kg	1	1	100	None	3900					3900	3900	3900	NJ	SB-14-271	CM-SO-SB-14-271-0204
1-docosene	µg/kg	2	2	100	None	917.3		977.7			1608.65	2300	2300	NJ	SB-14-271	CM-SO-SB-14-271-0204
1-dodecene_total	µg/kg	2	2	100	None	243		5342			4020.5	7798	7798	NJ_2	MW08S	CM-SO-MW08-0102
1-heptadecanol	µg/kg	1	1	100	None	1017					1017	1017	1017	NJ	MW08S	CM-SO-MW08-0204
1-hexadecanol	µg/kg	1	1	100	None	799					799	799	799	NJ	MW08S	CM-SO-DUP02
1-hexadecene_total	µg/kg	2	2	100	None	1511		116.5			1593.4	1675.8	1676	NJ_2	MW08S	CM-SO-DUP02
1-nonadecanol	µg/kg	1	1	100	None	2500					2500	2500	2500	NJ	SB-14-271	CM-SO-SB-14-271-0204
1-nonadecene	µg/kg	1	1	100	None	410					410	410	410	JN	MW02S	CM-SO-MW02-0810
1-octadecene	µg/kg	2	2	100	None	840		183.8			970	1100	1100	NJ	SB-14-271	CM-SO-SB-14-271-0102
1-phenanthrenecarboxylic Acid, 1,2,3,4,4	µg/kg	3	3	100	None	1037		1181			1308	3205	3205	NJ	MW08S	CM-SO-MW08-0102
1-tetradecene_total	µg/kg	3	3	100	None	206.4		2691			2581	5576	5576	NJ_2	MW08S	CM-SO-MW08-0204
2,2'-methylenebis[3,4,6-trichlorophenol]	µg/kg	2	2	100	None	1800		70.71			1850	1900	1900	NJ	MW05S	CM-SO-MW05-1012
2,2'-oxybis(1-chloropropane)	µg/kg	73	0	0	None	6.9					200	2500				
2,4,5-trichlorophenol	µg/kg	148	11	7	None	69					470	37000	16000	*	MW05S	CM-SO-MW05-0406
2,4,6-trichlorophenol	µg/kg	146	0	0	None	10.705					210	37000				
2,4-dichlorophenol	µg/kg	146	2	1	None	14.425					207.5	37000	94	J	CMS-451	CMS-451-H
2,4-dimethylphenol	µg/kg	146	5	3	None	12.985					205	37000	900	J	CMS-417	CMS-417-D
2,4-dinitrophenol	µg/kg	148	0	0	None	64.03					900	180000				
2,4-dinitrotoluene	µg/kg	146	0	0	None	5.415					210	37000				
2,5-cyclohexadiene-1,4-dione, 2,6-bis(1,	µg/kg	3	3	100	None	136.4		1119			1553	2345	2345	NJ	MW15D	CM-SO-MW15D-0406
2,6-dinitrotoluene	µg/kg	146	0	0	None	7.925					210	37000				
28-nor-17.alpha.(h)-hopane	µg/kg	2	2	100	None	341.2		1589			1465.1	2589	2589	NJ	MW06S	CM-SO-MW06-0406
28-nor-17.beta.(h)-hopane	µg/kg	2	2	100	None	86		646.3			543	1000	1000	JN	MW02S	CM-SO-MW02-0608
2-chloronaphthalene	µg/kg	146	0	0	None	2.935					210	37000				
2-chlorophenol	µg/kg	146	0	0	None	12.09					210	37000				
2-heptacosanone	µg/kg	1	1	100	None	120					120	120	120	JN	MW02S	CM-SO-MW02-0810
2-methylchrysene	µg/kg	1	1	100	None	865.3					865.3	865.3	865.3	NJ	MW03S	CM-SO-MW03-0406
2-methylnaphthalene	µg/kg	154	36	23	None	23.5					205	37000	9300	J	CMS-417	CMS-417-B
2-methylphenol	µg/kg	146	1	1	None	11.69					210	37000	790	J	CMS-417	CMS-417-D
2-nitroaniline	µg/kg	146	0	0	None	17.69					900	180000				
2-nitrophenol	µg/kg	148	0	0	None	13.355					210	37000				
2-nonacosanone	µg/kg	1	1	100	None	120					120	120	120	JN	MW02S	CM-SO-MW02-0810
3,3'-dichlorobenzidine	µg/kg	145	0	0	None	165					850	180000				
3,4-dihydrocyclopenta(cd)pyrene(acepyr	µg/kg	1	1	100	None	740					740	740	740	JN	SB03	CM-SO-SB03-0204
3+4-methylphenols	µg/kg	72	2	3	None	170					220	37000	8000	J	CMS-417	CMS-417-C
3-eicosene,(e)-	µg/kg	1	1	100	None	360					360	360	360	JN	MW02S	CM-SO-MW02-0810

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
3-nitroaniline	µg/kg	146	0	0	None	33.11					900	180000				
3-octadecene, (e)-_total	µg/kg	2	2	100	None	353.6		524.6			724.55	1095.5	1096	NJ_2	MW08S	CM-SO-MW08-0204
4,4'-trimethylenebis(1-methylpiperidine	µg/kg	1	1	100	None	730					730	730	730	JN	SB02	CM-SO-SB02-0204
4,6-dinitro-2-methylphenol	µg/kg	146	1	1	None	7.635					900	180000	950	J	MW01S	CM-SO-MW01-0608
4-bromophenyl-phenylether	µg/kg	146	0	0	None	6.615					210	37000				
4-chloro-3-methylphenol	µg/kg	146	0	0	None	14.045					210	37000				
4-chloroaniline	µg/kg	146	6	4	None	36.585					210	280000	280000		CMS-417	CMS-417-A
4-chlorophenyl-phenylether	µg/kg	146	0	0	None	8.515					210	37000				
4h-cyclopenta[def]phenanthrene	µg/kg	2	2	100	None	174.8		191.8			310.45	446.1	446.1	NJ	MW01S	CM-SO-MW01-0406
4-methylphenol	µg/kg	62	11	18	None	13.605					200	3100	910	J	MW08S	CM-SO-MW08-0102
4-nitroaniline	µg/kg	146	0	0	None	11.2					900	180000				
4-nitrophenol	µg/kg	148	0	0	None	18.805					900	180000				
4-nonylphenol	µg/kg	4	4	100	None	234.1		387.2			840	1100	1100	JN	SB02	CM-SO-SB02-0406
5,8,11,14-eicosatetraenoicacid,ethyl	µg/kg	1	1	100	None	160					160	160	160	JN	SB03	CM-SO-DUP05
5-eicosene, (e)-	µg/kg	1	1	100	None	490					490	490	490	NJ	SB-14-271	CM-SO-SB-14-271-0406
5-octadecene, (e)-	µg/kg	1	1	100	None	1173					1173	1173	1173	NJ	MW08S	CM-SO-DUP02
7h-benz[de]anthracen-7-one_total	µg/kg	3	3	100	None	151.5		866.9			1284.4	1854.7	1854.7	NJ_2	MW15D	CM-SO-DUP05-0801
9,10-anthracenedione	µg/kg	1	1	100	None	188.9					188.9	188.9	188.9	NJ	MW15D	CM-SO-MW15D-0406
9,17-octadecadienal,(z)-	µg/kg	1	1	100	None	880					880	880	880	JN	SB03	CM-SO-DUP05
9-hexacosene	µg/kg	1	1	100	None	980					980	980	980	JN	SB03	CM-SO-SB03-0204
9h-fluorene, 1-methyl-	µg/kg	1	1	100	None	230					230	230	230	NJ	MW05S	CM-SO-MW05-0204
9h-fluorene, 2,3-dimethyl-	µg/kg	1	1	100	None	1057					1057	1057	1057	NJ	MW03S	CM-SO-MW03-0406
9-octadecene, (e)-	µg/kg	1	1	100	None	654.1					654.1	654.1	654.1	NJ	MW08S	CM-SO-DUP02
Acenaphthene	µg/kg	148	39	26	None	4.71					202.5	37000	4300	J	CMS-417	CMS-417-A
Acenaphthylene	µg/kg	154	37	24	None	4.335					205	37000	4400	J	CMS-405	CMS-405-B
Acetophenone	µg/kg	61	2	3	None	40					200	2500	60	J	MW08S	CM-SO-DUP02
Adamantane, 1,3-dimethyl-	µg/kg	1	1	100	None	97					97	97	97	NJ	SB-14-271	CM-SO-SB-14-271-0102
Anthracene	µg/kg	155	74	48	None	5.45					205	37000	2400		CMW-SD-2018	CMW-SD-2018-01
Anthracene, 1-methyl-	µg/kg	5	5	100	Lnrm	206.3			476.4	2.22	390	1381	1381	NJ	MW06S	CM-SO-MW06-DUP01
Anthracene, 2-methyl-_total	µg/kg	6	6	100	Lnrm	214			391.9	1.69	390	820.8	820.8	NJ	MW03S	CM-SO-MW03-0406
Anthracene, 9-methyl-	µg/kg	1	1	100	None	180.5					180.5	180.5	180.5	NJ	MW01S	CM-SO-MW01-0406
Atrazine	µg/kg	61	0	0	None	165					200	2500				
Bapeq	µg/kg	92	68	74	Lnrm	7			363.9	21.27	495	13000	13000		CMW-SD-2018	CMW-SD-2018-01
Benz[a]anthracene, 1-methyl-	µg/kg	1	1	100	None	907.5					907.5	907.5	907.5	NJ	MW01S	CM-SO-MW01-0102
Benz[a]anthracene, 8-methyl-	µg/kg	2	2	100	None	101.6		900.4			738.3	1375	1375	NJ	MW03S	CM-SO-MW03-0406
Benzaldehyde	µg/kg	63	7	11	None	42					200	2500	1200	J	RES-14-272-01	RES-SS-DU-111899A
Benzanthracenone	µg/kg	3	3	100	None	143.6		535.3			284.2	1133	1133	J	MW09S	CM-SO-MW09-0406
Benzenamine,2-chloro-5-(trifluoromethy	µg/kg	1	1	100	None	130					130	130	130	JN	MW14M	CM-SO-MW14-0102
Benzenamine,3,3'-sulfonylbis-	µg/kg	3	3	100	None	350		3280			1200	6408	6408	NJ	MW03S	CM-SO-MW03-0608
Benzenamine,n-ethyl-	µg/kg	2	2	100	None	79		4.95			82.5	86	86	JN	SB03	CM-SO-SB03-0406
Benzene, 1,2,3-trimethyl-_total	µg/kg	2	2	100	None	3043		435.6			3351	3659	3659	NJ_1	MW08S	CM-SO-DUP02
Benzene, 1-ethyl-2-methyl-	µg/kg	2	2	100	None	98.21		776.3			647.105	1196	1196	NJ	MW08S	CM-SO-DUP02
Benzene, 1-ethyl-3-methyl-	µg/kg	3	3	100	None	96.89		1275			827.1	2577	2577	NJ	MW08S	CM-SO-MW08-0102
Benzene,1,1'-ethylidenebis[4-ethyl-	µg/kg	1	1	100	None	440					440	440	440	JN	MW14M	CM-SO-MW14-0204
Benzeneacetic Acid	µg/kg	1	1	100	None	95					95	95	95	NJ	SB-14-271	CM-SO-SB-14-271-0204
Benzeneethanamine,n-(1-methylethyliden	µg/kg	1	1	100	None	78					78	78	78	JN	SB03	CM-SO-SB03-0608
Benzo(a)anthracene	µg/kg	155	104	67	Lnrm	5.96			216.9	6.52	320	37000	8500		CMW-SD-2018	CMW-SD-2018-01
Benzo(a)pyrene	µg/kg	140	101	72	Lnrm	6.025			245.4	6.19	340	37000	8900		CMW-SD-2018	CMW-SD-2018-01
Benzo(a,e)pyrene	µg/kg	6	1	17	None	23.5					65	960	960		GEC-2	B-2, S-2
Benzo(b)fluoranthene	µg/kg	155	101	65	Lnrm	23.5			295.4	7.60	430	37000	10000	J	CMS-405	CMS-405-B
Benzo(g,h,i)perylene	µg/kg	155	75	48	None	4.06					225	37000	5300		CMW-SD-2018	CMW-SD-2018-01
Benzo[b]naphtho[2,1-d]thiophene	µg/kg	7	7	100	Norm	130.2	750.0	505.7			767	1598	1598	NJ	MW01S	CM-SO-MW01-0204
Benzo[b]naphtho[2,3-d]furan	µg/kg	1	1	100	None	300					300	300	300	NJ	MW05S	CM-SO-MW05-0204
Benzo[b]naphtho[2,3-d]thiophene	µg/kg	1	1	100	None	308.5					308.5	308.5	308.5	NJ	MW07S	CM-SO-MW07-0304
Benzo[b]triphenylene	µg/kg	1	1	100	None	177					177	177	177	NJ	MW01S	CM-SO-MW01-0406
Benzo[e]pyrene	µg/kg	6	6	100	Lnrm	60.93			297.4	4.04	222.15	3000	3000	JN	SB03	CM-SO-SB03-0204
Benzo[j]fluoranthene	µg/kg	4	4	100	None	149.5		750.3			407.9	1800	1800	JN	SB02	CM-SO-SB02-0204
Benzo[k]fluoranthene	µg/kg	157	59	38	None	9.85					220	37000	8800		CMW-SD-2018	CMW-SD-2018-01
Benzofluorene	µg/kg	3	3	100	None	168.3		374.1			193.1	828.3	828.3	J	MW09S	CM-SO-MW09-0406

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Benzoic Acid	µg/kg	75	3	4	None	100					1050	180000	220	JN	MW02S	CM-SO-MW02-0608
Benzothiazole	µg/kg	2	2	100	None	110		42.43			140	170	170	JN	SB03	CM-SO-DUP05
Benzyl Alcohol	µg/kg	72	0	0	None	170					220	37000				
Bicyclo[2.2.1]heptan-2-ol,3-(dimethyla	µg/kg	3	3	100	None	460		220.1			690	900	900	JN	MW14M	CM-SO-MW14-0102
Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimet	µg/kg	1	1	100	None	196.5					196.5	196.5	196.5	NJ	MW08S	CM-SO-MW08-0406
Bis(2-chloroethoxy)methane	µg/kg	146	0	0	None	6.105					210	37000				
Bis(2-chloroethyl)ether	µg/kg	146	0	0	None	7.585					210	37000				
Bis-(2-chloroisopropyl)ether	µg/kg	73	0	0	None	170					220	37000				
Bis(2-ethylhexyl)phthalate	µg/kg	149	95	64	Lnrm	42			175.8	9.37	430	460000	460000		CMS-417	CMS-417-A
Butylbenzylphthalate	µg/kg	148	21	14	None	10.305					207.5	27000	27000	J	CMS-419	CMS-419-B
Caprolactam	µg/kg	61	1	2	None	110					200	2500	110	J	SB02	CM-SO-SB02-0406
Carbazole	µg/kg	147	34	23	None	7.02					210	37000	2000	J	CMW-SD-2018	CMW-SD-2018-01
Cholestanol	µg/kg	1	1	100	None	1000					1000	1000	1000	JN	SB03	CM-SO-SB03-0204
Cholesterol	µg/kg	1	1	100	None	396.1					396.1	396.1	396.1	NJ	MW06S	CM-SO-MW06-0608
Chrysene	µg/kg	155	103	66	Lnrm	4.525			265.1	6.08	380	37000	11000		CMW-SD-2018	CMW-SD-2018-01
Chrysene, 5-methyl-	µg/kg	2	2	100	None	301		1054			1046	1791	1791	NJ	MW09S	CM-SO-MW09-0406
Cyclohexasiloxane,dodecamethyl-	µg/kg	5	5	100	Lnrm	78			158.4	2.80	80	778.7	778.7	NJ	MW08S	CM-SO-DUP02
Cyclopentaphenanthrene	µg/kg	3	3	100	None	438.1		551.5			608.4	1467	1467	J	MW03S	CM-SO-MW03-0406
Cyclopentasiloxane,decamethyl_total	µg/kg	4	4	100	None	73		5063			2533	11365	11365	NJ_2	MW08S	CM-SO-MW08-0102
Cyclopropanenonanoic Acid, 2-[(2-butylcy_tota	µg/kg	1	1	100	None	27680					27680	27680	27680	NJ_2	MW08S	CM-SO-MW08-0102
D:c-friedoolean-8-en-3-one	µg/kg	1	1	100	None	660					660	660	660	JN	SB02	CM-SO-SB02-0608
Decane, 1,1'-oxybis-	µg/kg	1	1	100	None	8763					8763	8763	8763	NJ	MW08S	CM-SO-MW08-0204
Decanedioic Acid, Didecyl Ester	µg/kg	1	1	100	None	394.8					394.8	394.8	394.8	NJ	MW08S	CM-SO-DUP02
Dibenzo(a,h)anthracene	µg/kg	149	40	27	None	4.78					205	37000	2200		CMW-SD-2018	CMW-SD-2018-01
Dibenzo[def,mno]chrysene	µg/kg	1	1	100	None	680					680	680	680	JN	SB02	CM-SO-DUP03
Dibenzofuran	µg/kg	148	33	22	None	6.715					205	37000	700	J	MW05S	CM-SO-MW05-0204
Dibenzofuran, 4-methyl-	µg/kg	1	1	100	None	270					270	270	270	NJ	MW05S	CM-SO-MW05-0204
Dibenzothiophene	µg/kg	1	1	100	None	390					390	390	390	NJ	MW05S	CM-SO-MW05-0204
Dibenzothiophene, 3-methyl-	µg/kg	1	1	100	None	742.7					742.7	742.7	742.7	NJ	MW03S	CM-SO-MW03-0406
Diethylphthalate	µg/kg	146	7	5	None	8.09					205	37000	3200		CMS-405	CMS-405-D
Dimethylphthalate	µg/kg	146	0	0	None	3.785					210	37000				
Di-n-butylphthalate	µg/kg	148	41	28	None	8.405					210	120000	120000		CMS-419	CMS-419-B
Di-n-octylphthalate	µg/kg	149	14	9	None	12.04					210	37000	7600	J	CMS-417	CMS-417-A
Diphenyl Ether	µg/kg	2	2	100	None	460		1378			1434.5	2409	2409	NJ	MW06S	CM-SO-MW06-0406
Dodecane, 1-iodo-	µg/kg	1	1	100	None	104.8					104.8	104.8	104.8	NJ	MW08S	CM-SO-MW08-0608
Drometrizole_total	µg/kg	3	3	100	None	1450		4086			6570	9525.7	9526	NJ_2	MW15D	CM-SO-MW15D-0406
Ergostanol	µg/kg	1	1	100	None	730					730	730	730	JN	SB02	CM-SO-SB02-0406
Ethanol, 2-(hexadecyloxy)-	µg/kg	1	1	100	None	1015					1015	1015	1015	NJ	MW08S	CM-SO-DUP02
Fluoranthene	µg/kg	155	120	77	Lnrm	23.5			464.0	8.61	630	24000	24000	*	CMW-SD-2018	CMW-SD-2018-01
Fluorene	µg/kg	154	52	34	None	7.685					202.5	37000	1500	J	CMS-405	CMS-405-B
Heptadecanoicacid	µg/kg	2	2	100	None	96		31.11			118	140	140	JN	SB03	CM-SO-DUP05
Hexachlorobenzene	µg/kg	146	0	0	None	4.155					210	37000				
Hexachlorobutadiene	µg/kg	216	2	1	None	1.3					190	65000	1000	J	CMS-408	CMS-408-B
Hexachlorocyclopentadiene	µg/kg	146	0	0	None	5.075					850	180000				
Hexachloroethane	µg/kg	146	0	0	None	10.885					210	37000				
Hexadecanamide	µg/kg	1	1	100	None	2300					2300	2300	2300	JN	SB02	CM-SO-SB02-0608
Hexadecanoic Acid	µg/kg	9	9	100	Lnrm	80			209.4	1.83	192.4	750.1	750.1	NJ	MW07S	CM-SO-MW07-0304
Hexanedioic Acid, Bis(2-ethylhexyl) Este	µg/kg	1	1	100	None	1377					1377	1377	1377	NJ	MW09S	CM-SO-MW09-0406
High Molecular Weight Pahs	µg/kg	92	77	84	Lnrm	36			2593	15.35	4150	100000	100000		CMW-SD-2018	CMW-SD-2018-01
Indeno[1,2,3-c,d]pyrene	µg/kg	155	77	50	None	5.5					225	37000	5300		CMW-SD-2018	CMW-SD-2018-01
Isophorone	µg/kg	146	2	1	None	5.925					207.5	37000	790		SS-02	SS-02
Longifolenaldehyde	µg/kg	1	1	100	None	650					650	650	650	JN	SB02	CM-SO-DUP03
Low Molecular Weight Pahs	µg/kg	92	78	85	Lnrm	68			688.1	5.81	700	22000	22000		CMS-419	CMS-419-B
Lupeol	µg/kg	1	1	100	None	420					420	420	420	JN	SB02	CM-SO-SB02-0608
Methylchrysene	µg/kg	1	1	100	None	1499					1499	1499	1499	J	MW01S	CM-SO-MW01-0204
Methylpyrene	µg/kg	3	3	100	None	144.7		429.4			865.3	909.7	909.7	J	MW01S	CM-SO-MW01-0204
Naphthalene	µg/kg	224	52	23	None	2.05					190	84000	84000	J	CMS-417	CMS-417-B
Naphthalene, 1-methyl-	µg/kg	2	2	100	None	120		42.43			150	180	180	NJ	MW05S	CM-SO-MW05-0204
Naphthalene, 2,3,6-trimethyl-	µg/kg	1	1	100	None	657.4					657.4	657.4	657.4	NJ	MW03S	CM-SO-MW03-0406

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Naphthalene, 2-phenyl-	µg/kg	2	2	100	None	203.1		443.3			516.55	830	830	NJ	MW05S	CM-SO-MW05-0204
Naphthalene, Decahydro-, Trans-	µg/kg	1	1	100	None	270					270	270	270	NJ	SB-14-271	CM-SO-SB-14-271-0102
Naphthalene, Decahydro-2-methyl-	µg/kg	1	1	100	None	210					210	210	210	NJ	SB-14-271	CM-SO-SB-14-271-0102
Naphthalene,1,4,6-trimethyl-_total	µg/kg	1	1	100	None	181					181	181	181	JN_2	MW14M	CM-SO-MW14-0102
Naphthalene,1,4-dimethyl_total	µg/kg	2	2	100	None	80		183.8			210	340	340	NJ_2	MW05S	CM-SO-MW05-0204
Naphthalene,1,5-dimethyl-	µg/kg	1	1	100	None	140					140	140	140	JN	MW14M	CM-SO-MW14-0102
Naphthalene,2,3-dimethyl-	µg/kg	1	1	100	None	180					180	180	180	JN	MW14M	CM-SO-MW14-0102
Naphthalene,2,6-dimethyl-	µg/kg	1	1	100	None	80					80	80	80	JN	MW14M	CM-SO-MW14-0102
Nitrobenzene	µg/kg	146	6	4	None	6.84					205	37000	190	J	MW06S	CM-SO-MW06-0204
N-nitroso-di-n-propylamine	µg/kg	146	0	0	None	8.26					210	37000				
N-nitroso-diphenylamine	µg/kg	146	1	1	None	5.565					207.5	37000	85	J	SB02	CM-SO-SB02-0406
Octadecanamide	µg/kg	1	1	100	None	2600					2600	2600	2600	JN	SB02	CM-SO-SB02-0204
Octadecane, 1-chloro-	µg/kg	1	1	100	None	850.3					850.3	850.3	850.3	NJ	MW08S	CM-SO-MW08-0608
Octadecanoicacid	µg/kg	10	10	100	Lnrm	110			381.8	2.77	367.5	3028	3028	NJ	MW08S	CM-SO-MW08-0102
Oleicacid_total	µg/kg	5	5	100	Lnrm	150			288.2	2.33	180	1070	1070	JN_2	SB03	CM-SO-SB03-0406
Oxirane, [(dodecyloxy)methyl]-	µg/kg	1	1	100	None	454.9					454.9	454.9	454.9	NJ	MW08S	CM-SO-MW08-0406
Pentachlorophenol	µg/kg	148	2	1	None	11.03					900	180000	18000	J	RES-14-333-01	RES-SS-14-333-01
Pentadecanal-	µg/kg	1	1	100	None	160					160	160	160	NJ	SB-14-271	CM-SO-SB-14-271-0204
Perylene	µg/kg	7	7	100	Norm	89.65	798.4	513.6			617.3	1611	1611	NJ	MW01S	CM-SO-MW01-0102
Phenanthrene	µg/kg	155	113	73	Lnrm	23.5			325.1	6.58	400	22000	22000	J	CMS-419	CMS-419-B
Phenanthrene, 2,3,5-trimethyl-	µg/kg	2	2	100	None	794.5		341.9			1036.25	1278	1278	NJ	MW06S	CM-SO-MW06-DUP01
Phenanthrene, 2,4,5,7-tetramethyl-	µg/kg	1	1	100	None	610.7					610.7	610.7	610.7	NJ	MW01S	CM-SO-MW01-0406
Phenanthrene, 2,5-dimethyl-	µg/kg	2	2	100	None	185.7		657.1			650.35	1115	1115	NJ	MW03S	CM-SO-MW03-0406
Phenanthrene, 4-methyl-	µg/kg	1	1	100	None	205.8					205.8	205.8	205.8	NJ	MW01S	CM-SO-MW01-0406
Phenanthrene,1-methyl-	µg/kg	1	1	100	None	770					770	770	770	JN	SB03	CM-SO-SB03-0204
Phenanthrene,2-methyl-	µg/kg	2	2	100	None	210		452.5			530	850	850	JN	SB03	CM-SO-SB03-0204
Phenol	µg/kg	143	9	6	None	13.565					205	37000	2200	EB	SS-02	SS-02
Phenol, 4-(1,1,3,3-tetramethylbutyl)-	µg/kg	2	2	100	None	1200		1394			2186	3172	3172	NJ	MW06S	CM-SO-MW06-DUP01
Phenol, 4-(2,2,4-trimethylpentyl)-	µg/kg	1	1	100	None	227.1					227.1	227.1	227.1	NJ	MW08S	CM-SO-MW08-0608
Phenol, 4,4'-(1-methylethylidene)bis-	µg/kg	2	2	100	None	489.6		1313			1418.3	2347	2347	NJ	MW06S	CM-SO-MW06-0406
Phenol, P-tert-butyl-	µg/kg	2	2	100	None	122.5		3584			2656.75	5191	5191	NJ	MW08S	CM-SO-MW08-0102
Phenol,4-(2,2,3,3-tetramethylbutyl)-	µg/kg	2	2	100	None	650		601.0			1075	1500	1500	JN	SB02	CM-SO-SB02-0204
Phenol,nonyl-	µg/kg	3	3	100	None	290.1		1745			710	3501	3501	NJ	MW08S	CM-SO-MW08-0102
Phenylnaphthalene	µg/kg	1	1	100	None	934.4					934.4	934.4	934.4	J	MW03S	CM-SO-MW03-0406
Phosphonic Acid, Dioctadecyl Ester	µg/kg	2	2	100	None	97.2		497.0			448.6	800	800	NJ	SB-14-271	CM-SO-SB-14-271-0102
Phosphoric Acid, Tris(2-ethylhexyl) Este	µg/kg	2	2	100	None	2300		1756			3541.5	4783	4783	NJ	MW06S	CM-SO-MW06-0608
Pyrene	µg/kg	155	110	71	Lnrm	23.5			470.9	9.49	580	37000	23000	*	CMW-SD-2018	CMW-SD-2018-01
Pyrene, 1-methyl-_total	µg/kg	4	4	100	None	348.5		302.2			504.85	998.4	998.4	NJ	MW09S	CM-SO-MW09-0406
Pyrene,2-methyl-	µg/kg	2	2	100	None	521.3		154.6			630.65	740	740	JN	SB03	CM-SO-SB03-0204
Stigmast-4-en-3-one	µg/kg	1	1	100	None	570					570	570	570	JN	SB02	CM-SO-SB02-0406
Substituted Benzene	µg/kg	2	2	100	None	147.4		257.0			329.15	510.9	510.9	J	MW15D	CM-SO-DUP05-0801
Substituted Phenol_total	µg/kg	3	3	100	None	753.2		338.3			1255.3	1396.9	1396.9	J_5	MW15D	CM-SO-MW15D-0406
Sulfur, Mol. (s8)	µg/kg	2	2	100	None	87		16.26			98.5	110	110	NJ	SB-14-271	CM-SO-SB-14-271-0204
Tetradecanoic Acid	µg/kg	1	1	100	None	529.8					529.8	529.8	529.8	NJ	MW08S	CM-SO-DUP02
Total PAH	µg/kg	92	81	88	Lnrm	36			3364	6.52	5050	120000	120000		CMW-SD-2018	CMW-SD-2018-01
Total Semi-volatile Organics	µg/kg	73	73	100	Lnrm	72			5969	6.93	5100	1000000	1000000		CMS-417	CMS-417-A
Triphenylene, 2-methyl-	µg/kg	2	2	100	None	338		591.8			756.5	1175	1175	NJ	MW01S	CM-SO-MW01-0204
Unknown Alkane_total	µg/kg	42	42	100	Lnrm	104			2725	5.19	2480	64501	64501	J_12	MW08S	CM-SO-MW08-0102
Unknown Amide	µg/kg	1	1	100	None	2397					2397	2397	2397	J	MW06S	CM-SO-MW06-0204
Unknown Amide_total	µg/kg	9	9	100	Lnrm	98.32			1216	4.76	882.22	10868	10868	J_3	MW03S	CM-SO-MW03-0608
Unknown Amine	µg/kg	2	2	100	None	132		187.2			264.35	396.7	396.7	J	MW15D	CM-SO-DUP05-0801
Unknown Carboxylic Acid	µg/kg	2	2	100	None	180		57.49			220.65	261.3	261.3	J	MW07S	CM-SO-MW07-0304
Unknown Ketone	µg/kg	1	1	100	None	78.95					78.95	78.95	78.95	J	MW15D	CM-SO-MW15D-0204
Unknown Organic Acid_total	µg/kg	2	2	100	None	173		61.52			216.5	260	260	J_1	SB-14-271	CM-SO-SB-14-271-0204
Unknown Pah	µg/kg	1	1	100	None	338.2					338.2	338.2	338.2	J	MW07S	CM-SO-MW07-0304
Unknown Pah_total	µg/kg	3	3	100	None	179.26		1211			426.8	2389.5	2390	J_5	MW15D	CM-SO-DUP05-0801
Unknown Phthalate_total	µg/kg	6	6	100	Lnrm	1053.9			6897	3.12	7665	36254	36254	J_4	MW08S	CM-SO-MW08-0102
Unknown Siloxane_total	µg/kg	3	3	100	None	111.9		2900			3610.1	5867	5867	J_1	MW08S	CM-SO-DUP02

Table C-1. Source Area Soil Statistical Summary CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/kg	70	0	0	None	2.05					3.725	65000				
1,1,1-trichloroethane	µg/kg	135	2	1	None	0.3					45	110000	110000	J	CMS-417	CMS-417-B
1,1,2,2-tetrachloroethane	µg/kg	135	0	0	None	0.325					45	65000				
1,1,2-trichloro-1,2,2-trifluoroethane	µg/kg	65	0	0	None	0.35					55	250				
1,1,2-trichloroethane	µg/kg	135	1	1	None	0.52					45	65000	120	J	MW06S	CM-SO-MW06-0406
1,1-dichloroethane	µg/kg	135	2	1	None	0.135					45	65000	7000	J	CMS-417	CMS-417-C
1,1-dichloroethene	µg/kg	135	1	1	None	0.625					45	65000	26	J	MW14M	CM-SO-MW14-0102
1,1-dichloropropene	µg/kg	70	0	0	None	2.05					3.725	65000				
1,2,3-trichlorobenzene	µg/kg	70	6	9	None	2.05					3.725	180000	180000		CMS-417	CMS-417-A
1,2,3-trichloropropane	µg/kg	70	0	0	None	2.05					3.725	65000				
1,2,4-trimethylbenzene	µg/kg	71	20	28	None	1.7					4.45	160000	160000		CMS-417	CMS-417-B
1,2-dibromo-3-chloropropane	µg/kg	120	2	2	None	1.205					18	135000	240	J	MW09S	CM-SO-MW09-0406
1,2-dibromoethane	µg/kg	135	0	0	None	0.35					45	65000				
1,2-dichloroethane	µg/kg	135	2	1	None	0.205					45	65000	1700	J	CMS-405	CMS-405-E
1,2-dichloropropane	µg/kg	135	0	0	None	0.24					45	65000				
1,3,5-trimethylbenzene	µg/kg	70	10	14	None	2.05					4.175	42000	42000	J	CMS-417	CMS-417-B
1,3-dichloropropane	µg/kg	70	0	0	None	2.05					3.725	65000				
1,4-dichlorobutane	µg/kg	1	0	0	None	3950					3950	3950				
2,2-dichloropropane	µg/kg	70	0	0	None	2.05					3.725	65000				
2-butanone	µg/kg	66	9	14	None	1.705					60	4000	4000		MW06S	CM-SO-MW06-0406
2-chloroethylvinylether	µg/kg	1	0	0	None	3950					3950	3950				
2-hexanone	µg/kg	66	0	0	None	0.51					55	3950				
4-methyl-2-pentanone	µg/kg	72	4	6	None	0.435					62.5	3950	590		GEC-7	B-7, S-2
Acetone	µg/kg	66	1	2	None	3.365					172.5	3950	780	J	MW05S	CM-SO-MW05-0406
Acrolein	µg/kg	1	0	0	None	10000					10000	10000				
Acrylonitrile	µg/kg	1	0	0	None	3950					3950	3950				
Benzene	µg/kg	145	23	16	None	0.26					45	480000	480000		CMS-408	CMS-408-C
Benzene, 1-chloro-2-methyl-	µg/kg	72	3	4	None	2.05					3.8	65000	604.1			
Benzene, 1-chloro-4-methyl-	µg/kg	77	6	8	None	2.05					4.35	65000	8700			
Bromobenzene	µg/kg	70	0	0	None	2.05					3.725	65000				
Bromochloromethane	µg/kg	70	0	0	None	2.05					3.725	65000				
Bromodichloromethane	µg/kg	135	0	0	None	0.33					45	65000				
Bromoform	µg/kg	135	0	0	None	0.35					45	65000				
Bromomethane	µg/kg	135	1	1	None	0.53					45	135000	26	J	MW14M	CM-SO-MW14-0708
Carbon Disulfide	µg/kg	66	0	0	None	0.3					55	3950				
Carbon Tetrachloride	µg/kg	135	0	0	None	0.21					45	65000				
Chlorobenzene	µg/kg	142	37	26	None	0.375					50	1000000	1000000		CMS-417	CMS-417-B
Chloroethane	*µg/kg*	133	2	2	*None*	0.9					45	135000	*110*	*JTB*	*MW15D*	CM-SO-MW15D-0204
Chloroform	µg/kg	141	2	1	None	0.295					45	65000	2300		GEC-2	B-2, S-2
Chloromethane	µg/kg	135	0	0	None	0.91					45	135000				
Cis-1,2-dichloroethene	µg/kg	142	35	25	None	0.5					55	500000	500000		CMS-417	CMS-417-B
Cis-1,3-dichloropropene	µg/kg	135	0	0	None	0.225					45	65000				
Cyclohexane	µg/kg	65	1	2	None	0.415					55	530	530	J	MW06S	CM-SO-MW06-0406
Dibromochloromethane	µg/kg	135	0	0	None	0.21					45	65000				
Dibromomethane	µg/kg	70	0	0	None	2.05					3.725	65000				
Dichlorodifluoromethane	µg/kg	135	0	0	None	0.175					45	135000				

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ethyl Ether	µg/kg	1	0	0	None	10000					10000	10000				
Ethyl Methacrylate	µg/kg	1	0	0	None	3950					3950	3950				
Ethylbenzene	µg/kg	142	28	20	None	0.28					46.25	81000	81000	J	CMS-417	CMS-417-B
Iodomethane	µg/kg	1	0	0	None	3950					3950	3950				
Isopropylbenzene	µg/kg	136	11	8	None	0.295					45	65000	5400	J	CMS-419	CMS-419-B
m&p-Xylene	µg/kg	77	25	32	None	1.4					4.75	270000	270000		CMS-417	CMS-417-B
Methyl Acetate	µg/kg	65	11	17	None	0.97					130	6200	6200		MW04D	CM-SO-MW04-0204
Methyl Tert-butyl Ether	µg/kg	66	0	0	None	0.445					77.5	3950				
Methylcyclohexane	µg/kg	65	3	5	None	0.33					55	1400	1400		MW06S	CM-SO-MW06-0406
Methylene Chloride	µg/kg	135	6	4	None	0.635					47.5	65000	90	JTB	MW01S	CM-SO-MW01-0102
N-butylbenzene	µg/kg	70	5	7	None	2					4	65000	18000	J	CMS-417	CMS-417-A
N-propylbenzene	µg/kg	71	6	8	None	2.05					4.15	65000	150	J	CMS-407	CMS-407-D
O-xylene	µg/kg	77	20	26	None	2.05					4.85	110000	110000	J	CMS-417	CMS-417-B
P-isopropyltoluene	µg/kg	70	3	4	None	2.05					3.8	65000	180	J	CMS-417	CMS-417-D
Sec-butylbenzene	µg/kg	71	4	6	None	2.05					3.85	65000	1000	J	CMS-405	GP04-FD
Styrene	µg/kg	135	4	3	None	0.12					45	65000	10000	J	CMS-417	CMS-417-C
													10000	J	CMS-419	CMS-419-B
Tert-butylbenzene	µg/kg	70	2	3	None	2.05					3.8	65000	10000	J	CMS-419	CMS-419-B
Tetrachloroethene	µg/kg	143	46	32	None	0.165					55	1700000	1700000		CMS-417	CMS-417-B
Tetrahydrofuran	µg/kg	1	0	0	None	19500					19500	19500				
Toluene	µg/kg	142	30	21	None	0.285					43.25	430000	430000		CMS-417	CMS-417-B
Total Volatile Organics	µg/kg	74	72	97	Lnrm	1.7			258.3	61.09	92	10000000	10000000		CMS-417	CMS-417-B
Total Xylenes	µg/kg	133	41	31	None	0.875					60	380000	380000	J	CMS-417	CMS-417-B
Trans-1,2-dichloroethene	µg/kg	142	8	6	None	0.34					50	65000	8400	J	CMS-417	CMS-417-C
Trans-1,3-dichloropropene	µg/kg	135	0	0	None	0.255					45	65000				
Trans-1,4-dichloro-2-butene	µg/kg	1	0	0	None	1950					1950	1950				
Trichloroetnene	µg/kg	142	38	27	None	0.23					49.5	2400000	2400000		CMS-417	CMS-417-B
Trichlorofluoromethane	µg/kg	135	1	1	None	0.21					45	135000	3.1	J	CMS-427	CMS-427-H
Vinyl Acetate	µg/kg	1	0	0	None	3950					3950	3950				
Vinyl Chloride	µg/kg	141	6	4	None	0.555					45	135000	2300		GEC-6	B-6, S-2
PCB as Aroclors																
Aroclor, Total	µg/kg	417	309	74	Lnrm	7.4			286.6	28.23	400	1300000	1300000		CMS-147	CMS-147-C
Aroclor-1016	µg/kg	420	5	1	None	2.39					95	110000	1400		MW06S	CM-SO-MW06-DUP01
Aroclor-1221	µg/kg	420	0	0	None	2.11					90	110000				
Aroclor-1232	µg/kg	420	5	1	None	1.35					90	250000	250000		CMS-417	CMS-417-A
Aroclor-1242	µg/kg	421	15	4	None	4.64					90	230000	230000		CMS-410	CMS-410-A
Aroclor-1248	µg/kg	420	39	9	None	1.075					107.5	420000	420000	J	CMS-402	CMS-402-C
Aroclor-1254	µg/kg	425	297	70	Lnrm	1.26			232.2	34.87	350	1300000	1300000		CMS-147	CMS-147-C
Aroclor-1260	µg/kg	424	12	3	None	2.35					95	110000	1700		MW06S	CM-SO-MW06-DUP01
Aroclor-1268	µg/kg	2	2	100	None	2012.63		1651			3180	4347	4347	J	CMS-4105	CMS-SS-4105-0010-01
PCB Congeners																
1,1'-biphenyl, 2,2',3,3',6,6'-hexachloro	µg/kg	1	1	100	None	445.6					445.6	445.6	445.6	NJ	MW06S	CM-SO-MW06-0608
1,1'-biphenyl, 2,3',4,4',5,5'-hexachloro	µg/kg	1	1	100	None	1516					1516	1516	1516	NJ	MW06S	CM-SO-MW06-DUP01
1,1'-biphenyl,2,2',3,4,5,5'-hexachloro	µg/kg	1	1	100	None	240					240	240	240	JN	MW14M	CM-SO-DUP03-0701
1,1'-biphenyl,2,3,3',4,4'-pentachloro-	µg/kg	2	2	100	None	91		864.8			702.5	1314	1314	NJ	MW06S	CM-SO-MW06-DUP01
1,1'-biphenyl,3,3',4,4'-tetrachloro-	µg/kg	1	1	100	None	320					320	320	320	JN	SB02	CM-SO-SB02-0608

Table C-1. Source Area Soil Statistical Summary CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
2,4,5-T	µg/kg	73	1	1	None	10					12.5	225	21	J	CMS-451	CMS-451-H
2,4,5-TP (Silvex)	µg/kg	73	1	1	None	10					12.5	225	59	J	CMS-417	CMS-417-B
2,4-D	µg/kg	59	1	2	None	41					48	900	71	J	CMS-419	CMS-419-B
2,4-DB	µg/kg	60	2	3	None	41					48	900	360	J	CMS-417	CMS-417-A
4,4'-DDD	µg/kg	144	35	24	None	0.25					2.35	2000	1200	J	CMS-417	CMS-417-A
4,4'-DDE	µg/kg	148	84	57	Lnrm	0.15			1.23	49.48	5.75	2200	2200	J	CMS-417	CMS-417-B
4,4'-DDT	µg/kg	145	21	14	None	0.0821					2.45	2000	410	J	CMS-419	CMS-419-B
Aldrin	µg/kg	142	20	14	None	0.0530					1.2	1200	1200	J	CMS-417	CMS-417-B
alpha-BHC	µg/kg	144	21	15	None	0.0451					1.225	1000	52	J	CMS-449	CMS-449-F
alpha-Chlordane	µg/kg	109	40	37	None	0.17					3.2	1000	160	J	CMS-164	CMS-164-A
beta-BHC	µg/kg	144	26	18	None	0.0934					1.6	1000	32		CMW-SD-2021	CMW-SD-2021-01
Dalapon	µg/kg	73	10	14	None	9.8					25.5	240	240		CMS-428	CMS-428-F
													240	J	CMS-451	CMS-451-J
delta-BHC	µg/kg	143	9	6	None	0.0756					1.15	1000	38	J	CMS-451	CMS-451-F
Dicamba	µg/kg	73	0	0	None	20.5					25	450				
Dichlorprop	µg/kg	73	0	0	None	41					50	900				
Dieldrin	µg/kg	145	77	53	Lnrm	0.193			0.901	101.93	8	9900	9900	J	CMS-417	CMS-417-B
Dinoseb	µg/kg	72	0	0	None	6					7.5	135				
Endosulfan I	µg/kg	143	12	8	None	0.086					1.2	1000	670	J	CMS-417	CMS-417-C
Endosulfan II	µg/kg	145	18	12	None	0.179					2.3	3400	3400	*	RES-14-303-01	RES-SS-14-303-01
Endosulfan Sulfate	µg/kg	143	33	23	None	0.087					2.9	2000	74		MW06S	CM-SO-MW06-0406
Endrin	µg/kg	144	28	19	None	0.074					2.2	2100	2100	J	CMS-417	CMS-417-C
Endrin Aldehyde	µg/kg	145	38	26	None	0.121					2.6	2000	1700		CMS-419	CMS-419-B
Endrin Ketone	µg/kg	110	23	21	None	0.0811					2.6	2000	20	J	RES-14-333-01	RES-SS-14-333-01
gamma-BHC	µg/kg	144	11	8	None	0.307					1.2	1000	31	J	CMS-419	CMS-419-B
gamma-Chlordane	µg/kg	108	35	32	None	0.21					2.025	1000	260		RES-14-303-01	RES-SS-14-303-01
Heptachlor	µg/kg	144	13	9	None	0.0693					1.2	5100	5100	J	CMS-417	CMS-417-C
Heptachlor Epoxide	µg/kg	144	17	12	None	0.054					1.175	1000	11	J	CMS-419	CMS-419-B
MCPA	µg/kg	72	1	1	None	4100					5000	90000	5800	J	CMS-456	CMS-456-B
MCPP	µg/kg	73	6	8	None	1600					5000	68000	68000	J	CMS-451	CMS-451-J
Methoxychlor	µg/kg	129	14	11	None	0.0945					11	10000	460		CMS-419	CMS-419-B
Technical Chlordane	µg/kg	52	9	17	None	0.9					47.5	10601	10601	J	CMS-4105	CMS-SS-4105-0010-01
Toxaphene	µg/kg	144	1	1	None	13					115	39500	13	J	CMS-449	CMS-449-H
Ancillary																
Percent Clay	pct	2	2	100	None	9		0.88			9.625	10.25	10.25		CMS-4110	CMS-SS-4110-0010-01
Percent Fines (silt + clay)	pct	9	9	100	Norm	2	37.11	28.54			41	81	81		CMW-SD-2021	CMW-SD-2021-01
Percent Gravel	pct	9	9	100	Norm	0.59	16.14	13.37			12.65	42	42		CMW-SD-2016	CMW-SD-2016-01
Percent Sand	pct	9	9	100	Norm	14.5	40.41	26.99			39	92	92		CMW-SD-2018	CMW-SD-2018-01
Percent Silt	pct	2	2	100	None	34.85		7.80			40.365	45.88	45.88		CMS-4110	CMS-SS-4110-0010-01
Percent Solids	pct	2	2	100	None	41.3		5.30			45.05	48.8	48.8		CMS-4105	CMS-SS-4105-0010-01
Specific Gravity		*5*	*5*	*100*	*None*	*2.65*		*0.00*			*2.65*	*2.65*	*2.65*		*CMW-SD-2017*	*CMW-DU-102799A*
													2.65		CMW-SD-2017	CMW-SD-2017-01
													2.65		CMW-SD-2019	CMW-SD-2019-01
													2.65		CMW-SD-2020	CMW-SD-2020-01
													2.65		CMW-SD-2021	CMW-SD-2021-01
Total Organic Carbon	pct	15	15	100	None	0.48		4.93			2	12.2	12.2		SS-06	SS-06

Table C-2. Allendale S[illegible] Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	33	32	97	Lnrm	0.93			39.44	3.79	32.5	1380	1380		RES-14-399-02	RES-SS-14-399-02
1,2,3,4,6,7,8-HpCDF	ng/kg	33	33	100	None	2.97		111.2			15.2	597	597		CMS-485	CMS-485-A
1,2,3,4,7,8,9-HpCDF	ng/kg	33	23	70	Lnrm	0.1505			0.944	4.17	1.21	29.8	29.8		CMS-485	CMS-485-A
1,2,3,4,7,8-HxCDD	ng/kg	33	26	79	Lnrm	0.088			0.814	3.77	1.125	22	22	EB	RES-14-399-02	RES-SS-14-399-02
1,2,3,4,7,8-HxCDF	ng/kg	33	29	88	None	0.752		12.38			2.88	60.6	60.6		CMS-485	CMS-485-A
1,2,3,6,7,8-HxCDD	ng/kg	33	21	64	None	0.3005		1.30			2.04	80.4	80.4		RES-14-399-02	RES-SS-14-399-02
1,2,3,6,7,8-HxCDF	ng/kg	33	31	94	Lnrm	0.601			3.16	3.08	2.8	37.6	37.6		CMS-485	CMS-485-A
1,2,3,7,8,9-HxCDD	ng/kg	33	22	67	None	0.2085		1.71			1.46	60.3	60.3		RES-14-399-02	RES-SS-14-399-02
1,2,3,7,8,9-HxCDF	ng/kg	33	23	70	Lnrm	0.173			0.439	3.40	1.22	11.6	11.6		CMS-485	CMS-485-A
1,2,3,7,8-PeCDD	ng/kg	33	16	48	None	0.1805					1.095	10.8	10.8		CMS-478	CMS-478-A
1,2,3,7,8-PeCDF	ng/kg	33	26	79	Lnrm	0.261			1.50	5.14	1.76	37.3	37.3		CMS-478	CMS-478-A
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	9	4	44	None	1.47					2.275	16.72	16.72	J	RES-14-365-02	RES-SS-14-365-02
2,3,4,6,7,8-HxCDF	ng/kg	33	32	97	Lnrm	0.919			5.19	3.06	4.1	45	45		CMS-478	CMS-478-A
2,3,4,7,8-PeCDF	ng/kg	33	27	82	None	1.125		8.34			4.12	48.5	48.5		CMS-478	CMS-478-A
2,3,7,8-TCDD	ng/kg	50	43	86	Lnrm	0.2405			22.38	6.77	22.4	1510	1510		CMS-019	3428-CMS-019
2,3,7,8-TCDF	ng/kg	33	29	88	Lnrm	0.503			3.68	2.97	3.4	53.3	53.3		CMS-478	CMS-478-A
OCDD	ng/kg	33	33	100	None	70.2		744.9			256	3600	3600	&	RES-14-399-02	RES-SS-14-399-02
OCDF	ng/kg	33	33	100	None	3.5		119.8			18.1	669	669		CMS-485	CMS-485-A
PCDD/Fs	ng/kg	33	33	100	None	212		1752			566	7860	7860		RES-14-399-02	RES-SS-14-399-02
TEQ	ng/kg	68	68	100	Lnrm	0			44.12	5.28	40.1	1939	1939		03/04-DEL-103	2108319
Total HpCDD	ng/kg	33	31	94	Lnrm	11.7			80.13	3.21	68.6	2410	2410	J	RES-14-399-02	RES-SS-14-399-02
Total HpCDF	ng/kg	33	32	97	Lnrm	4.48			37.44	3.56	26.2	739	739	J	CMS-485	CMS-485-A
Total HxCDD	ng/kg	33	23	70	Lnrm	3			14.87	3.21	20.1	410	410	J	RES-14-399-02	RES-SS-14-399-02
Total HxCDF	ng/kg	33	31	94	Lnrm	5.75			56.15	3.09	48 8	429	429	J	RES-14-399-02	RES-SS-14-399-02
Total PeCDD	ng/kg	33	23	70	Lnrm	1.25			10.28	3.32	12.4	260	260	J	CMS-478	CMS-478-A
Total PeCDF	ng/kg	33	30	91	Lnrm	8.45			71.06	3.18	56.6	629	629	J	CMS-478	CMS-478-A
Total TCDD	ng/kg	33	31	94	Lnrm	0.975			26.17	3.42	25	280	280	J	CMS-474	CMS-474-C
Total TCDF	ng/kg	33	33	100	Lnrm	11.2			63.07	2.89	56.6	1110	1110	J	CMS-478	CMS-478-A
Metals																
Aluminum	mg/kg	3	3	100	None	1890		1227			2490	4250	4250		RES-14-421-01	RES-SS-14-421-01
Antimony	mg/kg	1	0	0	None	0.24					0.24	0.24				
Arsenic	mg/kg	3	3	100	None	1.3		0.929			1.5	3	3		RES-14-421-01	RES-SS-14-421-01
Barium	mg/kg	3	3	100	None	16.6		4.80			18.8	25.8	25.8		RES-14-421-01	RES-SS-14-421-01
Beryllium	mg/kg	3	3	100	None	0.19		0.093			0.21	0.36	0.36		RES-14-421-01	RES-SS-14-421-01
Cadmium	mg/kg	3	2	67	None	0.035					0.16	0.16	0.16	J	CMS-418	CMS-418-A
													0.16	J	CMS-418	CMS-418-B
Calcium	mg/kg	3	3	100	None	428		219.8			504	841	841	J	RES-14-421-01	RES-SS-14-421-01
Chromium	mg/kg	3	3	100	None	5.4		2.30			6.8	9.9	9.9		CMS-418	CMS-418-A
Cobalt	mg/kg	3	3	100	None	1.6		2.05			3.5	5.7	5.7		RES-14-421-01	RES-SS-14-421-01
Copper	mg/kg	3	3	100	None	8.2		2.32			11.4	12.7	12.7		CMS-418	CMS-418-A
Cyanide	mg/kg	2	0	0	None	0.255					0.2675	0.28				
Iron	mg/kg	3	3	100	None	7160		466.1			7750	8080	8080		CMS-418	CMS-418-A
Lead	mg/kg	3	3	100	None	35.2		95.00			89.4	220	220		CMS-418	CMS-418-B
Magnesium	mg/kg	3	3	100	None	768		223.5			1150	1160	1160	J	RES-14-421-01	RES-SS-14-421-01
Manganese	mg/kg	3	3	100	None	98.7		27.11			134	152	152		RES-14-421-01	RES-SS-14-421-01
Mercury	mg/kg	3	1	33	None	0.0205					0.0225	0.05	0.05	J	RES-14-421-01	RES-SS-14-421-01
Molybdenum	mg/kg	2	2	100	None	1.3		0.919			1.95	2.6	2.6	J	CMS-418	CMS-418-A
Nickel	mg/kg	3	3	100	None	4.8		3.55			4.9	11	11		CMS-418	CMS-418-A
Potassium	mg/kg	3	3	100	None	287		120.5			388	527	527		RES-14-421-01	RES-SS-14-421-01
Selenium	mg/kg	3	0	0	None	0.205					12.65	14.1				

Table C-2. Allendale Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Silver	mg/kg	3	0	0	None	0.115					0.5	0.55				
Sodium	mg/kg	3	0	0	None	17.6					253.5	282.5				
Thallium	mg/kg	3	0	0	None	0.24					101.5	113				
Vanadium	mg/kg	3	3	100	None	6.1		1.47			8.6	8.7	8.7		RES-14-421-01	RES-SS-14-421-01
Zinc	mg/kg	3	3	100	None	38.5		8.86			44.8	56	56		CMS-418	CMS-418-B
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	1	0	0	None	185					185	185				
1,2,4-trichlorobenzene	µg/kg	6	0	0	None	2.25					175	240				
1,2-dichlorobenzene	µg/kg	6	0	0	None	2.25					175	240				
1,3-dichlorobenzene	µg/kg	6	0	0	None	2.25					175	240				
1,4-dichlorobenzene	µg/kg	6	0	0	None	2.25					175	240				
2,2'-oxybis(1-chloropropane)	µg/kg	3	0	0	None	185					215	240				
2,4,5-trichlorophenol	µg/kg	5	1	20	None	165					185	600	180	J	SS-04	SS-04
2,4,6-trichlorophenol	µg/kg	5	0	0	None	165					185	240				
2,4-dichlorophenol	µg/kg	5	0	0	None	165					185	240				
2,4-dimethylphenol	µg/kg	5	0	0	None	165					185	240				
2,4-dinitrophenol	µg/kg	5	0	0	None	460					600	900				
2,4-dinitrotoluene	µg/kg	5	0	0	None	165					185	240				
2,6-dinitrotoluene	µg/kg	5	0	0	None	165					185	240				
2-chloronaphthalene	µg/kg	5	0	0	None	165					185	240				
2-chlorophenol	µg/kg	5	0	0	None	165					185	240				
2-methylnaphthalene	µg/kg	5	1	20	None	78					185	240	78	J	SS-04	SS-04
2-methylphenol	µg/kg	5	0	0	None	165					185	240				
2-nitroaniline	µg/kg	5	0	0	None	460					600	900				
2-nitrophenol	µg/kg	5	0	0	None	165					185	240				
3,3'-dichlorobenzidine	µg/kg	5	0	0	None	185					240	900				
3+4-methylphenols	µg/kg	2	0	0	None	165					175	185				
3-nitroaniline	µg/kg	5	0	0	None	460					600	900				
4,6-dinitro-2-methylphenol	µg/kg	5	0	0	None	460					600	900				
4-bromophenyl-phenylether	µg/kg	5	0	0	None	165					185	240				
4-chloro-3-methylphenol	µg/kg	5	0	0	None	165					185	240				
4-chloroaniline	µg/kg	5	0	0	None	165					185	240				
4-chlorophenyl-phenylether	µg/kg	5	0	0	None	165					185	240				
4-methylphenol	µg/kg	3	0	0	None	185					215	240				
4-nitroaniline	µg/kg	5	0	0	None	460					600	900				
4-nitrophenol	µg/kg	5	0	0	None	460					600	900				
Acenaphthene	µg/kg	5	3	60	Norm	87			87		185	240	210	J	SS-04	SS-04
Acenaphthylene	µg/kg	5	4	80	Lnrm	58			142.0	3.79	185	830	830	J	CMS-418	CMS-418-A
Acetophenone	µg/kg	1	0	0	None	185					185	185				
Anthracene	µg/kg	5	4	80	Lnrm	120			265.5	2.84	300	900	900	J	CMS-418	CMS-418-A
Atrazine	µg/kg	1	0	0	None	185					185	185				
Bapeq	µg/kg	5	4	80	Norm	60	1190	750.3			1000	3800	3800		SS-04	SS-04
Benzaldehyde	µg/kg	1	0	0	None	185					185	185				
Benzo(a)anthracene	µg/kg	5	4	80	Lnrm	185			929.9	2.73	920	2400	2400		SS-04	SS-04
Benzo(a)pyrene	µg/kg	5	4	80	Lnrm	185			829.1	2.18	760	2600	2600		SS-04	SS-04
Benzo(b)fluoranthene	µg/kg	5	2	40	None	165					185	3200	3200	*	SS-04	SS-04
Benzo(g,h,i)perylene	µg/kg	5	4	80	Lnrm	185			393.9	1.59	340	1300	1300		SS-04	SS-04
Benzo(k)fluoranthene	µg/kg	5	4	80	Lnrm	185			704.4	3.41	960	3100	3100	J	CMS-418	CMS-418-A
Benzoic Acid	µg/kg	2	0	0	None	800					850	900				
Benzyl Alcohol	µg/kg	2	0	0	None	165					175	185				
Bis(2-chloroethoxy)methane	µg/kg	5	0	0	None	165					185	240				
Bis(2-chloroethyl)ether	µg/kg	5	0	0	None	165					185	240				
Bis-(2-chloroisopropyl)ether	µg/kg	2	0	0	None	165					175	185				

Table C-2. Allendale Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Bis(2-ethylhexyl)phthalate	µg/kg	5	4	80	Lnrm	160			202.9	1.55	185	420	420		CMS-418	CMS-418-B
Butylbenzylphthalate	µg/kg	5	2	40	None	54					165	185	110	J	SS-04	SS-04
Caprolactam	µg/kg	1	0	0	None	185					185	185				
Carbazole	µg/kg	5	3	60	Norm	81	81				185	430	430	J	SS-04	SS-04
Chrysene	µg/kg	5	4	80	Lnrm	185			888.8	2.59	830	2200	2200		SS-04	SS-04
Dibenzo(a,h)anthracene	µg/kg	5	3	60	Lnrm	120	120				165	460	460		SS-04	SS-04
Dibenzofuran	µg/kg	5	2	40	None	150					185	240	200	J	CMS-418	CMS-418-A
Diethylphthalate	µg/kg	5	0	0	None	165					185	240				
Dimethylphthalate	µg/kg	5	0	0	None	165					185	240				
Di-n-butylphthalate	µg/kg	5	1	20	None	37					185	240	37	J	RES-14-421-01	RES-SS-14-421-01
Di-n-octylphthalate	µg/kg	5	0	0	None	165					185	240				
Fluoranthene	µg/kg	5	5	100	Norm	51	2350.2	1906			2100	4700	4700	*	SS-04	SS-04
Fluorene	µg/kg	5	4	80	Lnrm	51			116.2	3.34	185	500	500	J	CMS-418	CMS-418-A
Hexachlorobenzene	µg/kg	5	0	0	None	165					185	240				
Hexachlorobutadiene	µg/kg	7	0	0	None	2.25					185	240				
Hexachlorocyclopentadiene	µg/kg	5	0	0	None	185					240	900				
Hexachloroethane	µg/kg	5	0	0	None	165					185	240				
High Molecular Weight Pahs	µg/kg	5	5	100	Norm	110	10822	9198			9000	23000	23000		SS-04	SS-04
Indeno(1,2,3-cd)pyrene	µg/kg	5	4	80	Lnrm	185			417.5	1.63	350	1500	1500		SS-04	SS-04
Isophorone	µg/kg	5	0	0	None	165					185	240				
Low Molecular Weight Pahs	µg/kg	5	4	80	Lnrm	185			2038	3.88	1900	5800	5800		CMS-418	CMS-418-A
Naphthalene	µg/kg	7	1	14	None	2.25					165	240	110	J	SS-04	SS-04
Nitrobenzene	µg/kg	5	0	0	None	165					185	240				
N-nitroso-di-n-propylamine	µg/kg	5	0	0	None	165					185	240				
N-nitroso-diphenylamine	µg/kg	5	0	0	None	165					185	240				
Pentachlorophenol	µg/kg	5	0	0	None	460					600	900				
Phenanthrene	µg/kg	5	4	80	Lnrm	185			1369	3.50	1300	3900	3900	*	SS-04	SS-04
Phenol	µg/kg	5	0	0	None	165					185	240				
Pyrene	µg/kg	5	5	100	Norm	55	2001	1572			2200	3500	3500	*	SS-04	SS-04
													3500	J	CMS-418	CMS-418-A
Total PAH	µg/kg	5	5	100	Norm	110	13782	11989			11000	29000	29000		SS-04	SS-04
Total Semi-volatile Organics	µg/kg	2	2	100	None	11000		8485			17000	23000	23000	J	CMS-418	CMS-418-A
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1,1-trichloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1,2,2-tetrachloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1,2-trichloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1-dichloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1-dichloroethene	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,1-dichloropropene	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,2,3-trichlorobenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,2,3-trichloropropane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,2,4-trimethylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,2-dibromo-3-chloropropane	µg/kg	2	0	0	None	4.5					5	5.5				
1,2-dibromoethane	µg/kg	2	0	0	None	4.5					5	5.5				
1,2-dichloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,2-dichloropropane	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,3,5-trimethylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
1,3-dichloropropane	µg/kg	2	0	0	None	2.25					2.475	2.7				
2,2-dichloropropane	µg/kg	2	0	0	None	2.25					2.475	2.7				
2-chlorotoluene	µg/kg	2	0	0	None	2.25					2.475	2.7				
4-chlorotoluene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Benzene	µg/kg	2	0	0	None	2.25					2.475	2.7				

Table C-2. Allendale Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Bromobenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Bromochloromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Bromodichloromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Bromoform	µg/kg	2	0	0	None	2.25					2.475	2.7				
Bromomethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Carbon Tetrachloride	µg/kg	2	0	0	None	2.25					2.475	2.7				
Chlorobenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Chloroethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Chloroform	µg/kg	2	0	0	None	2.25					2.475	2.7				
Chloromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Cis-1,2-dichloroethene	µg/kg	2	1	50	None	2					2.125	2.25	2	J	CMS-418	CMS-418-B
Cis-1,3-dichloropropene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Dibromochloromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Dibromomethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Dichlorodifluoromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Ethylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Isopropylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
m&p-Xylene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Methylene Chloride	µg/kg	2	0	0	None	4.5					5	5.5				
N-butylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
N-propylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
O-xylene	µg/kg	2	0	0	None	2.25					2.475	2.7				
P-isopropyltoluene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Sec-butylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Styrene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Tert-butylbenzene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Tetrachloroethene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Toluene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Total Volatile Organics	µg/kg	2	2	100	None	2		4.95			5.5	9	9		CMS-418	CMS-418-A
Total Xylenes	µg/kg	2	0	0	None	2.25					2.475	2.7				
Trans-1,2-dichloroethene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Trans-1,3-dichloropropene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Trichloroethene	µg/kg	2	0	0	None	2.25					2.475	2.7				
Trichlorofluoromethane	µg/kg	2	0	0	None	2.25					2.475	2.7				
Vinyl Chloride	µg/kg	2	0	0	None	2.25					2.475	2.7				
PCB as Aroclors																
Aroclor, Total	µg/kg	5	4	80	Lnrm	37			258.2	1.72	210	780	780		SS-05	SS-05
Aroclor-1016	µg/kg	5	0	0	None	16.5					18.5	24				
Aroclor-1221	µg/kg	5	0	0	None	16.5					37	49				
Aroclor-1232	µg/kg	5	0	0	None	16.5					18.5	24				
Aroclor-1242	µg/kg	5	0	0	None	16.5					18.5	24				
Aroclor-1248	µg/kg	5	0	0	None	16.5					18.5	24				
Aroclor-1254	µg/kg	5	4	80	Norm	18.5	273.3	160.2			210	780	780		SS-05	SS-05
Aroclor-1260	µg/kg	5	0	0	None	16.5					18.5	24				

Table C-2. Allendale S[illegible] Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
2,4,5-T	µg/kg	2	0	0	None	10					10.75	11.5				
2,4,5-TP (Silvex)	µg/kg	2	0	0	None	10					10.75	11.5				
2,4-D	µg/kg	2	0	0	None	40.5					42.75	45				
2,4-DB	µg/kg	2	0	0	None	40.5					42.75	45				
4,4'-DDD	µg/kg	5	1	20	None	0.85					1.85	9.9	9.9	J	SS-04	SS-04
4,4'-DDE	µg/kg	4	3	75	None	0.73		1.27			1.925	6.4	6.4	J	SS-04	SS-04
4,4'-DDT	µg/kg	5	1	20	None	0.85					1.85	2.4	1.3	J	CMS-418	CMS-418-B
Aldrin	µg/kg	5	0	0	None	0.85					0.95	1.25				
alpha-BHC	µg/kg	5	0	0	None	0.85					0.95	1.25				
alpha-Chlordane	µg/kg	3	2	67	None	0.95					1	2.2	2.2	J	SS-04	SS-04
beta-BHC	µg/kg	4	1	25	None	0.85					0.95	12	12	J	SS-05	SS-05
Dalapon	µg/kg	2	0	0	None	20.5					21.5	22.5				
delta-BHC	µg/kg	4	0	0	None	0.85					0.95	1.1				
Dicamba	µg/kg	2	0	0	None	20.5					21.5	22.5				
Dichlorprop	µg/kg	2	0	0	None	40.5					42.75	45				
Dieldrin	µg/kg	3	1	33	None	0.85					0.98	1.85	0.98	J	CMS-418	CMS-418-B
Dinoseb	µg/kg	2	0	0	None	6					6.5	7				
Endosulfan I	µg/kg	4	0	0	None	0.85					0.95	1.1				
Endosulfan II	µg/kg	4	0	0	None	0.85					1.4	2.15				
Endosulfan Sulfate	µg/kg	4	1	25	None	0.85					1.4	10	10	J	SS-05	SS-05
Endrin	µg/kg	5	0	0	None	0.85					1.85	2.4				
Endrin Aldehyde	µg/kg	5	1	20	None	0.95					1.85	2.4	1.2	J	CMS-418	CMS-418-A
Endrin Ketone	µg/kg	1	0	0	None	1.85					1.85	1.85				
gamma-BHC	µg/kg	5	0	0	None	0.85					0.95	1.25				
gamma-Chlordane	µg/kg	3	0	0	None	0.95					1.1	1.25				
Heptachlor	µg/kg	4	1	25	None	0.31					0.9	0.95	0.31	J	SS-05	SS-05
Heptachlor Epoxide	µg/kg	4	1	25	None	0.36					0.95	1.1	0.36	J	CMS-418	CMS-418-A
MCPA	µg/kg	2	0	0	None	4050					4275	4500				
MCPP	µg/kg	2	0	0	None	4050					4275	4500				
Methoxychlor	µg/kg	3	0	0	None	1.65					1.85	9.5				
Technical Chlordane	µg/kg	2	0	0	None	8.5					9	9.5				
Toxaphene	µg/kg	5	0	0	None	34					95	125				
Ancillary																
Total Organic Carbon	pct	2	2	100	None	3.52		0.566			3.92	4.32	4.32		SS-05	SS-05

Table C-3. Lyman Mill Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	117	106	91	Lnrm	0.41			29.90	5.65	30.2	2520	2520	$	RES-11-433-01	RES-SS-11-433-01
1,2,3,4,6,7,8-HpCDF	ng/kg	117	98	84	Lnrm	0.96			11.96	5.28	11.5	2920	2920	$	RES-11-433-01	RES-SS-11-433-01
1,2,3,4,7,8,9-HpCDF	ng/kg	117	72	62	Lnrm	0.33			0.833	4.64	1.7	1735	694		RES-11-433-01	RES-SS-11-433-01
1,2,3,4,7,8-HxCDD	ng/kg	117	75	64	Lnrm	0.262			0.696	4.19	1.15	1175	167		RES-11-433-01	RES-SS-11-433-01
1,2,3,4,7,8-HxCDF	ng/kg	117	74	63	Lnrm	0.199			2.04	18.54	3.08	1720	1720	EB$	RES-11-433-01	RES-SS-11-433-01
1,2,3,6,7,8-HxCDD	ng/kg	117	75	64	Lnrm	0.347			1.39	6.32	1.9	1075	284		RES-11-433-01	RES-SS-11-433-01
1,2,3,6,7,8-HxCDF	ng/kg	115	83	72	Lnrm	0.22			1.37	6.34	1.47	797	797		RES-11-433-01	RES-SS-11-433-01
1,2,3,7,8,9-HxCDD	ng/kg	117	74	63	Lnrm	0.247			1.55	10.17	2.3	1480	580		RES-11-433-01	RES-SS-11-433-01
1,2,3,7,8,9-HxCDF	ng/kg	117	31	26	None	0.05					1.25	1275	51.8		RES-11-433-01	RES-SS-11-433-01
1,2,3,7,8-PeCDD	ng/kg	117	65	56	Lnrm	0.0826			0.438	25.21	1.1	1115	112		RES-11-433-01	RES-SS-11-433-01
1,2,3,7,8-PeCDF	ng/kg	117	81	69	Lnrm	0.12			0.933	8.06	1.75	1765	239		RES-11-433-01	RES-SS-11-433-01
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	112	47	42	None	0.59					8.77	407.35	407.35	J	RES-10-044-01	RES-SS-10-044-01
2,3,4,6,7,8-HxCDF	ng/kg	117	94	80	Lnrm	0.065			2.03	6.13	2.16	2185	1260		RES-11-433-01	RES-SS-11-433-01
2,3,4,7,8-PeCDF	ng/kg	117	79	68	Lnrm	0.064			1.12	18.59	1.2	1170	745		RES-11-433-01	RES-SS-11-433-01
2,3,7,8-TCDD	ng/kg	127	111	87	Lnrm	0.0948			8.58	9.68	6.3	1130	1130		LPX-FP-4004	LPX-FP-4004-0000-01
2,3,7,8-TCDF	ng/kg	117	80	68	Lnrm	0.146			2.42	19.88	2.8	811	811	$	RES-11-433-01	RES-SS-11-433-01
OCDD	ng/kg	117	113	97	Lnrm	0.13			241.22	4.96	202	11180	11180	J	LPX-FP-4007	LPX-FP-4007-0000-01
OCDF	ng/kg	117	113	97	Lnrm	0.045			19.14	5.17	15.2	6450	2240	J	RES-11-433-01	RES-SS-11-433-01
PCDD/Fs	ng/kg	111	111	100	Lnrm	13.5			526.3	4.26	470	37700	37700		RES-11-433-01	RES-SS-11-433-01
TEQ	ng/kg	143	143	100	Lnrm	0.68			20.35	6.50	15	1291	1291		10-DEL-303	2108301
Total HpCDD	ng/kg	112	92	82	Lnrm	0.41			58.28	5.96	62.75	4760	4760	J$	RES-11-433-01	RES-SS-11-433-01
Total HpCDF	ng/kg	112	95	85	Lnrm	0.96			24.84	6.80	22.75	4540	4540	J$	RES-11-433-01	RES-SS-11-433-01
Total HxCDD	ng/kg	112	90	80	Lnrm	0.5			16.38	6.23	19.8	3360	3360	J$	RES-11-433-01	RES-SS-11-433-01
Total HxCDF	ng/kg	112	95	85	Lnrm	0.85			24.09	5.89	20.8	4950	4950	J$	RES-11-433-01	RES-SS-11-433-01
Total PeCDD	ng/kg	112	99	88	Lnrm	0.15			8.72	5.58	8.87	2620	2620	J	RES-11-433-01	RES-SS-11-433-01
Total PeCDF	ng/kg	112	106	95	Lnrm	0.99			28.70	5.09	21.2	7370	7370	J	RES-11-433-01	RES-SS-11-433-01
Total TCDD	ng/kg	112	100	89	Lnrm	0.15			15.66	6.69	11.25	1460	1460	J	RES-11-433-01	RES-SS-11-433-01
Total TCDF	ng/kg	112	99	88	Lnrm	0.245			26.49	5.63	22.75	3220	3220	J$	RES-11-433-01	RES-SS-11-433-01
Metals																
Aluminum	mg/kg	41	41	100	None	2430		32269			7180	213000	213000		RES-10-076-01	RES-SS-10-076-01
Antimony	mg/kg	41	20	49	None	0.04					0.704	38.2	38.2	J	RES-10-042-01	RES-SS-10-042-01
Arsenic	mg/kg	41	40	98	Lnrm	0.8			5.94	2.17	6.6	55.6	55.6		RES-10-042-01	RES-SS-10-042-01
Barium	mg/kg	41	41	100	None	16.9		195.6			63.7	874	874		RES-10-075-01	RES-SS-10-075-01
Beryllium	mg/kg	39	19	49	None	0.105					0.205	1.06	1.06		LPX-FP-4004	LPX-FP-4004-0000-01
Cadmium	mg/kg	40	21	53	None	0.035		0.120			0.203	5.2	5.2		RES-11-433-01	RES-SS-11-433-01
Calcium	mg/kg	34	30	88	Lnrm	321			2383	3.25	1990	48700	48700		RES-11-429-01	RES-SS-11-429-01
Chromium	mg/kg	41	40	98	None	0.5		74.06			20.6	404	404		RES-11-486-01	RES-SS-11-486-01
Cobalt	mg/kg	41	40	98	None	0.125		3.34			4.4	21.7	21.7		RES-10-042-01	RES-SS-10-042-01
Copper	mg/kg	41	40	98	None	3.65		3979			36.7	25500	25500		RES-11-433-01	RES-SS-11-433-01
Iron	mg/kg	41	41	100	Lnrm	4440			15296	1.85	13400	89700	89700		RES-10-076-01	RES-SS-10-076-01
Lead	mg/kg	41	41	100	Lnrm	8.1			163.8	3.80	169	2460	2460		RES-11-012-01	RES-SS-11-012-01
Magnesium	mg/kg	34	34	100	Lnrm	752			1507	1.51	1300	4260	4260		RES-11-429-01	RES-SS-11-429-01
Manganese	mg/kg	41	41	100	Lnrm	61			251.3	2.17	217	2880	2880		RES-10-076-01	RES-SS-10-076-01
Mercury	mg/kg	39	21	54	None	0.055		0.057			0.111	3	3	J	RES-10-044-01	RES-SS-DU-111999A
Methyl Mercury	mg/kg	7	7	100	None	0.000159		0.00021			0.000203	0.000767	0.000767	J	LPX-FP-4004	LPX-FP-4004-0000-01
Molybdenum	mg/kg	7	7	100	Lnrm	0.538			1.15	2.08	0.84	3.48	3.48	J	LPX-FP-4004	LPX-FP-4004-0000-01
Nickel	mg/kg	41	41	100	Lnrm	3.2			12.54	2.03	10.6	64.6	64.6		RES-11-433-01	RES-SS-11-433-01
Potassium	mg/kg	34	34	100	None	300		397.4			522.5	2530	2530		RES-10-042-01	RES-SS-10-042-01

Table C-3. Lyman Mill Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Selenium	mg/kg	39	6	15	None	0.25					0.63	2.4	2.4	J	RES-12-556-01	RES-SS-12-556-01
Silver	mg/kg	41	17	41	None	0.11					0.32	5.7	5.7	J	RES-11-012-01	RES-SS-11-012-01
Sodium	mg/kg	34	17	50	None	19.2					142.5	2010	2010		RES-10-042-01	RES-SS-10-042-01
Thallium	mg/kg	39	7	18	None	0.141					0.75	1.45	0.575		LPX-FP-4006	LPX-FP-4006-0000-01
Vanadium	mg/kg	41	41	100	Lnrm	4.1			20.77	1.81	21.4	54.9	54.9		LPX-4113	LPX-SS-4113-0005-01
Zinc	mg/kg	41	41	100	Lnrm	17.9			188.7	3.39	163	2190	2190		LPX-4113	LPX-SS-4113-0005-01
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	40	8	20	None	1.11					295	55000	502.8		LPX-4113	LPX-SS-4113-0005-01
2,2'-oxybis(1-chloropropane)	µg/kg	33	0	0	None	180					1000	55000				
2,4,5-trichlorophenol	µg/kg	40	0	0	None	19					1300	140000				
2,4,6-trichlorophenol	µg/kg	33	0	0	None	180					1000	55000				
2,4-dichlorophenol	µg/kg	33	0	0	None	180					1000	55000				
2,4-dimethylphenol	µg/kg	33	0	0	None	180					1000	55000				
2,4-dinitrophenol	µg/kg	40	0	0	None	300					1300	140000				
2,4-dinitrotoluene	µg/kg	33	0	0	None	180					1000	55000				
2,6-dinitrotoluene	µg/kg	33	0	0	None	180					1000	55000				
2-chloronaphthalene	µg/kg	33	0	0	None	180					1000	55000				
2-chlorophenol	µg/kg	33	0	0	None	180					1000	55000				
2-methylnaphthalene	µg/kg	40	9	23	None	2.38					367.5	55000	1560		LPX-4113	LPX-SS-4113-0005-01
2-methylphenol	µg/kg	33	0	0	None	180					1000	55000				
2-nitroaniline	µg/kg	33	0	0	None	450					2500	140000				
2-nitrophenol	µg/kg	40	0	0	None	27					307.5	55000				
3,3'-dichlorobenzidine	µg/kg	33	0	0	None	180					1000	55000				
3-nitroaniline	µg/kg	33	0	0	None	450					2500	140000				
4,6-dinitro-2-methylphenol	µg/kg	33	0	0	None	450					2500	140000				
4-bromophenyl-phenylether	µg/kg	33	0	0	None	180					1000	55000				
4-chloro-3-methylphenol	µg/kg	33	0	0	None	180					1000	55000				
4-chloroaniline	µg/kg	33	0	0	None	180					1000	55000				
4-chlorophenyl-phenylether	µg/kg	33	0	0	None	180					1000	55000				
4-methylphenol	µg/kg	40	0	0	None	44.5					307.5	55000				
4-nitroaniline	µg/kg	33	0	0	None	450					2500	140000				
4-nitrophenol	µg/kg	40	0	0	None	13.5					1300	140000				
Acenaphthene	µg/kg	40	11	28	None	4.74					257.5	14000	14000	J	RES-11-424-01	RES-SS-11-424-01
Acenaphthylene	µg/kg	40	10	25	None	7.09					275	55000	3100	J	RES-10-075-01	RES-SS-10-075-01
Acetophenone	µg/kg	33	0	0	None	180					1000	55000				
Anthracene	µg/kg	40	25	63	Lnrm	15.95			27.79	3.06	225	40000	40000	J	RES-11-424-01	RES-SS-11-424-01
Atrazine	µg/kg	33	0	0	None	180					1000	55000				
Bapeq	µg/kg	34	30	88	Lnrm	7			381.7	9.10	470	170000	170000		RES-11-424-01	RES-SS-11-424-01
Benzaldehyde	µg/kg	41	10	24	None	0.252					280	55000	720	J	RES-11-433-01	RES-SS-11-433-01
Benzo(a)anthracene	µg/kg	41	35	85	None	30		21854			300	140000	140000		RES-11-424-01	RES-SS-11-424-01
Benzo(a)pyrene	µg/kg	41	32	78	None	62		493.6			420	110000	110000	J	RES-11-424-01	RES-SS-11-424-01
Benzo(b)fluoranthene	µg/kg	41	35	85	None	38		18814			419	120000	120000		RES-11-424-01	RES-SS-11-424-01
Benzo(g,h,i)perylene	µg/kg	41	23	56	None	71		31.94			410	58000	58000	J	RES-11-424-01	RES-SS-11-424-01
Benzo(k)fluoranthene	µg/kg	41	35	85	None	36		15843			380	100000	100000	J	RES-11-424-01	RES-SS-11-424-01
Bis(2-chloroethoxy)methane	µg/kg	33	0	0	None	180					1000	55000				
Bis(2-chloroethyl)ether	µg/kg	33	0	0	None	180					1000	55000				
Bis(2-ethylhexyl)phthalate	µg/kg	41	28	68	Lnrm	49			142.1	4.67	530	55000	4200	J	RES-10-044-01	RES-SS-DU-111999A
Butyibenzyiphthalate	µg/kg	40	5	13	None	21					337.5	55000	620	J	RES-11-012-01	RES-SS-11-012-01
Caprolactam	µg/kg	33	0	0	None	180					1000	55000				
Carbazole	µg/kg	40	12	30	None	17.5					365	26000	26000	J	RES-11-424-01	RES-SS-11-424-01
Chrysene	µg/kg	41	36	88	None	42		23617			457.35	150000	150000		RES-11-424-01	RES-SS-11-424-01

Table C-3. Lyman Mill Soil Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dibenzo(a,h)anthracene	µg/kg	41	14	34	None	25.78					410	26000	26000	J	RES-11-424-01	RES-SS-11-424-01
Dibenzofuran	µg/kg	40	11	28	None	3.95					337.5	55000	5200	J	RES-10-075-01	RES-SS-10-075-01
Diethylphthalate	µg/kg	33	0	0	None	180					1000	55000				
Dimethylphthalate	µg/kg	33	0	0	None	180					1000	55000				
Di-n-butylphthalate	µg/kg	41	6	15	None	18					410	55000	850	J	LPX-FP-4006	LPX-FP-4006-0000-01
Di-n-octylphthalate	µg/kg	40	1	3	None	17					295	55000	97	J	LPX-FP-4007	LPX-FP-4007-0000-01
Fluoranthene	µg/kg	41	37	90	None	52		47583			720	300000	300000	J	RES-11-424-01	RES-SS-11-424-01
Fluorene	µg/kg	40	15	38	None	4.86					250	16000	16000	J	RES-11-424-01	RES-SS-11-424-01
Hexachlorobenzene	µg/kg	33	0	0	None	180					1000	55000				
Hexachlorobutadiene	µg/kg	33	0	0	None	180					1000	55000				
Hexachlorocyclopentadiene	µg/kg	33	0	0	None	180					1000	55000				
Hexachloroethane	µg/kg	33	0	0	None	180					1000	55000				
High Molecular Weight Pahs	µg/kg	34	31	91	Lnrm	120			3373	7.83	3000	1300000	1300000		RES-11-424-01	RES-SS-11-424-01
Indeno(1,2,3-cd)pyrene	µg/kg	41	24	59	None	56		59.72			380	56000	56000	J	RES-11-424-01	RES-SS-11-424-01
Isophorone	µg/kg	33	0	0	None	180					1000	55000				
Low Molecular Weight Pahs	µg/kg	34	24	71	None	91		644.1			680	250000	250000		RES-11-424-01	RES-SS-11-424-01
Naphthalene	µg/kg	40	10	25	None	3.97					295	55000	4390		LPX-4113	LPX-SS-4113-0005-01
Nitrobenzene	µg/kg	33	0	0	None	180					1000	55000				
N-nitroso-di-n-propylamine	µg/kg	33	0	0	None	180					1000	55000				
N-nitroso-diphenylamine	µg/kg	33	0	0	None	180					1000	55000				
Pentachlorophenol	µg/kg	40	0	0	None	13.5					1300	140000				
Phenanthrene	µg/kg	41	31	76	None	72		570.3			460	180000	180000	J	RES-11-424-01	RES-SS-11-424-01
Phenol	µg/kg	40	0	0	None	21.5					307.5	55000				
Pyrene	µg/kg	41	37	90	None	57		44215			550	280000	280000	J	RES-11-424-01	RES-SS-11-424-01
Total PAH	µg/kg	37	34	92	Lnrm	120			3968	7.80	3568	1600000	1600000		RES-11-424-01	RES-SS-11-424-01
PCB as Aroclors																
Aroclor, Total	µg/kg	38	15	39	None	30					55	859.2	859.2	J	LPX-FP-4004	LPX-FP-4004-0000-01
Aroclor-1016	µg/kg	41	0	0	None	5.04					23	100				
Aroclor-1221	µg/kg	41	0	0	None	5.04					46.5	205				
Aroclor-1232	µg/kg	41	0	0	None	5.04					23	100				
Aroclor-1242	µg/kg	41	1	2	None	5.04					23	140	140		RES-11-328-01	RES-SS-11-328-01
Aroclor-1248	µg/kg	41	0	0	None	5.04					23	100				
Aroclor-1254	µg/kg	41	18	44	None	5.06					40	938.1	938.1		LPX-4112	LPX-SS-4112-0005-01
Aroclor-1260	µg/kg	41	2	5	None	5.04					23	140	140		RES-10-044-01	RES-SS-10-044-01
Aroclor-1268	µg/kg	8	4	50	None	5.04					13.99	113.1	113.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
PCB Congeners																
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	ng/kg	2	2	100	None	1109.67		647.5			1567	2025	2025		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (194)	ng/kg	2	2	100	None	382.64		167.5			501.1	619.6	619.6	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl	ng/kg	2	2	100	None	70.63		51.27			106.9	143.1	143.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,4',5,6-Octachlorobiphenyl (195)	ng/kg	2	2	100	None	175.79		202.4			318.9	462.1	462.1	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (196)	ng/kg	2	2	100	None	218.88		72.61			270.2	321.6	321.6	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,4',5-Heptachlorobiphenyl (170)	ng/kg	2	2	100	None	1815.1		164.2			1931	2047	2047	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,4',6,6'-Octachlorobiphenyl (197)	ng/kg	2	1	50	None	11.27					51.08	90.88	11.27	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,4',6-Heptachlorobiphenyl (171)	ng/kg	2	2	100	None	494.2		18.47			507.26	520.32	520.32	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,4'-Hexachlorobiphenyl (128)	ng/kg	2	2	100	None	989.34		961.7			1669	2349	2349	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,5,5',6-Octachlorobiphenyl (198)	ng/kg	2	2	100	None	1261.22		25.14			1279	1296.78	1296.78	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,5,5'-Heptachlorobiphenyl (172)	ng/kg	2	2	100	None	174.75		17.13			186.865	198.98	198.98	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (200)	ng/kg	2	2	100	None	82.11		78.05			137.3	192.49	192.49	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (201)	ng/kg	2	2	100	None	69.95		5.40			73.765	77.58	77.58	J	LPX-FP-4004	LPX-FP-4004-0000-01

Table C-3. Lyman Mill Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,2',3,3',4,5,6'-Heptachlorobiphenyl (174)	ng/kg	2	2	100	None	1409.23		614.7			1843.9	2278.5	2278.5	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,5',6-Heptachlorobiphenyl (175)	ng/kg	2	2	100	None	32.72		1.07			33.48	34.24	34.24	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,5',6'-Heptachlorobiphenyl (177)	ng/kg	2	2	100	None	810.2		228.2			971.54	1133	1133	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',4,5-Hexachlorobiphenyl (129)	ng/kg	2	2	100	None	4615.4		4510			7805	10994	10994	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,5'-Hexachlorobiphenyl (130)	ng/kg	2	2	100	None	318.42		341.8			560.1	801.81	801.81	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,6,6'-Heptachlorobiphenyl (176)	ng/kg	2	1	50	None	90.88					111.015	131.15	131.15	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,6-Hexachlorobiphenyl (131)	ng/kg	2	2	100	None	53.2		45.88			85.65	118.09	118.09	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4,6'-Hexachlorobiphenyl (132)	ng/kg	2	2	100	None	2063.64		1157			2882	3699	3699	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',4-Pentachlorobiphenyl (82)	ng/kg	2	2	100	None	350.37		337.5			589.025	827.68	827.68	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',5,5',6-Heptachlorobiphenyl (178)	ng/kg	2	2	100	None	209.39		32.80			232.6	255.77	255.77	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',5,6-Hexachlorobiphenyl (134)	ng/kg	2	2	100	None	283.54		160.9			397.3	511.12	511.12	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',5,6'-Hexachlorobiphenyl (135)	ng/kg	2	2	100	None	1564.23		202.5			1707	1851	1851	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',5-Pentachlorobiphenyl (83)	ng/kg	2	2	100	None	992.28		1852			2302	3611	3611	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3',6,6'-Hexachlorobiphenyl (136)	ng/kg	2	2	100	None	819.79		4.03			822.6	825.49	825.49	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,3',6-Pentachlorobiphenyl (84)	ng/kg	2	2	100	None	635.53		503.8			991.8	1348	1348	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,3'-Tetrachlorobiphenyl (40)	ng/kg	2	2	100	None	173.22		290.5			378.66	584.1	584.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,4',5,5',6-Octachlorobiphenyl (203)	ng/kg	2	2	100	None	348.5		87.77			410.56	472.62	472.62	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)	ng/kg	2	2	100	None	1775.94		27.78			1796	1815	1815	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,4,4',5,6'-Heptachlorobiphenyl (182)	ng/kg	2	1	50	None	6.52					48.7	90.88	6.52	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,4',5',6-Heptachlorobiphenyl (183)	ng/kg	2	2	100	None	420.19		30.90			442.04	463.89	463.89	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,4,4',5-Hexachlorobiphenyl (137)	ng/kg	2	2	100	None	576.62		472.5			910.7	1244.78	1244.78	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,4',6,6'-Heptachlorobiphenyl (184)	ng/kg	2	0	0	None	77.455					84.2	90.88				
2,2',3,4,4'-Pentachlorobiphenyl (85)	ng/kg	2	2	100	None	436.05		855.5			1041	1646	1646	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,5,5',6-Heptachlorobiphenyl (185)	ng/kg	2	1	50	None	90.88					95.93	100.98	100.98	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4',5,5',6-Heptachlorobiphenyl (187)	ng/kg	2	2	100	None	981.43		121.5			1067	1153	1153	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,2',3,4,5,5'-Hexachlorobiphenyl (141)	ng/kg	2	2	100	None	619.49		489.4			965.6	1312	1312	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4',5,5'-Hexachlorobiphenyl (146)	ng/kg	2	2	100	None	229.86		340.7			470.7	711.6	711.6	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,5',6-Hexachlorobiphenyl (144)	ng/kg	2	1	50	None	45.44					140.0	234.5	234.5		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4',5,6-Hexachlorobiphenyl (147)	ng/kg	2	2	100	None	3861.88		1252			4747	5633	5633	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,5-Pentachlorobiphenyl (86)	ng/kg	2	2	100	None	866.82		3351			3236	5606	5606	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4',5-Pentachlorobiphenyl (90)	ng/kg	2	2	100	None	1904.88		3915			4673	7441	7441	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,6-Pentachlorobiphenyl (88)	ng/kg	2	2	100	None	375.16		379.6			643.6	911.9	911.9	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4,6'-Pentachlorobiphenyl (89)	ng/kg	2	2	100	None	11.12		14.81			21.60	32.07	32.07	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,4'-Tetrachlorobiphenyl (42)	ng/kg	2	2	100	None	88.74		205.8			234.3	379.8	379.8		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,5,5'-Pentachlorobiphenyl (92)	ng/kg	2	2	100	None	385.4		656.3			849.5	1314	1314		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,5,6-Pentachlorobiphenyl (93)	ng/kg	2	2	100	None	1261.77		2642			3130	4998	4998	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,5-Tetrachlorobiphenyl (43)	ng/kg	2	2	100	None	600.03		1849			1907	3215	3215	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,5'-Tetrachlorobiphenyl (44)	ng/kg	2	2	100	None	358.65		919.0			1008	1658	1658	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,6-Tetrachlorobiphenyl (45)	ng/kg	2	1	50	None	18.175					92.64	167.1	167.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3,6'-Tetrachlorobiphenyl (46)	ng/kg	2	2	100	None	17.44		21.55			32.68	47.92	47.92	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',3'-Trichlorobiphenyl (16)	ng/kg	2	1	50	None	9.09					172.63	336.17	336.17		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',4,4',5,5'-Hexachlorobiphenyl (153)	ng/kg	2	2	100	None	1490.58		2146			3008.05	4525.52	4525.52	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',4,5-Tetrachlorobiphenyl (48)	ng/kg	2	2	100	None	40.88		122.2			127.3	213.7	213.7		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',4,5'-Tetrachlorobiphenyl (49)	ng/kg	2	2	100	None	203.72		755.7			738.1	1273	1273	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',4,6-Tetrachlorobiphenyl (50)	ng/kg	2	2	100	None	41.78		53.97			79.94	118.1	118.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',4-Trichlorobiphenyl (17)	ng/kg	2	1	50	None	18.175					159.2	300.2	300.2		LPX-FP-4004	LPX-FP-4004-0000-01
2,2',5-Trichlorobiphenyl (18)	ng/kg	2	1	50	None	45.44					364.3	683.2	683.2	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,2',6-Trichlorobiphenyl (19)	ng/kg	2	1	50	None	9.09					41.73	74.36	74.36		LPX-FP-4004	LPX-FP-4004-0000-01
2,2'-Dichlorobiphenyl (4)	ng/kg	2	2	100	None	33.31		114.3			114.1	194.9	194.9	J	LPX-FP-4004	LPX-FP-4004-0000-01

Table C-3. Lyman Mill Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,3,3',4,4',5,5',6-Octachlorobiphenyl (205)	ng/kg	2	2	100	None	24.01		4.59			27.26	30.5	30.5	J	LPX-FP-4007	LPX-FP-4007-0000-01
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	ng/kg	2	2	100	None	32.83		9.19			39.33	45.82	45.82	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,4',5,6-Heptachlorobiphenyl (190)	ng/kg	2	2	100	None	244.09		30.18			265.43	286.8	286.8	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,4',5',6-Heptachlorobiphenyl (191)	ng/kg	2	2	100	None	32.69		3.13			34.9	37.11	37.11	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,4',5-Hexachlorobiphenyl (156)	ng/kg	2	2	100	None	369.06		503.0			724.7	1080	1080	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,4',6-Hexachlorobiphenyl (158)	ng/kg	2	2	100	None	338.5		429.7			642.3	946.1	946.1	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,4'-Pentachlorobiphenyl (105)	ng/kg	2	2	100	None	859.53		1476			1903	2947	2947	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4,5-Pentachlorobiphenyl (106)	ng/kg	2	2	100	None	183.9		352.7			433.3	682.7	682.7	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4',5'-Pentachlorobiphenyl (108)	ng/kg	2	2	100	None	80.76		190.8			215.7	350.7	350.7	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4',6-Pentachlorobiphenyl (110)	ng/kg	2	2	100	None	3941.7		3740			6586	9231	9231	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',4'-Tetrachlorobiphenyl (56)	ng/kg	2	2	100	None	256.79		519.0			623.8	990.7	990.7		LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3',6-Tetrachlorobiphenyl (59)	ng/kg	2	2	100	None	31.53		61.39			74.94	118.35	118.35	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,3'-Trichlorobiphenyl (20)	ng/kg	2	1	50	None	45.44					1247	2449	2449	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	ng/kg	2	2	100	None	152.92		152.6			260.8	368.7	368.7	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4,4',5-Pentachlorobiphenyl (114)	ng/kg	2	2	100	None	42.08		88.16			104.4	166.8	166.8	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3',4,4',5-Pentachlorobiphenyl (118)	ng/kg	2	2	100	None	2475.66		4498			5656	8837	8837	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4,4'-Tetrachlorobiphenyl (60)	ng/kg	2	2	100	None	123.77		250.9			301.2	478.6	478.6		LPX-FP-4004	LPX-FP-4004-0000-01
2,3',4,4'-Tetrachlorobiphenyl (66)	ng/kg	2	2	100	None	506.68		1375			1479	2452	2452	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4,5-Tetrachlorobiphenyl (61)	ng/kg	2	2	100	None	1005.72		2839			3013	5021	5021	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4',5-Tetrachlorobiphenyl (63)	ng/kg	2	2	100	None	11.1		33.69			34.93	58.75	58.75	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4',6-Tetrachlorobiphenyl (64)	ng/kg	2	2	100	None	185.91		417.4			481.0	776.2	776.2		LPX-FP-4004	LPX-FP-4004-0000-01
2,3,4'-Trichlorobiphenyl (22)	ng/kg	2	1	50	None	18.175					299.7	581.3	581.3		LPX-FP-4004	LPX-FP-4004-0000-01
2,3',4-Trichlorobiphenyl (25)	ng/kg	2	1	50	None	18.175					58.32	98.46	98.46		LPX-FP-4004	LPX-FP-4004-0000-01
2,3',5-Trichlorobiphenyl (26)	ng/kg	2	1	50	None	18.175					127.2	236.3	236.3	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3,6-Trichlorobiphenyl (24)	ng/kg	2	1	50	None	18.175					41.24	64.3	64.3	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,3-Dichlorobiphenyl (5)	ng/kg	2	1	50	None	4.545					13.47	22.4	22.4		LPX-FP-4004	LPX-FP-4004-0000-01
2,3'-Dichlorobiphenyl (6)	ng/kg	2	1	50	None	4.545					94.28	184.02	184.02	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,4',5-Trichlorobiphenyl (31)	ng/kg	2	1	50	None	45.44					730.4	1415.3	1415.3		LPX-FP-4004	LPX-FP-4004-0000-01
2,4',6-Trichlorobiphenyl (32)	ng/kg	2	1	50	None	18.175					114.7	211.2	211.2		LPX-FP-4004	LPX-FP-4004-0000-01
2,4-Dichlorobiphenyl (7)	ng/kg	2	1	50	None	4.545					21.75	38.96	38.96		LPX-FP-4004	LPX-FP-4004-0000-01
2,4'-Dichlorobiphenyl (8)	ng/kg	2	2	100	None	106.12		542.2			489.5	872.9	872.9	J	LPX-FP-4004	LPX-FP-4004-0000-01
2,5-Dichlorobiphenyl (9)	ng/kg	2	1	50	None	4.545					29.35	54.15	54.15		LPX-FP-4004	LPX-FP-4004-0000-01
2,6-Dichlorobiphenyl (10)	ng/kg	2	1	50	None	4.545					7.96	11.38	11.38		LPX-FP-4004	LPX-FP-4004-0000-01
2-Monochlorobiphenyl (1)	ng/kg	2	2	100	None	56.02		41.20			85.15	114.28	114.3		LPX-FP-4004	LPX-FP-4004-0000-01
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	ng/kg	2	1	50	None	8.47					26.96	45.44	8.47	J	LPX-FP-4004	LPX-FP-4004-0000-01
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	2	2	100	None	42.61		4.98			46.13	49.65	49.65	J	LPX-FP-4007	LPX-FP-4007-0000-01
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	2	2	100	None	130.09		200.0			271.5	412.88	412.88	J	LPX-FP-4004	LPX-FP-4004-0000-01
3,4,4',5-Tetrachlorobiphenyl (81)	ng/kg	2	0	0	None	38.73					42.09	45.44				
3,4-Dichlorobiphenyl (12)	ng/kg	2	1	50	None	9.09					93.19	177.28	177.28	J	LPX-FP-4004	LPX-FP-4004-0000-01
4-Chlorobiphenyl (3)	ng/kg	2	1	50	None	18.175					170.6	323.1	323.1		LPX-FP-4004	LPX-FP-4004-0000-01
Decachlorobiphenyl (209)	ng/kg	2	2	100	None	1252.53		547.1			1639	2026	2026	J	LPX-FP-4004	LPX-FP-4004-0000-01
Pcb Congeners, Total	ng/kg	2	2	100	None	53135		53834			91201	129268	129268	J	LPX-FP-4004	LPX-FP-4004-0000-01
TEQ (PCB)	ng/kg	2	2	100	None	5.52		0.481			5.86	6.2	6.2		LPX-FP-4004	LPX-FP-4004-0000-01

Table C-3. Lyman Mill Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
4,4'-DDD	µg/kg	41	13	32	None	0.044					2.55	38	38		RES-11-328-01	RES-SS-11-328-01
4,4'-DDE	µg/kg	41	24	59	None	1.75		5.60			5.2	1000	1000		RES-12-556-01	RES-SS-12-556-01
4,4'-DDT	µg/kg	41	24	59	None	1.85		5.39			5.3	1300	1300		RES-12-556-01	RES-SS-12-556-01
Aldrin	µg/kg	41	1	2	None	0.028					1.2	5	3.4	P	RES-11-012-01	RES-SS-11-012-01
alpha-BHC	µg/kg	41	0	0	None	0.024					1.2	5				
alpha-Chlordane	µg/kg	42	24	57	None	0.9		6.10			3.17	114.1	114.1		LPX-4112	LPX-DU-112202B-01
beta-BHC	µg/kg	41	0	0	None	0.050					1.2	5				
delta-BHC	µg/kg	41	0	0	None	0.040					1.2	5				
Dieldrin	µg/kg	41	8	20	None	0.745					2.5	15	15		RES-11-328-01	RES-SS-11-328-01
Endosulfan I	µg/kg	41	0	0	None	0.046					1.2	5				
Endosulfan II	µg/kg	41	6	15	None	0.57					2.36	31.98	31.98		LPX-4113	LPX-SS-4113-0005-01
Endosulfan Sulfate	µg/kg	41	7	17	None	0.047					2.35	18	18		RES-11-424-01	RES-SS-11-424-01
Endrin	µg/kg	41	0	0	None	0.039					2.3	10				
Endrin Aldehyde	µg/kg	41	0	0	None	0.065					2.3	10				
Endrin Ketone	µg/kg	41	4	10	None	0.043					2.35	62	62		RES-10-075-01	RES-SS-10-075-01
gamma-BHC	µg/kg	41	0	0	None	0.029					1.2	5				
gamma-Chlordane	µg/kg	42	16	38	None	0.035					2.03	94.45	94.45		LPX-4112	LPX-DU-112202B-01
Heptachlor	µg/kg	41	3	7	None	0.037					1.25	5	3.44		LPX-4112	LPX-DU-112202B-01
Heptachlor Epoxide	µg/kg	41	9	22	None	0.39					1.3	26	26		RES-11-012-01	RES-SS-11-012-01
Methoxychlor	µg/kg	41	0	0	None	0.050					12	50				
Technical Chlordane	µg/kg	8	8	100	Norm	79.63	543.0	388.3	386.8	2.75	481.9	1217	1217		LPX-4112	LPX-DU-112202B-01
Toxaphene	µg/kg	41	0	0	None	10.1					120	500				
Ancillary																
Percent Clay	pct	7	7	100	Norm	0	5.64	3.52			5	10	10		LPX-FP-4004	LPX-FP-4004-0000-01
													10		LPX-FP-4007	LPX-FP-4007-0000-01
Percent Fines (silt + clay)	pct	7	7	100	Norm	2.3	34.57	20.58			31.07	70.69	70.69		LPX-FP-4007	LPX-FP-4007-0000-01
Percent Gravel	pct	7	7	100	Norm	0	18.32	15.83			16.84	46.66	46.66		LPX-FP-4006	LPX-FP-4006-0000-01
Percent Moisture	pct	3	3	100	None	35.3		4.59			35.6	43.4	43.4		LPX-FP-4007	LPX-FP-4007-0000-01
Percent Sand	pct	7	7	100	None	29.31		8.69			51.05	54.36	54.36		LPX-4112	LPX-DU-112202B-01
Percent Silt	pct	7	7	100	Norm	2.3	28.93	17.37			26.08	60.69	60.69		LPX-FP-4007	LPX-FP-4007-0000-01
Percent Solids	pct	7	7	100	Lnrm	56.6			72.11	1.17	74.7	83.4	83.4		LPX-4112	LPX-SS-4112-0005-01
Total Organic Carbon	pct	7	7	100	Lnrm	0.88			3.27	2.14	4.36	7.13	7.13		LPX-FP-4006	LPX-FP-4006-0000-01
Water Content	pct	3	3	100	None	57		19.22			71	95	95		LPX-FP-4006	LPX-FP-4006-0000-01

Table C-4. Source Area Groundwater Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	43	5	12	None	0.405					4.47	10.2	10.2	EMPC	MW01S	CM-GW-MW01-01
1,2,3,4,6,7,8-HpCDF	pg/L	43	3	7	None	0.225					3.85	3.97	3.4	EMPC	MW04S	CMS-GW-DUP1-02
1,2,3,4,7,8,9-HpCDF	pg/L	43	2	5	None	0.28					5.5	5.65	3.6	EMPC	MW07D	CMS-GW-MW07D-02
1,2,3,4,7,8-HxCDD	pg/L	43	4	9	None	0.42					7.35	7.6	5.8	EMPC	MW04S	CMS-GW-DUP1-02
1,2,3,4,7,8-HxCDF	pg/L	43	7	16	None	0.3					5.8	6	3.4	EMPC	MW13D	CMS-GW-MW13D-02
1,2,3,6,7,8-HxCDD	pg/L	43	4	9	None	0.45					5	6.6	6.6	EMPC	MW04S	CMS-GW-DUP1-02
1,2,3,6,7,8-HxCDF	pg/L	43	4	9	None	0.305					3	4.4	4.4	J	MW07D	CMS-GW-MW07D-02
1,2,3,7,8,9-HxCDD	pg/L	43	4	9	None	0.4					9.8	10.1	5.1	J	MW04S	CMS-GW-DUP1-02
1,2,3,7,8,9-HxCDF	pg/L	43	5	12	None	0.32					5.75	5.95	5.1	EMPC	MW07D	CMS-GW-MW07D-02
1,2,3,7,8-PeCDD	pg/L	43	5	12	None	0.445					3.35	202	202		MW05S	CMS-GW-MW05S-02
1,2,3,7,8-PeCDF	pg/L	43	5	12	None	0.55					2.67	3.9	3.9	J	MW04S	CMS-GW-DUP1-02
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	1	1	100	None	270					270	270	270	J	MW05S	CMS-GW-MW05S-02
2,3,4,6,7,8-HxCDF	pg/L	43	5	12	None	0.3					9.9	10.2	3.7	J	MW07D	CMS-GW-MW07D-02
2,3,4,7,8-PeCDF	pg/L	43	6	14	None	0.55					13.95	14.4	3.5	J	MW04D	CMS-GW-MW04D-02
2,3,7,8-TCDD	pg/L	43	18	42	None	0.95					3.39	4180	4180	J	MW05S	CMS-GW-MW05S-02
2,3,7,8-TCDF	pg/L	43	4	9	None	0.4					2.8	11.1	11.1	EMPC	GEC6	CMS-GW-GEC6-02
OCDD	pg/L	43	18	42	None	0.23					12	72.4	72.4	J	MW01S	CM-GW-MW01-01
OCDF	pg/L	43	9	21	None	0.53					11.5	32.3	32.3	EMPC	MW13D	CMS-GW-MW13D-02
TEQ	pg/L	35	15	43	None	0.28					7.14	4400	4400	J	MW05S	CMS-GW-MW05S-02
Total HpCDD	pg/L	43	8	19	None	0.405					4.47	10.8	10.8	EMPC	MW02S	CM-GW-MW02-01
Total HpCDF	pg/L	43	8	19	None	0.25					6.4	7.6	7.6	EMPC	MW07D	CMS-GW-MW07D-02
Total HxCDD	pg/L	43	20	47	None	0.42					15.9	45.6	45.6	EMPC	MW04S	CMS-GW-DUP1-02
Total HxCDF	pg/L	43	14	33	None	0.305					17.6	99.2	99.2	J	MW05S	CMS-GW-MW05S-02
Total Penta-dioxins	pg/L	43	16	37	None	0.8					3.74	3940	3940	J	MW05S	CMS-GW-MW05S-02
Total Penta-furans	pg/L	43	11	26	None	0.55					3.67	1140	1140	J	MW05S	CMS-GW-MW05S-02
Total Tetra-dioxins	pg/L	43	28	65	None	0.95		5.39			5.3	4460	4460	J	MW05S	CMS-GW-MW05S-02
Total Tetra-furans	pg/L	43	25	58	None	0.4		3.65			3.95	2710	2710	J	MW05S	CMS-GW-MW05S-02
Metals (total)																
Aluminum	µg/L	41	20	49	None	17.55					59.9	4980	4980		MW12B	CMS-GW-DUP03-02
Antimony	µg/L	41	0	0	None	1.25					1.85	2.45				
Arsenic	µg/L	45	5	11	None	1					1.7	20	20		GEC6	GEC-6
Barium	µg/L	45	37	82	Lnrm	9.7			43.19	2.88	42.1	330	330		GEC5	GEC-5
Beryllium	µg/L	41	1	2	None	0.05					0.135	0.75	0.23		MW02S	CM-GW-MW02-01
Cadmium	µg/L	41	3	7	None	0.2					0.3	0.99	0.99	J	MW03S	CM-GW-MW03-01
Calcium	µg/L	41	41	100	Lnrm	9380			27406	1.746	28600	168000	168000		GEC2	CMS-GW-GEC2-02
Chromium	µg/L	45	12	27	None	0.35					1.7	52.7	52.7		MW08S	CM-GW-MW08-01
Cobalt	µg/L	41	18	44	None	0.35					1.85	35.6	35.6		MW05S	CMS-GW-MW05S-02
Copper	µg/L	41	12	29	None	0.35					3.95	50	50		MW03S	CMS-GW-MW03S-02
Iron	µg/L	41	26	63	None	16.15		4166			3540	68900	68900		MW09S	CM-GW-MW09-01
Lead	µg/L	45	9	20	None	0.65					0.85	70	70		GEC6	GEC-6
Magnesium	µg/L	41	41	100	Norm	764	3418	1596			3640	6860	6860		MW09S	CM-GW-MW09-01
Manganese	µg/L	41	41	100	Lnrm	52.2			576.5	3.73	630	5530	5530		MW09S	CMS-GW-MW09S-02
Mercury	µg/L	41	0	0	None	0.05					0.075	0.2				
Nickel	µg/L	41	16	39	None	0.45					2.5	158	158		MW10D	CMS-GW-MW10D-02
Potassium	µg/L	41	41	100	None	1520		2837			4520	16700	16700	J	GEC2	CMS-GW-GEC2-02

Table C-4. Source Area Groundwater Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Selenium	µg/L	41	0	0	None	1.1					2.2	2.4				
Silver	µg/L	41	4	10	None	0.25					0.4	2	0.92		MW10B	CMS-GW-MW10B-02
Sodium	µg/L	41	41	100	Lnrm	13700			56435	1.99	53000	371000	371000		MW03S	CM-GW-MW03-01
Thallium	µg/L	41	3	7	None	2.8					2.85	8.6	8.6	J	MW09S	CM-GW-MW09-01
Vanadium	µg/L	41	11	27	None	0.35					1.6	38.7	38.7		MW03S	CMS-GW-MW03S-02
Zinc	µg/L	41	9	22	None	0.55					12.95	169	169	J	MW03S	CM-GW-MW03-01
Metals (dissolved)																
Aluminum	µg/L	41	11	27	None	5					22.85	509	509		MW08S	CM-GW-MW08-01F
Antimony	µg/L	41	0	0	None	1.25					2.45	3.35				
Arsenic	µg/L	41	2	5	None	1					1.35	5.8	5.8	J	MW08S	CM-GW-MW08-01F
Barium	µg/L	41	34	83	Lnrm	9.1			37.64	2.65	41.1	171	171		MW02S	CMS-GW-MW02SF-02
Beryllium	µg/L	41	0	0	None	0.05					0.12	0.55				
Cadmium	µg/L	41	4	10	None	0.2					0.3	1	1	J	MW03S	CM-GW-MW03-01F
Calcium	µg/L	41	41	100	Lnrm	8700			27072	1.72	27500	155000	155000		GEC2	CMS-GW-GEC2F-02
Chromium	µg/L	41	9	22	None	0.25					1.15	114	114		MW13B	CMS-GW-MW13BF-02
Cobalt	µg/L	41	12	29	None	0.35					0.9	14.4	14.4		MW02M	CMS-GW-MW02MF-02
Copper	µg/L	41	11	27	None	0.35					3.5	40.1	40.1		MW03S	CMS-GW-MW03SF-02
Iron	µg/L	41	24	59	None	6.55		4907			800	66200	66200		MW09S	CM-GW-MW09-01F
Lead	µg/L	41	3	7	None	0.65					0.75	27.7	27.7		MW03S	CMS-GW-MW03SF-02
Magnesium	µg/L	41	41	100	Norm	861	3303	1552			3360	7090	7090		MW08S	CMS-GW-MW08SF-02
Manganese	µg/L	41	41	100	Lnrm	35.5			556.1	3.85	638	5590	5590		MW09S	CMS-GW-MW09SF-02
Mercury	µg/L	41	0	0	None	0.05					0.095	0.29				
Nickel	µg/L	41	16	39	None	0.55					3.45	152	152		MW10D	CMS-GW-DUP04F-02
Potassium	µg/L	41	41	100	None	1440		2750			4550	15300	15300	J	GEC2	CMS-GW-GEC2F-02
Selenium	µg/L	41	0	0	None	1.1					2.2	2.4				
Silver	µg/L	41	8	20	None	0.25					0.82	2	1.4		MW12D	CMS-GW-MW12DF-02
Sodium	µg/L	41	41	100	Lnrm	12800			55675	1.97	53600	378000	378000		MW03S	CM-GW-MW03-01F
Thallium	µg/L	41	3	7	None	2.8					2.85	6.9	6.9	J	MW09S	CMS-GW-MW09SF-02
Vanadium	µg/L	41	10	24	None	0.35					1.6	36.2	36.2		MW03S	CMS-GW-MW03SF-02
Zinc	µg/L	41	2	5	None	0.55					9.6	174	174	J	MW03S	CM-GW-MW03-01F
Semi-volatile Organic Compounds																
(carbethoxyethylidine)triphenylphosphora	µg/L	1	1	100	None	3					3	3	3	NJ	MW12B	CMS-GW-MW12B-02
1,1'-biphenyl	µg/L	41	0	0	None	5					5	7				
1,2,4,7,8-pentachlorodibenzo-p-dioxin	µg/L	1	1	100	None	4					4	4	4	NJ	MW05S	CMS-GW-MW05S-02
1,2,4-trichlorobenzene	µg/L	76	0	0	None	0.105					5	850				
1,2-dichlorobenzene	µg/L	76	7	9	None	0.055					5	850	21		MW06S	CM-GW-MW06-01
1,3-benzenediol, 4,6-dichloro-	µg/L	1	1	100	None	5					5	5	5	NJ	MW05S	CMS-GW-MW05S-02
1,3-dichlorobenzene	µg/L	76	1	1	None	0.055					5	850	0.27	J	GEC7	CMS-GW-GEC7-03
1,4-dichlorobenzene	µg/L	76	5	7	None	0.06					5	850	6.2	J	MW06S	CMS-DU-102302A-03
1-decene	µg/L	1	1	100	None	3					3	3	3	NJ	MW13D	CMS-GW-MW13D-02
1-methylnaphthalene	µg/L	7	4	57	Lnrm	0.06			0.15		0.15	0.47	0.47		GEC3	GEC-3
1-naphthalenol, 2-methyl-	µg/L	1	1	100	None	5					5	5	5	NJ	MW05S	CMS-GW-MW05S-02
1-propene, 1,1,2-trichloro-	µg/L	3	3	100	None	3		2.65			4	8	8	NJ	MW09S	CMS-GW-MW09S-02
2,2'-methylenebis[3,4,6-trichlorophenol]	µg/L	1	1	100	None	0.7					0.7	0.7	0.7	NJ	MW05S	CMS-GW-MW05S-02
2,2'-oxybis(1-chloropropane)	µg/L	41	0	0	None	5					5	7				
2,4,5-trichlorophenol	µg/L	41	0	0	None	12.5					12.5	18				
2,4,6-trichlorophenol	µg/L	41	2	5	None	2					5	2900	2900	*	MW05S	CMS-GW-MW05S-02
2,4-dichlorophenol	µg/L	41	1	2	None	5					5	60	60		MW05S	CMS-GW-MW05S-02
2,4-dimethylphenol	µg/L	41	0	0	None	5					5	7				

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2,4-dinitrophenol	µg/L	41	0	0	None	12.5					12.5	18				
2,4-dinitrotoluene	µg/L	41	0	0	None	5					5	7				
2,5-cyclohexadiene-1,4-dione, 2,6-bis(1,	µg/L	2	2	100	None	3		0			3	3	3	NJ	GEC2	CMS-GW-GEC2-02
													3	NJ	MW06S	CMS-GW-MW06S-02
2,6-dinitrotoluene	µg/L	41	0	0	None	5					5	7				
2-chloronaphthalene	µg/L	41	0	0	None	5					5	7				
2-chlorophenol	µg/L	41	0	0	None	5					5	7				
2-imidazolidinone	µg/L	2	2	100	None	2		1.41			3	4	4	NJ	MW08S	CMS-GW-MW08S-02
2-methylnaphthalene	µg/L	48	3	6	None	0.06					5	7	0.6		GEC3	GEC-3
2-methylphenol	µg/L	41	0	0	None	5					5	7				
2-nitroaniline	µg/L	41	0	0	None	12.5					12.5	18				
2-nitrophenol	µg/L	41	0	0	None	5					5	7				
3,3'-dichlorobenzidine	µg/L	41	0	0	None	5					5	7				
3-nitroaniline	µg/L	41	0	0	None	12.5					12.5	18				
4,6-dinitro-2-methylphenol	µg/L	41	0	0	None	12.5					12.5	18				
4-bromophenyl-phenylether	µg/L	41	0	0	None	5					5	7				
4-chloro-3-methylphenol	µg/L	41	0	0	None	5					5	7				
4-chloroaniline	µg/L	41	0	0	None	5					5	7				
4-chlorophenyl-phenylether	µg/L	41	0	0	None	5					5	7				
4-heptanone, 2,6-dimethyl-	µg/L	1	1	100	None	33					33	33	33	NJ	MW05S	CMS-GW-MW05S-02
4-methylphenol	µg/L	41	3	7	None	1					5	7	3	J	MW08S	CM-GW-MW08-01
4-nitroaniline	µg/L	41	0	0	None	12.5					12.5	18				
4-nitrophenol	µg/L	41	0	0	None	12.5					12.5	18				
Acenaphthene	µg/L	48	2	4	None	0.06					5	7	0.91		GEC3	GEC-3
Acenaphthylene	µg/L	48	2	4	None	0.06					5	7	0.55		GEC3	GEC-3
Acetophenone	µg/L	41	0	0	None	5					5	7				
Anthracene	µg/L	48	3	6	None	0.06					5	7	1.7		GEC3	GEC-3
Atrazine	µg/L	41	0	0	None	5					5	7				
Benzaldehyde	µg/L	41	0	0	None	5					5	7				
Benzenamine, 2-chloro-5-(trifluoromethyl	µg/L	2	2	100	None	4		47.38			37.5	71	71	NJ	MW05S	CMS-GW-MW05S-02
Benzenamine, 2-methyl-	µg/L	1	1	100	None	5					5	5	5	NJ	MW06S	CMS-GW-MW06S-02
Benzenamine, 3,3'-sulfonylbis-	µg/L	5	5	100	Lnrm	10			79.80	7.48	87	690	690	NJ_2	MW02S	CMS-GW-MW02S-02
Benzenamine, N,n-diethyl-	µg/L	1	1	100	None	5					5	5	5	NJ	MW06S	CM-GW-MW06-01
Benzenamine, N,n-diethyl-4-methyl-	µg/L	1	1	100	None	3					3	3	3	NJ	MW06S	CM-GW-MW06-01
Benzene, 1,2,3-trimethyl-_total	µg/L	3	3	100	None	3		18.73			12	39	39	NJ_2	MW08S	CM-GW-MW08-01
Benzene, 1,2,4-trichloro-5-methoxy-	µg/L	1	1	100	None	6					6	6	6	NJ	MW05S	CMS-GW-MW05S-02
Benzene, 1-ethyl-2-methyl-_total	µg/L	2	2	100	None	4		4.24			7	10	10	NJ_2	MW05S	CMS-GW-MW05S-02
Benzene, 1-ethyl-3-methyl-	µg/L	1	1	100	None	10					10	10	10	NJ	MW08S	CM-GW-MW08-01
Benzene, 1-ethyl-4-methyl-	µg/L	2	2	100	None	3		13.44			12.5	22	22	NJ	MW08S	CM-GW-MW08-01
Benzene, Dichlorodimethoxy-	µg/L	1	1	100	None	32					32	32	32	NJ	MW05S	CMS-GW-MW05S-02
Benzeneacetic Acid	µg/L	1	1	100	None	28					28	28	28	NJ	MW08S	CM-GW-MW08-01
Benzenebutanoic Acid	µg/L	1	1	100	None	8					8	8	8	NJ	MW08S	CM-GW-MW08-01
Benzenemethanol, 2-methyl-	µg/L	1	1	100	None	7					7	7	7	NJ	MW05S	CMS-GW-MW05S-02
Benzenesulfonamide, 2-methyl-	µg/L	1	1	100	None	3					3	3	3	NJ	MW06S	CMS-GW-MW06S-02
Benzenesulfonamide, 4-methyl-	µg/L	2	1	50	None	1					2.5	4	4	NJ	MW09S	CMS-GW-MW09S-02

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Benzo(a)anthracene	µg/L	48	5	10	None	0.06					5	7	3.7		GEC3	GEC-3
Benzo(a)pyrene	µg/L	41	0	0	None	5					5	7				
Benzo(a,e)pyrene	µg/L	7	5	71	Lnrm	0.06			0.219	2.34	0.18	3.1	3.1		GEC3	GEC-3
Benzo(b)fluoranthene	µg/L	48	5	10	None	0.06					5	7	2.5		GEC3	GEC-3
Benzo(g,h,i)perylene	µg/L	48	3	6	None	0.06					5	7	1.8		GEC3	GEC-3
Benzo(k)fluoranthene	µg/L	48	5	10	None	0.06					5	7	2.9		GEC3	GEC-3
Benzoic Acid, 3,5-dimethyl-	µg/L	1	1	100	None	6					6	6	6	NJ	MW08S	CM-GW-MW08-01
Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimet	µg/L	1	1	100	None	9					9	9	9	NJ	MW08S	CMS-GW-MW08S-02
Bis(2-chloroethoxy)methane	µg/L	41	0	0	None	5					5	7				
Bis(2-chloroethyl)ether	µg/L	41	0	0	None	5					5	7				
Bis(2-ethylhexyl)phthalate	µg/L	41	7	17	None	1					5	31	31		MW13D	CMS-GW-MW13D-02
Butylbenzylphthalate	µg/L	41	0	0	None	5					5	7				
C3-benzene Isomer	µg/L	2	2	100	None	3		2.12			4.5	6	6	J	MW08S	CM-GW-MW08-01
C4-benzene Isomer	µg/L	1	1	100	None	3					3	3	3	J	MW06S	CM-GW-MW06-01
Caprolactam	µg/L	41	1	2	None	5					5	490	490	*	MW10B	CMS-GW-MW10B-02
Carbazole	µg/L	41	0	0	None	5					5	7				
Chrysene	µg/L	48	5	10	None	0.06					5	7	3.9		GEC3	GEC-3
Cyclohexanone	µg/L	1	1	100	None	4					4	4	4	NJ	MW09S	CM-GW-MW09-01
Cyclopropanenonanoic Acid, 2-[(2-butylcy	µg/L	1	1	100	None	2					2	2	2	NJ	MW01S	CM-GW-MW01-01
Dibenzo(a,h)anthracene	µg/L	48	1	2	None	0.06					5	7	0.47		GEC3	GEC-3
Dibenzo[b,e][1,4]dioxin, 1,2,3,4-tetrach	µg/L	1	1	100	None	31					31	31	31	NJ	MW05S	CMS-GW-MW05S-02
Dibenzofuran	µg/L	41	0	0	None	5					5	7				
Diethylphthalate	µg/L	41	0	0	None	5					5	7				
Dimethylphthalate	µg/L	41	0	0	None	5					5	7				
Di-n-butylphthalate	µg/L	41	0	0	None	5					5	7				
Di-n-octylphthalate	µg/L	41	0	0	None	5					5	7				
Ethanol, 2-(2-butoxyethoxy)-	µg/L	1	1	100	None	6					6	6	6	NJ	MW06S	CM-GW-MW06-01
Fluoranthene	µg/L	48	6	13	None	0.06					5	10	10		GEC3	GEC-3
Fluorene	µg/L	48	3	6	None	0.06					5	7	1.2		GEC3	GEC-3
Hexachlorobenzene	µg/L	41	0	0	None	5					5	7				
Hexachlorobutadiene	µg/L	76	0	0	None	0.36					5	360				
Hexachlorocyclopentadiene	µg/L	41	0	0	None	5					5	7				
Hexachloroethane	µg/L	41	0	0	None	5					5	7				
Hexanedioic Acid, Bis(2-ethylhexyl) Este	µg/L	1	1	100	None	10					10	10	10	NJ	MW01S	CMS-GW-DUP02-02
Indeno(1,2,3-cd)pyrene	µg/L	48	3	6	None	0.06					5	7	2		GEC3	GEC-3
Isophorone	µg/L	41	0	0	None	5					5	7				
Lycopodan-5-one, 12-hydroxy-15-methyl-,	µg/L	1	1	100	None	5					5	5	5	NJ	MW06S	CM-GW-MW06-01
Naphthalene	µg/L	83	6	7	None	0.06					5	155	11		MW05S	CMS-GW-MW05S-02
Nitrobenzene	µg/L	41	0	0	None	5					5	7				
N-nitroso-di-n-propylamine	µg/L	41	0	0	None	5					5	7				
N-nitroso-diphenylamine	µg/L	41	0	0	None	5					5	7				
O-hydroxybiphenyl	µg/L	1	1	100	None	3					3	3	3	NJ	MW08S	CMS-GW-MW08S-02

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Parachlorophenol	µg/L	1	1	100	None	9					9	9	9	NJ	MW05S	CMS-GW-MW05S-02
Pentachlorophenol	µg/L	41	0	0	None	12.5					12.5	18				
Phenanthrene	µg/L	48	7	15	None	0.06					5	7.4	7.4		GEC3	GEC-3
Phenol	µg/L	41	0	0	None	5					5	7				
Phenol, 2-[1-(4-hydroxyphenyl)-1-methyle	µg/L	1	1	100	None	8					8	8	8	NJ	MW06S	CM-GW-MW06-01
Phenol, 3,4-dichloro-	µg/L	1	1	100	None	31					31	31	31	NJ	MW05S	CMS-GW-MW05S-02
Phenol, 4-(1,1,3,3-tetramethylbutyl)-	µg/L	1	1	100	None	67					67	67	67	NJ	MW06S	CM-GW-MW06-01
Phenol, 4-(1,1-dimethylpropyl)-	µg/L	1	1	100	None	3					3	3	3	NJ	MW06S	CM-GW-MW06-01
Phenol, 4-(2,2,3,3-tetramethylbutyl)-	µg/L	1	1	100	None	8					8	8	8	NJ	MW08S	CM-GW-MW08-01
Phenol, 4-(2,2,4-trimethylpentyl)-	µg/L	2	2	100	None	3		3.54			5.5	8	8	NJ	MW08S	CMS-GW-MW08S-02
Phenol, 4,4'-(1-methylethylidene)bis-	µg/L	2	2	100	None	12		39.60			40	68	68	NJ	MW06S	CM-GW-MW06-01
Phenol, M-tert-butyl-	µg/L	1	1	100	None	5					5	5	5	NJ	MW06S	CMS-GW-MW06S-02
Phenol, Nonyl-	µg/L	1	1	100	None	60					60	60	60	NJ	MW06S	CM-GW-MW06-01
Phenol, P-tert-butyl-	µg/L	1	1	100	None	6					6	6	6	NJ	MW08S	CMS-GW-MW08S-02
Phenylbutazone	µg/L	2	2	100	None	9		0.707			9.5	10	10	NJ	MW06S	CM-GW-MW06-01
Phthalic Anhydride	µg/L	1	1	100	None	22					22	22	22	NJ	MW08S	CM-GW-MW08-01
Propanoic Acid, 2-methyl-, 2,2-dimethyl-	µg/L	1	1	100	None	2					2	2	2	JN	MW13S	CMS-GW-MW13S-02
Propanoic Acid, 2-methyl-, 3-hydroxy-2,4	µg/L	1	1	100	None	3					3	3	3	JN	MW13S	CMS-GW-MW13S-02
Pyrene	µg/L	48	6	13	None	0.06					5	8	8		GEC3	GEC-3
Substituted Phenol_total	µg/L	1	1	100	None	35					35	35	35	J_2	MW06S	CMS-GW-MW06S-02
Sulfur, Mol. (s8)	µg/L	1	1	100	None	4					4	4	4	NJ	MW08S	CMS-GW-MW08S-02
Trichloropropene	µg/L	3	3	100	None	2		0.577			3	3	3	J	MW01S	CMS-GW-MW01S-02
													3	J	MW07S	CMS-GW-MW07S-02
Trifluralin	µg/L	1	1	100	None	41					41	41	41	NJ	MW05S	CMS-GW-MW05S-02
Unknown Alcohol	µg/L	1	1	100	None	14					14	14	14	J	MW04S	CMS-GW-MW04S-02
Unknown Alkyl Phenol	µg/L	1	1	100	None	3					3	3	3	J	GEC2	CMS-GW-GEC2-02
Unknown Amide	µg/L	1	1	100	None	5					5	5	5	J	MW01S	CM-GW-DUP01-01
Unknown Phthalate	µg/L	1	1	100	None	9					9	9	9	J	MW07S	CM-GW-MW07-01
Unknown Siloxane_total	µg/L	2	2	100	None	32		9.19			38.5	45	45	J_7	MW08S	CM-GW-MW08-01
Vanillin	µg/L	1	1	100	None	2					2	2	2	J	MW10B	CMS-GW-MW10B-02
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/L	35	0	0	None	0.085					0.085	85				
1,1,1-trichloroethane	µg/L	76	0	0	None	0.135					5	850				
1,1,2,2-tetrachloroethane	µg/L	76	1	1	None	0.145					5	850	4	J	MW07S	CMS-GW-MW07S-02
1,1,2-trichloro-1,2,2-trifluoroethane	µg/L	41	0	0	None	5					5	850				
1,1,2-trichloroethane	µg/L	76	0	0	None	0.065					5	850				
1,1-dichloroethane	µg/L	76	0	0	None	0.11					5	850				
1,1-dichloroethene	µg/L	76	0	0	None	0.19					5	850				
1,1-dichloropropene	µg/L	35	0	0	None	0.065					0.065	65				
1,2,3-trichlorobenzene	µg/L	35	0	0	None	0.125					0.125	125				
1,2,3-trichloropropane	µg/L	35	0	0	None	0.19					0.19	190				
1,2,4-trimethylbenzene	µg/L	36	3	8	None	0.022					0.022	93	93	J	MW08S	CMS-GW-MW08S-03

Table C-4. Source Area Groundwater Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
1,2-dibromo-3-chloropropane	µg/L	66	1	2	None	0.4					5	850	7	J	MW07S	CMS-GW-MW07S-02
1,2-dibromoethane	µg/L	76	1	1	None	0.042					5	850	1	J	MW07S	CMS-GW-MW07S-02
1,2-dichloroethane	µg/L	76	0	0	None	0.07					5	850				
1,2-dichloropropane	µg/L	76	0	0	None	0.075					5	850				
1,3-dichloropropane	µg/L	35	0	0	None	0.085					0.085	85				
2,2-dichloropropane	µg/L	35	0	0	None	0.1					0.1	100				
2-butanone	µg/L	41	0	0	None	5					5	850				
2-chlorotoluene	µg/L	35	0	0	None	0.13					0.13	130				
2-hexanone	µg/L	41	1	2	None	5					5	850	6	J	MW07S	CMS-GW-MW07S-02
4-chlorotoluene	µg/L	35	0	0	None	0.125					0.125	125				
4-methyl-2-pentanone	µg/L	41	0	0	None	5					5	850				
Acetone	µg/L	48	1	2	None	5					5	1650	24		GEC2	GEC-2
Benzene	µg/L	83	14	17	None	0.041					5	850	21		MW09S	CMS-GW-MW09S-02
Benzene, 1,3,5-trimethyl-	µg/L	36	2	6	None	0.075					0.075	75	61	NJ	MW08S	CM-GW-MW08-01
Bromobenzene	µg/L	35	0	0	None	0.16					0.16	160				
Bromochloromethane	µg/L	35	0	0	None	0.095					0.095	95				
Bromodichloromethane	µg/L	76	0	0	None	0.065					5	850				
Bromoform	µg/L	76	1	1	None	0.15					5	850	2	J	MW07S	CMS-GW-MW07S-02
Bromomethane	µg/L	76	0	0	None	0.15					5	850				
C7 Benzene Isomer	µg/L	1	1	100	None	29					29	29	29	J	MW08S	CM-GW-MW08-01
Carbon Disulfide	µg/L	41	0	0	None	5					5	850				
Carbon Tetrachloride	µg/L	76	0	0	None	0.155					5	850				
Chlorobenzene	µg/L	76	16	21	None	0.075					5	850	190		MW06S	CMS-DU-102302A-03
Chloroethane	µg/L	76	2	3	None	0.1					5	850	14	J	MW06S	CMS-DU-102302A-03
Chloroform	µg/L	76	4	5	None	0.085					5	850	4.1		MW10D	CMS-GW-MW10D-03
Chloromethane	µg/L	76	0	0	None	0.14					5	850				
Cis-1,2-dichloroethene	µg/L	83	20	24	None	0.19					5	1600	1600	J	MW05S	CMS-GW-MW05S-03
Cis-1,3-dichloropropene	µg/L	76	0	0	None	0.11					5	850				
Cyclohexane	µg/L	41	1	2	None	4					5	850	4	J	MW06S	CMS-GW-MW06S-02
Cyclotrisiloxane, Hexamethyl-	µg/L	1	1	100	None	6					6	6	6	J	MW08S	CM-GW-MW08-01
Dibromochloromethane	µg/L	76	0	0	None	0.039					5	850				
Dibromomethane	µg/L	35	0	0	None	0.095					0.095	95				
Dichlorodifluoromethane	µg/L	76	0	0	None	0.33					5	850				
Ethylbenzene	µg/L	76	5	7	None	0.036					5	850	7	J	MW06S	CM-GW-MW06-01
Indane	µg/L	1	1	100	None	9					9	9	9	J	MW08S	CM-GW-MW08-01
Isopropyl Alcohol	µg/L	5	5	100	None	6		30.81			7	70	70	NJ	GEC2	CMS-GW-GEC2-02
Isopropylbenzene	µg/L	76	2	3	None	0.044					5	850	2		MW08S	CMS-GW-MW08S-03
Laboratory Artifact_total	µg/L	1	1	100	None	44					44	44	44	J_2	MW08S	CMS-GW-MW08S-02
Methyl Acetate	µg/L	41	2	5	None	2.5					5	430	430	J	MW05S	CMS-GW-MW05S-02
Methyl Tert-butyl Ether	µg/L	41	8	20	None	1					5	850	11		MW03S	CM-GW-MW03-01
Methylcyclohexane	µg/L	41	2	5	None	5					5	850	13		MW06S	CM-GW-MW06-01
Methylene Chloride	µg/L	76	3	4	None	0.075					5	850	3.6	J	MW06S	CMS-DU-102302A-03
M-xylene & P-xylene	µg/L	35	4	11	None	0.065					0.065	65	13		MW08S	CMS-GW-MW08S-03
N-butylbenzene	µg/L	35	0	0	None	0.08					0.08	80				
N-propylbenzene	µg/L	35	1	3	None	0.055					0.055	55	7.4		MW08S	CMS-GW-MW08S-03

Table C-4. Source Area Groundwater Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
O-xylene	µg/L	35	3	9	None	0.0415					0.0415	41.5	15		MW08S	CMS-GW-MW08S-03
P-isopropyltoluene	µg/L	35	1	3	None	0.07					0.07	70	1.2		MW08S	CMS-GW-MW08S-03
Sec-butylbenzene	µg/L	35	0	0	None	0.06					0.06	60				
Styrene	µg/L	76	0	0	None	0.0335					5	850				
Tert-butylbenzene	µg/L	35	0	0	None	0.065					0.065	65				
Tetrachloroethene	µg/L	83	33	40	None	0.1					5	61000	61000	*	MW05S	CMS-GW-MW05S-02
Toluene	µg/L	76	6	8	None	0.06					5	850	5	J	MW06S	CM-GW-MW06-01
													5	J	MW07S	CM-GW-MW07-01
Total Xylenes	µg/L	48	6	13	None	0.5					5	850	69		MW06S	CM-GW-MW06-01
Trans-1,2-dichloroethene	µg/L	76	1	1	None	0.155					5	850	0.62	J	MW08S	CMS-GW-MW08S-03
Trans-1,3-dichloropropene	µg/L	76	0	0	None	0.0345					5	850				
Trichloroethene	µg/L	83	27	33	None	0.0435					2.3	2500	2500		MW05S	CMS-GW-MW05S-02
Trichlorofluoromethane	µg/L	76	0	0	None	0.215					5	850				
Vinyl Chloride	µg/L	83	12	14	None	0.07					5	850	27		GEC4	GEC-4
PCB as Aroclors																
Aroclor-1016	µg/L	41	0	0	None	0.5					0.5	0.5				
Aroclor-1221	µg/L	41	0	0	None	1					1	1				
Aroclor-1232	µg/L	41	0	0	None	0.5					0.5	0.5				
Aroclor-1242	µg/L	41	0	0	None	0.5					0.5	0.5				
Aroclor-1248	µg/L	41	0	0	None	0.5					0.5	0.5				
Aroclor-1254	µg/L	45	1	2	None	0.125					0.5	0.5	0.264		GEC6	GEC-6
Aroclor-1260	µg/L	41	0	0	None	0.5					0.5	0.5				
Pesticides/Herbicides																
4,4'-DDD	µg/L	41	0	0	None	0.05					0.05	0.05				
4,4'-DDE	µg/L	41	0	0	None	0.05					0.05	0.05				
4,4'-DDT	µg/L	41	0	0	None	0.05					0.05	0.05				
Aldrin	µg/L	41	0	0	None	0.025					0.025	0.025				
alpha-BHC	µg/L	41	0	0	None	0.025					0.025	0.025				
alpha-Chlordane	µg/L	41	1	2	None	0.025					0.025	0.032	0.032	J	MW06S	CMS-GW-MW06S-02
beta-BHC	µg/L	41	0	0	None	0.025					0.025	0.025				
delta-BHC	µg/L	41	0	0	None	0.025					0.025	0.025				
Dieldrin	µg/L	41	1	2	None	0.05					0.05	0.11	0.11		MW06S	CMS-GW-MW06S-02
Endosulfan I	µg/L	41	0	0	None	0.025					0.025	0.025				
Endosulfan II	µg/L	41	0	0	None	0.05					0.05	0.05				
Endosulfan Sulfate	µg/L	41	0	0	None	0.05					0.05	0.05				
Endrin	µg/L	41	0	0	None	0.05					0.05	0.05				
Endrin Aldehyde	µg/L	41	0	0	None	0.05					0.05	0.05				
Endrin Ketone	µg/L	41	0	0	None	0.05					0.05	0.05				
gamma-BHC	µg/L	41	0	0	None	0.025					0.025	0.025				
gamma-Chlordane	µg/L	41	2	5	None	0.018					0.025	0.049	0.049	J	MW06S	CMS-GW-MW06S-02
Heptachlor	µg/L	41	0	0	None	0.025					0.025	0.025				
Heptachlor Epoxide	µg/L	41	0	0	None	0.025					0.025	0.025				
Methoxychlor	µg/L	41	0	0	None	0.25					0.25	0.25				
Toxaphene	µg/L	41	0	0	None	2.5					2.5	2.5				
Ancillary																
Total Organic Carbon	mg/L	41	41	100	Lnrm	1			5.70	2.80	5	35	35		MW09S	CM-GW-MW09-01
Sulfide	mg/L	41	11	27	Lnrm	0.5			2.52	2.72	2	50	6		MW05S	CMS-GW-MW05S-02
Alkalinity	mg/L	41	41	100	Lnrm	9			58.96	2.35	70	570	570		MW08S	CM-GW-MW08-01

Table C-5. Assapumpset Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	5	4	80	Lnrm	1.7			6.80	6.53	7.7	78.6	78.6		RAB-FP-3004	RAB-FP-3004-01
1,2,3,4,6,7,8-HpCDF	ng/kg	5	3	60	None	2.35					8.02	2345000	17.1		RAB-FP-3004	RAB-FP-3004-01
1,2,3,4,7,8,9-HpCDF	ng/kg	5	2	40	None	0.54					1.7	1695000	1.2	EMPC	RAB-FP-3004	RAB-FP-3004-01
1,2,3,4,7,8-HxCDD	ng/kg	5	1	20	None	0.83					1.15	1150000	0.83	EMPC	RAB-SD-2069	RAB-SD-2069-01
1,2,3,4,7,8-HxCDF	ng/kg	5	1	20	None	1.4					2.5	1400000	2.5	J	RAB-SD-2069	RAB-SD-2069-01
1,2,3,6,7,8-HxCDD	ng/kg	5	2	40	None	1.05					3.04	1050000	4.1	J	RAB-FP-3004	RAB-FP-3004-01
1,2,3,6,7,8-HxCDF	ng/kg	5	1	20	None	1.1					2.1	1100000	2.1	J	RAB-SD-2069	RAB-SD-2069-01
1,2,3,7,8,9-HxCDD	ng/kg	5	1	20	None	1.45					2.3	1450000	2.3	J	RAB-SD-2069	RAB-SD-2069-01
1,2,3,7,8,9-HxCDF	ng/kg	5	1	20	None	1					1.25	1250000	1	EMPC	RAB-SD-2069	RAB-SD-2069-01
1,2,3,7,8-PeCDD	ng/kg	5	1	20	None	1.1					1.1	1100000	1.1	J	RAB-SD-2069	RAB-SD-2069-01
1,2,3,7,8-PeCDF	ng/kg	5	0	0	None	1.75					3.04	1750000				
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	3	1	33	None	17.22					17.22	17.22	17.22	J	RAB-SD-5004	RAB-SD-5004-0000-01
2,3,4,6,7,8-HxCDF	ng/kg	5	2	40	None	0.18					2.16	4.1	4.1	J	RAB-SD-2069	RAB-SD-2069-01
2,3,4,7,8-PeCDF	ng/kg	5	1	20	None	1.15					2	1150000	2	J	RAB-SD-2069	RAB-SD-2069-01
2,3,7,8-TCDD	ng/kg	5	3	60	None	0.605					3.4	150000	4.5	EMPC	RAB-SD-3004	RAB-SD-3004-01
2,3,7,8-TCDF	ng/kg	5	3	60	Lnrm	0.26			0.56		0.605	3.4	3.4		RAB-SD-2069	RAB-SD-2069-01
OCDD	ng/kg	5	3	60	Lnrm	6.07			55.6		181	3995000	637	JEB	RAB-FP-3004	RAB-FP-3004-01
OCDF	ng/kg	5	4	80	Lnrm	0.74			5.07	10.04	10.69	35.5	35.5		RAB-FP-3004	RAB-FP-3004-01
PCDD/Fs	ng/kg	2	2	100	None	66.3		631.2			512.7	959	959		RAB-FP-3004	RAB-FP-3004-01
TEQ	ng/kg	5	5	100	Norm	0.0847	3.29	3.18			3.9	7.36	7.36	J	RAB-SD-2069	RAB-SD-2069-01
Total HpCDD	ng/kg	5	3	60	Lnrm	3			3		7.8	157	157	J	RAB-FP-3004	RAB-FP-3004-01
Total HpCDF	ng/kg	5	2	40	None	0.39					3.04	35.9	35.9	J	RAB-FP-3004	RAB-FP-3004-01
Total HxCDD	ng/kg	5	4	80	Lnrm	0.52			3.40	16.43	3.04	32.5	32.5	EMPC	RAB-FP-3004	RAB-FP-3004-01
Total HxCDF	ng/kg	5	4	80	Lnrm	1.4			4.35	9.28	3.04	58.4	58.4	J	RAB-SD-2069	RAB-SD-2069-01
Total PeCDD	ng/kg	5	4	80	Lnrm	0.2			1.98	6.13	2.43	8.1	8.1	EMPC	RAB-FP-3004	RAB-FP-3004-01
Total PeCDF	ng/kg	5	4	80	Lnrm	1.2			2.94	7.39	3.04	85.8	85.8	J	RAB-SD-2069	RAB-SD-2069-01
Total TCDD	ng/kg	5	4	80	Lnrm	0.36			1.31	5.97	1.4	7.5	7.5	J	RAB-SD-2069	RAB-SD-2069-01
Total TCDF	ng/kg	5	4	80	Lnrm	0.15			5.38	5.04	7.3	43.5	43.5	J	RAB-SD-2069	RAB-SD-2069-01
Metals																
Aluminum	mg/kg	6	6	100	Lnrm	2980			7593	2.26	8605	21774	21774	J	RAB-SD-5008	RAB-SD-5008-0000-01
Antimony	mg/kg	6	0	0	None	0.04					0.288	0.44				
Arsenic	mg/kg	6	5	83	Norm	0.24	2.65	2.24			2.6	5.21	5.21	J	RAB-SD-5008	RAB-SD-5008-0000-01
Barium	mg/kg	6	6	100	Lnrm	26.4			71.90	2.29	80.85	204	204	J	RAB-SD-5008	RAB-SD-5008-0000-01
Beryllium	mg/kg	6	6	100	Norm	0.41	1.42	0.927			1.45	2.66	2.66		RAB-SD-5008	RAB-SD-5008-0000-01
Cadmium	mg/kg	6	2	33	None	0.065					0.255	0.858	0.858		RAB-SD-5008	RAB-SD-5008-0000-01
Calcium	mg/kg	4	4	100	None	710		841.0			1295	2660	2660	J	RAB-FP-3004	RAB-FP-3004-01
Chromium	mg/kg	6	6	100	Lnrm	3.7			8.99	1.84	10.45	17.5	17.5	J	RAB-SD-5008	RAB-SD-5008-0000-01
Cobalt	mg/kg	6	6	100	Norm	2.1	6.20	3.07			6.4	10.1	10.1		RAB-SD-5008	RAB-SD-5008-0000-01
Copper	mg/kg	6	6	100	Lnrm	7.9			11.37	1.34	10.74	18.3	18.3	J	RAB-SD-5004	RAB-SD-5004-0000-01
Iron	mg/kg	6	6	100	Norm	5230	14363	7473			15055	23357	23357		RAB-SD-5008	RAB-SD-5008-0000-01
Lead	mg/kg	6	6	100	Lnrm	8.5			32.48	2.20	36	88.6	88.6	J	RAB-SD-5008	RAB-SD-5008-0000-01
Magnesium	mg/kg	4	4	100	None	1000		469.1			1105	2000	2000	J	RAB-FP-3004	RAB-FP-3004-01
Manganese	mg/kg	6	6	100	Norm	99.9	710.8	548.2			753	1590	1590		RAB-FP-3004	RAB-FP-3004-01
Mercury	mg/kg	6	2	33	None	0.005					0.025	0.114	0.114		RAB-SD-5004	RAB-SD-5004-0000-01
Mercury (methyl)	mg/kg	2	2	100	None	0.000258		0.000428			0.000561	0.000863	0.000863	J	RAB-SD-5004	RAB-SD-5004-0000-01
Molybdenum	mg/kg	2	2	100	None	1.56		0.0212			1.58	1.59	1.59	J	RAB-SD-5008	RAB-SD-5008-0000-01
Nickel	mg/kg	6	4	67	Lnrm	1.155			6.6	2.70	7.15	20	20	J	RAB-SD-5004	RAB-SD-5004-0000-01
Potassium	mg/kg	4	2	50	None	32.79					445.9	1580	1580		RAB-FP-3004	RAB-FP-3004-01
Selenium	mg/kg	6	1	17	None	0.23					0.53	2.2	2.2	J	RAB-FP-3004	RAB-FP-3004-01
Silver	mg/kg	6	3	50	None	0.18					0.284	6.5	6.5		RAB-FP-3004	RAB-FP-3004-01

Table C-5. Assapumpset Sediment Statistical Summary
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Sodium	mg/kg	4	2	50	None	7.89					32.95	74.9	74.9		RAB-SD-2069	RAB-SD-2069-01
Thallium	mg/kg	6	2	33	None	0.285					0.468	0.5	0.354	J	RAB-SD-5008	RAB-SD-5008-0000-01
Vanadium	mg/kg	6	6	100	Norm	5.8	17.02	10.22			16.65	32	32		RAB-SD-5008	RAB-SD-5008-0000-01
Zinc	mg/kg	6	6	100	Lnrm	28			79.35	2.15	75.8	227	227	J	RAB-SD-5008	RAB-SD-5008-0000-01
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	3	1	33	None	6.44					215	250	6.44	J	RAB-SD-5008	RAB-SD-5008-0000-01
1,2,4-trichlorobenzene	µg/kg	2	0	0	None	15.16					15.16	15.16				
1,2-dichlorobenzene	µg/kg	2	0	0	None	10.59					10.59	10.59				
1,3-dichlorobenzene	µg/kg	2	0	0	None	9.84					9.84	9.84				
1,4-dichlorobenzene	µg/kg	2	0	0	None	9.55					9.55	9.55				
2,2'-oxybis(1-chloropropane)	µg/kg	4	0	0	None	9.60					112.3	250				
2,4,5-trichlorophenol	µg/kg	4	0	0	None	22.68					286.3	600				
2,4,6-trichlorophenol	µg/kg	4	0	0	None	19.95					117.5	250				
2,4-dichlorophenol	µg/kg	4	0	0	None	17.53					116.3	250				
2,4-dimethylphenol	µg/kg	4	0	0	None	17.75					116.4	250				
2,4-dinitrophenol	µg/kg	4	0	0	None	30.36					290.2	600				
2,4-dinitrotoluene	µg/kg	4	0	0	None	19.08					117.0	250				
2,6-dinitrotoluene	µg/kg	4	0	0	None	19.21					117.1	250				
2-chloronaphthalene	µg/kg	4	0	0	None	17.68					116.3	250				
2-chlorophenol	µg/kg	4	0	0	None	9.31					112.2	250				
2-methylnaphthalene	µg/kg	5	1	20	None	17.95					18.55	250	18.55		RAB-SD-5008	RAB-SD-5008-0000-01
2-methylphenol	µg/kg	4	0	0	None	27.42					121.2	250				
2-nitroaniline	µg/kg	4	0	0	None	15.89					282.9	600				
2-nitrophenol	µg/kg	4	0	0	None	19.53					117.3	250				
3,3'-dichlorobenzidine	µg/kg	4	0	0	None	48.42					131.7	250				
3-nitroaniline	µg/kg	4	0	0	None	12.62					281.3	600				
4,6-dinitro-2-methylphenol	µg/kg	4	0	0	None	40.43					295.2	600				
4-bromophenyl-phenylether	µg/kg	4	0	0	None	16.77					115.9	250				
4-chloro-3-methylphenol	µg/kg	4	0	0	None	12.96					114.0	250				
4-chloroaniline	µg/kg	4	0	0	None	41.62					128.3	250				
4-chlorophenyl-phenylether	µg/kg	4	0	0	None	21.50					118.2	250				
4-methylphenol	µg/kg	4	0	0	None	17.57					116.3	250				
4-nitroaniline	µg/kg	4	0	0	None	12.62					281.3	600				
4-nitrophenol	µg/kg	4	0	0	None	47.44					298.7	600				
Acenaphthene	µg/kg	5	1	20	None	16.45					34.11	250	34.11	J	RAB-SD-5008	RAB-SD-5008-0000-01
Acenaphthylene	µg/kg	5	2	40	None	14.64					47	215	58.9		RAB-SD-5008	RAB-SD-5008-0000-01
Acetophenone	µg/kg	2	0	0	None	215.00					232.5	250				
Anthracene	µg/kg	5	2	40	None	14.02					100	215	147.5		RAB-SD-5008	RAB-SD-5008-0000-01
Atrazine	µg/kg	2	0	0	None	215					232.5	250				
Bapeq	µg/kg	2	2	100	None	520		162.6			635	750	750		RAB-SD-3004	RAB-SD-3004-01
Benzaldehyde	µg/kg	3	2	67	None	31					215	278.56	278.6		RAB-SD-5008	RAB-SD-5008-0000-01
Benzo(a)anthracene	µg/kg	5	4	80	Lnrm	215			425.0	1.95	410	1000	1000		RAB-SD-2069	RAB-SD-2069-01
Benzo(a)pyrene	µg/kg	5	4	80	Lnrm	215			503.3	1.91	500	840	840		RAB-SD-2069	RAB-SD-2069-01
Benzo(b)fluoranthene	µg/kg	5	5	100	Norm	22	626.8	518.1			500	1400	1400		RAB-SD-2069	RAB-SD-2069-01
Benzo(g,h,i)perylene	µg/kg	5	4	80	Norm	215	393.3	162.7			390	594.7	594.7		RAB-SD-5008	RAB-SD-5008-0000-01
Benzo(k)fluoranthene	µg/kg	5	5	100	Norm	8	410.5	296.3			370	804.3	804.3		RAB-SD-5008	RAB-SD-5008-0000-01
Bis(2-chloroethoxy)methane	µg/kg	4	0	0	None	14.47					114.7	250				
Bis(2-chloroethyl)ether	µg/kg	4	0	0	None	8.38					111.7	250				
Bis(2-ethylhexyl)phthalate	µg/kg	5	3	60	Lnrm	22.93			95		95	1000	1000	J	RAB-SD-2069	RAB-SD-2069-01
Butylbenzylphthalate	µg/kg	4	1	25	None	17.04					116.0	460	460	J	RAB-SD-2069	RAB-SD-2069-01
Caprolactam	µg/kg	2	0	0	None	215					232.5	250				
Carbazole	µg/kg	4	2	50	None	22.15					85.5	215	89	J	RAB-SD-3004	RAB-SD-3004-01
Chrysene	µg/kg	5	4	80	Norm	215	687.3	391.9			650	1100	1100		RAB-SD-2069	RAB-SD-2069-01

Table C-5. Assapumpset Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dibenzo(a,h)anthracene	µg/kg	5	4	80	Lnrm	100			116.0	1.21	130	215	179.0		RAB-SD-5008	RAB-SD-5008-0000-01
Dibenzofuran	µg/kg	5	1	20	None	15.01					35.86	250	35.86		RAB-SD-5008	RAB-SD-5008-0000-01
Diethylphthalate	µg/kg	4	0	0	None	16.73					115.9	250				
Dimethylphthalate	µg/kg	4	0	0	None	16.86					115.9	250				
Di-n-butylphthalate	µg/kg	4	3	75	None	34		29			71.5	250	80	JEB	RAB-SD-3004	RAB-SD-3004-01
Di-n-octylphthalate	µg/kg	4	0	0	None	12.38					113.7	250				
Fluoranthene	µg/kg	5	5	100	Norm	23	1089	682.1			1300	1700	1700		RAB-SD-2069	RAB-SD-2069-01
Fluorene	µg/kg	5	2	40	None	18.32					36	215	80.68		RAB-SD-5008	RAB-SD-5008-0000-01
Hexachlorobenzene	µg/kg	4	0	0	None	16.65					115.8	250				
Hexachlorobutadiene	µg/kg	4	0	0	None	20.95					118.0	250				
Hexachlorocyclopentadiene	µg/kg	4	0	0	None	16.13					115.6	250				
Hexachloroethane	µg/kg	4	0	0	None	9.38					112.2	250				
High Molecular Weight Pahs	µg/kg	2	2	100	None	3800		1414			4800	5800	5800		RAB-SD-3004	RAB-SD-3004-01
Indeno(1,2,3-cd)pyrene	µg/kg	5	4	80	Lnrm	215			398.1	1.87	360	650	650		RAB-SD-2069	RAB-SD-2069-01
Isophorone	µg/kg	4	0	0	None	14.76					114.9	250				
Low Molecular Weight Pahs	µg/kg	2	2	100	None	300		212.1			450	600	600		RAB-SD-3004	RAB-SD-3004-01
Naphthalene	µg/kg	5	1	20	None	13.98					19.05	250	19.05		RAB-SD-5008	RAB-SD-5008-0000-01
Nitrobenzene	µg/kg	4	0	0	None	16.31					115.7	250				
N-nitroso-di-n-propylamine	µg/kg	4	0	0	None	22.81					118.9	250				
N-nitroso-diphenylamine	µg/kg	4	0	0	None	15.04					115.0	250				
Pentachlorophenol	µg/kg	4	0	0	None	22.30					286.1	600				
Phenanthrene	µg/kg	5	4	80	Norm	215	563.3	348.2			600	794.7	794.7		RAB-SD-5008	RAB-SD-5008-0000-01
Phenol	µg/kg	4	0	0	None	10.50					112.7	250				
Pyrene	µg/kg	5	4	80	Norm	215	966.6	523.2			980	1600	1600		RAB-SD-2069	RAB-SD-2069-01
Total PAH	µg/kg	3	3	100	None	4100		2778			6400	9631	9631		RAB-SD-5008	RAB-SD-5008-0000-01
PCB as Aroclors																
Aroclor, Total	µg/kg	4	3	75	None	0.604		2.65			28.33	99.22	99.22	J	RAB-SD-5008	RAB-SD-5008-0000-01
Aroclor-1016	µg/kg	6	0	0	None	0.934					5.08	11.34				
Aroclor-1221	µg/kg	6	0	0	None	0.958					2.11	11.34				
Aroclor-1232	µg/kg	6	0	0	None	0.840					1.35	11.34				
Aroclor-1242	µg/kg	6	0	0	None	1.05					4.64	11.34				
Aroclor-1248	µg/kg	6	0	0	None	1.08					1.34	11.34				
Aroclor-1254	µg/kg	6	3	50	None	0.604					13.18	57.55	57.55		RAB-SD-5008	RAB-SD-5008-0000-01
Aroclor-1260	µg/kg	6	0	0	None	1.50					4.64	11.34				
Aroclor-1268	µg/kg	2	2	100	None	4.55		26.24			23.11	41.66	41.66		RAB-SD-5008	RAB-SD-5008-0000-01

Table C-5. Assapumpset Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
4,4'-DDD	µg/kg	6	2	33	None	0.095					0.152	3.17	3.17	J	RAB-SD-5008	RAB-SD-5008-0000-01
4,4'-DDE	µg/kg	6	2	33	None	0.0665					0.069	5.47	5.47	J	RAB-SD-5008	RAB-SD-5008-0000-01
4,4'-DDT	µg/kg	6	2	33	None	0.0525					0.547	9	9		RAB-SD-2069	RAB-SD-2069-01
Aldrin	µg/kg	6	0	0	None	0.0305					0.107	0.905				
alpha-BHC	µg/kg	6	0	0	None	0.0565					0.184	0.905				
alpha-Chlordane	µg/kg	6	2	33	None	0.0425					0.06	1.33	1.33	J	RAB-SD-5008	RAB-SD-5008-0000-01
beta-BHC	µg/kg	6	0	0	None	0.0345					0.106	0.905				
delta-BHC	µg/kg	6	0	0	None	0.0475					0.0865	0.905				
Dieldrin	µg/kg	6	2	33	None	0.0535					0.118	1.91	1.91	J	RAB-SD-5008	RAB-SD-5008-0000-01
Endosulfan I	µg/kg	6	0	0	None	0.0675					0.071	0.905				
Endosulfan II	µg/kg	6	0	0	None	0.056					0.067	0.905				
Endosulfan Sulfate	µg/kg	6	0	0	None	0.068					0.214	0.905				
Endrin	µg/kg	6	0	0	None	0.059					0.275	0.905				
Endrin Aldehyde	µg/kg	6	0	0	None	0.069					0.854	0.905				
Endrin Ketone	µg/kg	6	0	0	None	0.065					0.117	0.905				
gamma-BHC	µg/kg	6	0	0	None	0.074					0.075	0.905				
gamma-Chlordane	µg/kg	6	1	17	None	0.03					0.061	0.81	0.65	J	RAB-SD-5004	RAB-SD-5004-0000-01
Heptachlor	µg/kg	6	0	0	None	0.063					0.130	0.905				
Heptachlor Epoxide	µg/kg	6	0	0	None	0.0335					0.066	0.905				
Methoxychlor	µg/kg	6	0	0	None	0.075					0.625	0.905				
Technical Chlordane	µg/kg	2	2	100	None	63.85		62.71			108.2	152.5	152.5	J	RAB-SD-5008	RAB-SD-5008-0000-01
Toxaphene	µg/kg	6	0	0	None	4.95					21.45	125				
Ancillary																
Percent Clay	pct	4	4	100	None	0.8		9.75			10.25	20.5	20.5		RAB-SD-5004	RAB-SD-5004-0000-01
Percent Fines (silt + clay)	pct	6	6	100	Norm	5.8	41.92	29.74			42.52	84	84		RAB-FP-3004	RAB-FP-3004-01
Percent Gravel	pct	6	6	100	Lnrm	0			6.11	4.00	4.245	33.6	33.6		RAB-SD-2070	RAB-SD-2070-01
Percent Moisture	pct	1	1	100	None	71.2					71.2	71.2	71.2		RAB-SD-5008	RAB-SD-5008-0000-01
Percent Sand	pct	6	6	100	Norm	16	48.26	19.79			53.24	71.5	71.5		RAB-SD-2069	RAB-SD-2069-01
Percent Silt	pct	4	4	100	None	5		10.13			14.86	27.02	27.02		RAB-SD-5008	RAB-SD-5008-0000-01
Percent Solids	pct	3	3	100	None	28.8		27.26			66.7	81.7	81.7		RAB-SD-2070	RAB-SD-2070-01
Specific Gravity		4	4	100	None	2.65		0			2.65	2.65	2.65		RAB-FP-3004	RAB-FP-3004-01
													2.65		RAB-SD-2069	RAB-SD-2069-01
													2.65		RAB-SD-2070	RAB-SD-2070-01
Water Content	pct	2	2	100	None	253		4.95			256.5	260	260		RAB-SD-5004	RAB-SD-5004-0000-01
Total Organic Carbon	pct	6	5	83	Norm	0.0064	2.89	2.19			3.29	4.45	4.45		RAB-SD-5004	RAB-SD-5004-0000-01

Table C-6. Upstream Sed[illegible]nt Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	28	21	75	Lnrm	12.58			128.4	7.43	195.0	1470	1470		RCC-FP-3002	RCC-FP-3002-01
1,2,3,4,6,7,8-HpCDF	ng/kg	28	27	96	None	0.75		166.9			122.5	547.5	547.5	J	SD-33	SD-33
1,2,3,4,7,8,9-HpCDF	ng/kg	28	22	79	Lnrm	0.34			4.00	5.95	4.765	47.6	47.6	EMPC	SD-33	SD-33
1,2,3,4,7,8-HxCDD	ng/kg	28	20	71	Lnrm	0.62			2.86	2.52	4.15	25.3	25.3		RCC-FP-3002	RCC-FP-3002-01
1,2,3,4,7,8-HxCDF	ng/kg	25	22	88	Lnrm	0.74			12.38	4.86	19.2	148.9	148.9	J	SD-33	SD-33
1,2,3,6,7,8-HxCDD	ng/kg	26	24	92	Lnrm	1.04			12.92	3.72	15.21	85.3	85.3		RCC-FP-3002	RCC-FP-3002-01
1,2,3,6,7,8-HxCDF	ng/kg	24	21	88	Lnrm	0.74			9.31	3.81	13.27	60.38	60.38	J	SD-33	SD-33
1,2,3,7,8,9-HxCDD	ng/kg	28	22	79	Lnrm	0.59			13.35	3.49	15.85	549.7	549.7	EMPC	SD-38	SD-38
1,2,3,7,8,9-HxCDF	ng/kg	21	7	33	None	0.37					1.245	32.71	4.86	EMPC	SD-34	SD-34
1,2,3,7,8-PeCDD	ng/kg	27	15	56	Lnrm	0.35			0.656	10.66	2.66	13.1	13.1		RCC-FP-3002	RCC-FP-3002-01
1,2,3,7,8-PeCDF	ng/kg	25	18	72	Lnrm	0.55			2.51	6.09	3.43	29	29	EMPC	RCC-BK-3001	RCC-BK-3001Z-01
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	28	14	50	None	1.69					135.3	1550	417.06	J	RWR-FP-5004	RWR-FP-5004-0000-01
2,3,4,6,7,8-HxCDF	ng/kg	26	22	85	Lnrm	1.16			6.49	4.43	7.46	111	111		RCC-BK-3001	RCC-DU-102299A
2,3,4,7,8-PeCDF	ng/kg	28	20	71	Lnrm	0.21			3.38	4.30	4.52	52.4	52.4	J	SD-33	SD-33
2,3,7,8-TCDD	ng/kg	27	14	52	Lnrm	0.15			0.43		2.1	86.6	86.6		RCC-FP-3002	RCC-FP-3002-01
2,3,7,8-TCDF	ng/kg	28	23	82	Lnrm	0.34			6.16	7.16	6.84	110.3	110.3	J	RWR-FP-5001	RWR-FP-5001-0000-01
OCDD	ng/kg	28	20	71	Lnrm	66.75			667.1	8.85	787.5	10920	10920	J$EB	RCC-FP-3002	RCC-FP-3002-01
OCDF	ng/kg	28	21	75	Lnrm	5.01			93.00	9.68	114.3	1254	1254		RWR-FP-5004	RWR-FP-5004-0000-01
PCDD/Fs	ng/kg	21	14	67	Lnrm	37.3			762.7	9.11	559	18900	18900		RCC-FP-3002	RCC-FP-3002-01
TEQ	ng/kg	28	28	100	Lnrm	2.3			21.05	3.20	24.8	179	179		RCC-FP-3002	RCC-FP-3002-01
Total HpCDD	ng/kg	19	18	95	None	3.56		832.7			494	2940	2940	J	RCC-FP-3002	RCC-FP-3002-01
Total HpCDF	ng/kg	19	19	100	Lnrm	13.8			267.1	3.31	306.92	1300	1300	J	RCC-FP-3002	RCC-FP-3002-01
Total HxCDD	ng/kg	19	17	89	Lnrm	3.56			86.28	4.58	127.6	655	655	J	RCC-FP-3002	RCC-FP-3002-01
Total HxCDF	ng/kg	19	19	100	Lnrm	11.7			164.7	3.45	216.3	1020	1020	J	RCC-FP-3002	RCC-FP-3002-01
Total PeCDD	ng/kg	19	12	63	Lnrm	2			7.12	8.29	14.135	116	116	J	RCC-BK-3001	RCC-DU-102299A
Total PeCDF	ng/kg	19	17	89	Lnrm	5.1			110.5	4.20	180.0	651.1	651.1	J	RWR-FP-5004	RWR-FP-5004-0000-01
Total TCDD	ng/kg	19	13	68	Lnrm	0.355			7.98	6.68	8.81	147	147	J	RCC-FP-3002	RCC-FP-3002-01
Total TCDF	ng/kg	19	18	95	Lnrm	0.71			45.54	5.80	52.09	636	636	J	RCC-FP-3002	RCC-FP-3002-01
Metals																
Aluminum	mg/kg	23	23	100	Lnrm	1880			7348	2.22	5805	24690	24690	J	GMP-SD-5002	GMP-SD-5002-0000-01
Antimony	mg/kg	23	11	48	None	0.04					0.46	5	4.6	J	RCC-SD-3002	RCC-SD-DU-111099B
Arsenic	mg/kg	23	21	91	Lnrm	0.355			3.83	2.70	5.58	17.5	13.5		RCC-FP-3002	RCC-FP-3002-01
Barium	mg/kg	23	23	100	Norm	7.6	160.1	113.1			163	375	375		Esmond Dam	DAM001-SD
Beryllium	mg/kg	23	23	100	Lnrm	0.15			1.39	2.95	1.9	5.4	5.4		Esmond Dam	DAM001-SD
Cadmium	mg/kg	23	16	70	None	0.03		0.821			0.711	4.35	4.35		GMP-SD-5002	GMP-SD-5002-0000-01
Calcium	mg/kg	14	14	100	Lnrm	447			1377	2.14	1270	4830	4830		Esmond Dam	DAM001-SD
Chromium	mg/kg	23	23	100	Norm	4.6	154.1	109.6			144	360	360		RCC-SD-3002	RCC-SD-DU-111099B
Cobalt	mg/kg	23	20	87	Norm	0.65	11.71	8.57			10.4	32.2	32.2		RCC-BK-3001	RCC-BK-3001X-01
Copper	mg/kg	23	21	91	None	1.95		118.5			99.7	436	436		RCC-FP-3002	RCC-FP-3002-01
Cyanide	mg/kg	1	0	0	None	6.4					6.4	6.4				
Iron	mg/kg	23	23	100	Lnrm	3700			13039	2.03	15000	37162	37162		RWR-FP-5004	RWR-FP-5004-0000-01
Lead	mg/kg	23	23	100	None	24.4		191.4			228	591	591		RWR-FP-5001	RWR-FP-5001-0000-01
Magnesium	mg/kg	14	14	100	None	573		793.7			832.5	2910	2910		Esmond Dam	DAM001-SD
Manganese	mg/kg	23	23	100	Lnrm	54.7			429.3	3.36	503	4126	4126		RWR-FP-5004	RWR-FP-5004-0000-01
Mercury	mg/kg	23	22	96	Lnrm	0.01			0.153	3.67	0.12	0.811	0.811		RWR-FP-5001	RWR-FP-5001-0000-01
Mercury (methyl)	mg/kg	8	8	100	Lnrm	0.000079			0.000289	2.28	0.000337	0.000762	0.000762	J	RWR-FP-5002	RWR-FP-5002-0000-01
Molybdenum	mg/kg	9	9	100	Lnrm	7.01			22.47	2.36	17.2	87.7	87.7	J	RWR-FP-5003	RWR-FP-5003-0000-01
Nickel	mg/kg	23	20	87	Lnrm	1.4			18.80	4.79	25.5	387	387		RWR-FP-5001	RWR-FP-5001-0000-01
Potassium	mg/kg	13	13	100	None	317		377.0			420	1440	1440		RCC-SD-3002	RCC-SD-DU-111099B
Selenium	mg/kg	23	14	61	Lnrm	0.38			0.910	1.64	1.03	5	3.6	J	RCC-FP-3002	RCC-FP-3002-01
Silver	mg/kg	23	15	65	Lnrm	0.18			1.04	7.22	1.65	9.2	9.2		RCC-FP-3002	RCC-FP-3002-01
Sodium	mg/kg	13	8	62	Lnrm	5.33			40.89	2.62	45.3	349	349		RCC-SD-3002	RCC-SD-DU-111099B
Thallium	mg/kg	23	11	48	None	0.079					0.4	5	0.76	J	RCC-BK-3001	RCC-DU-102299A
Vanadium	mg/kg	23	23	100	Lnrm	6.8			39.85	2.64	47.3	159	159		RCC-BK-3001	RCC-BK-3001X-01
Zinc	mg/kg	23	22	96	Lnrm	11.4			175.0	3.13	214	856	856	J	RCC-SD-3002	RCC-SD-DU-111099B

Table C-6. Upstream Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	5	5	100	Lnrm	26.02			40.24	1.47	36.9	61.7	61.7		RWR-FP-5001	RWR-FP-5001-0000-01
1,2,4-trichlorobenzene	µg/kg	18	0	0	None	15.16					225	3200				
1,2-dichlorobenzene	µg/kg	18	0	0	None	10.59					225	3200				
1,3-dichlorobenzene	µg/kg	18	0	0	None	9.84					225	3200				
1,4-dichlorobenzene	µg/kg	18	0	0	None	9.55					225	3200				
2,2'-oxybis(1-chloropropane)	µg/kg	18	0	0	None	9.60					225	3200				
2,4,5-trichlorophenol	µg/kg	22	0	0	None	22.68					950	8000				
2,4,6-trichlorophenol	µg/kg	18	0	0	None	19.95					225	3200				
2,4-dichlorophenol	µg/kg	18	0	0	None	17.53					225	3200				
2,4-dimethylphenol	µg/kg	18	0	0	None	17.75					225	3200				
2,4-dinitrophenol	µg/kg	21	0	0	None	30.36					700	8000				
2,4-dinitrotoluene	µg/kg	18	0	0	None	19.08					225	3200				
2,6-dinitrotoluene	µg/kg	18	0	0	None	19.21					225	3200				
2-chloronaphthalene	µg/kg	18	0	0	None	17.68					225	3200				
2-chlorophenol	µg/kg	18	0	0	None	9.31					225	3200				
2-methylnaphthalene	µg/kg	23	6	26	None	17.95					185	3200	440	J	SD-37	SD-37
2-methylphenol	µg/kg	18	0	0	None	27.42					225	3200				
2-nitroaniline	µg/kg	18	0	0	None	15.89					550	8000				
2-nitrophenol	µg/kg	22	0	0	None	19.53					287.5	3200				
3,3'-dichlorobenzidine	µg/kg	18	0	0	None	48.42					225	3200				
3-nitroaniline	µg/kg	18	0	0	None	12.62					550	8000				
4,6-dinitro-2-methylphenol	µg/kg	18	0	0	None	40.43					550	8000				
4-bromophenyl-phenylether	µg/kg	18	0	0	None	16.77					225	3200				
4-chloro-3-methylphenol	µg/kg	18	0	0	None	12.96					225	3200				
4-chloroaniline	µg/kg	18	0	0	None	41.62					225	3200				
4-chlorophenyl-phenylether	µg/kg	18	0	0	None	21.50					225	3200				
4-methylphenol	µg/kg	22	1	5	None	17.57					302.5	3200	380	J	RCC-SD-3002	RCC-SD-DU-111099B
4-nitroaniline	µg/kg	18	0	0	None	12.62					550	8000				
4-nitrophenol	µg/kg	22	0	0	None	47.44					950	8000				
Acenaphthene	µg/kg	24	11	46	None	16.45					213.1	3200	1600		SD-37	SD-37
Acenaphthylene	µg/kg	24	7	29	None	14.64					203.3	3200	497.5		RWR-FP-5001	RWR-FP-5001-0000-01
Anthracene	µg/kg	24	15	63	None	14.02		614.9			475.1	3100	3100		SD-37	SD-37
Bapeq	µg/kg	19	19	100	None	4		2403			1900	9100	9100		SD-37	SD-37
Benzaldehyde	µg/kg	5	5	100	Lnrm	60.52			121.5	1.76	112.08	258.29	258.3	J	GMP-SD-5007	GMP-SD-5007-0000-01
Benzo(a)anthracene	µg/kg	24	23	96	None	87		1991			1900	8600	8600	*	SD-37	SD-37
Benzo(a)pyrene	µg/kg	24	23	96	None	100		1565			2196	6200	6200	*	SD-37	SD-37
Benzo(b)fluoranthene	µg/kg	24	24	100	None	43		1926			2108	8400	8400	*	SD-37	SD-37
Benzo(g,h,i)perylene	µg/kg	24	23	96	None	56		929.0			1300	2871	2871		RWR-FP-5001	RWR-FP-5001-0000-01
Benzo(k)fluoranthene	µg/kg	24	23	96	None	100		1308			1750	3864	3864		RWR-FP-5001	RWR-FP-5001-0000-01
Bis(2-chloroethoxy)methane	µg/kg	18	0	0	None	14.47					225	3200				
Bis(2-chloroethyl)ether	µg/kg	18	0	0	None	8.38					225	3200				
Bis(2-ethylhexyl)phthalate	µg/kg	23	16	70	None	22.93		572.2			340	3500	3500	J	RCC-BK-3001	RCC-BK-3001X-01
Butylbenzylphthalate	µg/kg	22	6	27	None	17.04					327.5	3200	580	J	RWR-FP-5004	RWR-FP-5004-0000-01
Carbazole	µg/kg	23	12	52	None	22.15					470	2000	2000	J	SD-37	SD-37
Chrysene	µg/kg	24	24	100	None	83		2038			2874	7900	7900	*	SD-37	SD-37
Dibenzo(a,h)anthracene	µg/kg	24	14	58	None	16.13		489.0			452.72	3200	880		SD-37	SD-37
Dibenzofuran	µg/kg	23	7	30	None	15.01					195.84	3200	1300		SD-37	SD-37
Diethylphthalate	µg/kg	18	0	0	None	16.73					225	3200				
Dimethylphthalate	µg/kg	18	0	0	None	16.86					225	3200				
Di-n-butylphthalate	µg/kg	23	9	39	None	17.30					210	3200	470	JEB	RCC-FP-3001	RCC-FP-3001-01
Di-n-octylphthalate	µg/kg	22	1	5	None	12.38					262.5	3200	83	J	RWR-FP-5002	RWR-FP-5002-0000-01
Fluoranthene	µg/kg	24	24	100	None	77		4110			5314	17000	17000	*	SD-37	SD-37
Fluorene	µg/kg	24	12	50	None	18.32					281	2000	2000		SD-37	SD-37

Table C-6. Upstream Sed[illegible]t Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Hexachlorobenzene	µg/kg	18	0	0	None	16.65					225	3200				
Hexachlorobutadiene	µg/kg	18	0	0	None	20.95					225	3200				
Hexachlorocyclopentadiene	µg/kg	18	0	0	None	16.13					225	3200				
Hexachloroethane	µg/kg	18	0	0	None	9.38					225	3200				
High Molecular Weight Pahs	µg/kg	19	19	100	Lnrm	250		19259			14000	74000	74000		SD-37	SD-37
Indeno(1,2,3-cd)pyrene	µg/kg	24	23	96	None	63		1011			1400	3092.9	3092.9		RWR-FP-5001	RWR-FP-5001-0000-01
Isophorone	µg/kg	18	0	0	None	14.76					225	3200				
Low Molecular Weight Pahs	µg/kg	19	19	100	Lnrm	72		5991			1200	25000	25000		SD-37	SD-37
Naphthalene	µg/kg	24	7	29	None	13.98					187.5	3200	930		SD-37	SD-37
Nitrobenzene	µg/kg	18	0	0	None	16.31					225	3200				
N-nitroso-di-n-propylamine	µg/kg	18	0	0	None	22.81					225	3200				
N-nitroso-diphenylamine	µg/kg	18	0	0	None	15.04					225	3200				
Pentachlorophenol	µg/kg	22	0	0	None	22.30					950	8000				
Phenanthrene	µg/kg	24	24	100	Lnrm	72			1398	4.66	2575	17000	17000	*	SD-37	SD-37
Phenol	µg/kg	22	0	0	None	10.50					287.5	3200				
Pyrene	µg/kg	24	24	100	None	49		3797			4518	17000	17000	*	SD-37	SD-37
Total PAH	µg/kg	24	24	100	None	320		23445			30473	99000	99000		SD-37	SD-37
PCB as Aroclors																
Aroclor, Total	µg/kg	30	20	67	None	0.604		191.1			168.92	7800	7800		SD-33	SD-33
Aroclor-1016	µg/kg	30	0	0	None	0.934					17.5	48.5				
Aroclor-1221	µg/kg	30	1	3	None	0.958					26	100	26	J	RCC-BK-3001	RCC-BK-3001Z-01
Aroclor-1232	µg/kg	30	0	0	None	0.840					17.5	48.5				
Aroclor-1242	µg/kg	30	0	0	None	1.05					17.5	48.5				
Aroclor-1248	µg/kg	30	0	0	None	1.34					17.5	48.5				
Aroclor-1254	µg/kg	30	20	67	Lnrm	0.604			107.5	6.06	120	7800	7800	*J	SD-33	SD-33
Aroclor-1260	µg/kg	30	2	7	None	1.50					18.5	100	100		RCC-FP-3002	RCC-FP-3002-01
Aroclor-1262	µg/kg	1	0	0												
Aroclor-1268	µg/kg	9	9	100	Lnrm	22.01			81.17	2.28	83.6	246.7	246.7		GMP-SD-5002	GMP-SD-5002-0000-01
PCB Congeners																
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	ng/kg	2	2	100	None	1732		6769			6518	11304	11304	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (194)	ng/kg	2	2	100	None	369.8		1077			1131	1892	1892	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl	ng/kg	2	2	100	None	103.4		479.6			442.5	781.6	781.6	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',5,6-Octachlorobiphenyl (195)	ng/kg	2	2	100	None	224.4		490.7			571.3	918.3	918.3	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (196)	ng/kg	2	2	100	None	238.2		713.3			742.6	1247	1247	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',5-Heptachlorobiphenyl (170)	ng/kg	2	2	100	None	3175		3271			5488	7802	7802	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',6,6'-Octachlorobiphenyl (197)	ng/kg	2	2	100	None	11.64		23.65			28.36	45.08	45.08	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4',6-Heptachlorobiphenyl (171)	ng/kg	2	2	100	None	983.4		677.4			1462	1941	1941	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,4'-Hexachlorobiphenyl (128)	ng/kg	2	2	100	None	4377		3069			6547	8717	8717	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5,5',6-Octachlorobiphenyl (198)	ng/kg	2	2	100	None	1153		4572			4387	7620	7620	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5,5',6'-Octachlorobiphenyl (199)	ng/kg	1	1	100	None	72.98					72.98	72.98	72.98	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,2',3,3',4,5,5'-Heptachlorobiphenyl (172)	ng/kg	2	2	100	None	252.7		260.4			436.9	621.0	621.0	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (200)	ng/kg	1	1	100	None	563.6					563.6	563.6	563.6	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (201)	ng/kg	2	2	100	None	104.7		221.8			261.5	418.4	418.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5,6'-Heptachlorobiphenyl (174)	ng/kg	2	2	100	None	3319		3525			5811	8304	8304	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5',6-Heptachlorobiphenyl (175)	ng/kg	2	2	100	None	60.8		31.80			83.29	105.8	105.8	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5',6'-Heptachlorobiphenyl (177)	ng/kg	2	2	100	None	1449		1256			2337	3225	3225	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5-Hexachlorobiphenyl (129)	ng/kg	2	2	100	None	19175		7546			24510	29846	29846	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,5'-Hexachlorobiphenyl (130)	ng/kg	2	2	100	None	1377		680.1			1858	2339	2339	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,6,6'-Heptachlorobiphenyl (176)	ng/kg	2	2	100	None	330.41		250.8			507.7	685.0	685.0	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,6-Hexachlorobiphenyl (131)	ng/kg	2	2	100	None	319.81		115.2			401.3	482.7	482.7	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4,6'-Hexachlorobiphenyl (132)	ng/kg	2	2	100	None	8945		6379			13456	17967	17967	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',4-Pentachlorobiphenyl (82)	ng/kg	2	2	100	None	2510		831.5			3098	3685	3685	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',5,5',6-Heptachlorobiphenyl (178)	ng/kg	2	2	100	None	261.1		363.0			517.8	774.5	774.5	J	RWR-FP-5002	RWR-FP-5002-0000-01

Table C-6. Upstream Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,2',3,3',5,6-Hexachlorobiphenyl (134)	ng/kg	2	2	100	None	1289		874.2			1907	2525	2525	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',5,6'-Hexachlorobiphenyl (135)	ng/kg	2	2	100	None	4328		2240			5912	7496	7496	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',5-Pentachlorobiphenyl (83)	ng/kg	2	2	100	None	5781		550.9			6171	6560	6560	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',6,6'-Hexachlorobiphenyl (136)	ng/kg	2	2	100	None	2897		1643			4058	5220	5220	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3',6-Pentachlorobiphenyl (84)	ng/kg	2	2	100	None	5490		1813			6773	8055	8055	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,3'-Tetrachlorobiphenyl (40)	ng/kg	2	2	100	None	1031.7		1602			2164	3297	3297	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,4',5,5',6-Octachlorobiphenyl (203)	ng/kg	2	2	100	None	363.62		1348			1317	2270	2270	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)	ng/kg	2	2	100	None	2144		1988			3550	4956	4956	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,4',5,6'-Heptachlorobiphenyl (182)	ng/kg	2	0	0	None	71.63					87.81	104.0				
2,2',3,4,4',5',6-Heptachlorobiphenyl (183)	ng/kg	2	2	100	None	624.66		524.8			995.8	1367	1367	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,4',5-Hexachlorobiphenyl (137)	ng/kg	2	2	100	None	2417		1398			3406	4394	4394	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,4',6,6'-Heptachlorobiphenyl (184)	ng/kg	2	0	0	None	71.63					87.81	104.0				
2,2',3,4,4'-Pentachlorobiphenyl (85)	ng/kg	2	2	100	None	2839		255.6			3020	3201	3201	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,5,5',6-Heptachlorobiphenyl (185)	ng/kg	2	2	100	None	113.23		118.6			197.1	280.95	280.95	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4',5,5',6-Heptachlorobiphenyl (187)	ng/kg	2	2	100	None	1136		1187			1975	2814	2814	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,5,5'-Hexachlorobiphenyl (141)	ng/kg	2	2	100	None	2245		716.1			2752	3258	3258	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4',5,5'-Hexachlorobiphenyl (146)	ng/kg	2	2	100	None	1182		100.7			1253	1324	1324	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,2',3,4,5',6-Hexachlorobiphenyl (144)	ng/kg	2	0	0	None	35.82					43.91	52.00				
2,2',3,4',5,6-Hexachlorobiphenyl (147)	ng/kg	2	2	100	None	12138		6505			16737	21337	21337	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,5-Pentachlorobiphenyl (86)	ng/kg	2	2	100	None	12422		550.6			12811	13200	13200	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4',5-Pentachlorobiphenyl (90)	ng/kg	2	2	100	None	11079		524.9			11450	11821	11821	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,2',3,4,6-Pentachlorobiphenyl (88)	ng/kg	2	2	100	None	2379		705.5			2878	3377	3377	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4,6'-Pentachlorobiphenyl (89)	ng/kg	2	1	50	None	35.82					74.08	112.4	112.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,4'-Tetrachlorobiphenyl (42)	ng/kg	2	2	100	None	466.0		762.9			1005	1545	1545	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,5,5'-Pentachlorobiphenyl (92)	ng/kg	2	2	100	None	2297		354.5			2548	2798	2798	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,5,6-Pentachlorobiphenyl (93)	ng/kg	2	2	100	None	14326		2457			16063	17800	17800	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,5-Tetrachlorobiphenyl (43)	ng/kg	2	2	100	None	5110		195.4			5248	5386	5386	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,5'-Tetrachlorobiphenyl (44)	ng/kg	2	2	100	None	2387		1290			3300	4212	4212	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,6-Tetrachlorobiphenyl (45)	ng/kg	2	2	100	None	114.0		747.0			642.2	1170	1170	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3,6'-Tetrachlorobiphenyl (46)	ng/kg	2	2	100	None	89.71		254.8			269.9	450.0	450.0	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',3'-Trichlorobiphenyl (16)	ng/kg	2	2	100	None	424.4		1337			1370	2316	2316	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',4,4',5,5'-Hexachlorobiphenyl (153)	ng/kg	2	2	100	None	5201		1751			6439	7677	7677	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',4,5-Tetrachlorobiphenyl (48)	ng/kg	2	2	100	None	207		509.7			567.4	927.8	927.8	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',4,5'-Tetrachlorobiphenyl (49)	ng/kg	2	2	100	None	1329		549.6			1718	2106	2106	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',4,6-Tetrachlorobiphenyl (50)	ng/kg	2	2	100	None	256.0		475.5			592.3	928.5	928.5	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',4-Trichlorobiphenyl (17)	ng/kg	2	2	100	None	427.5		1406			1422	2416	2416	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',5-Trichlorobiphenyl (18)	ng/kg	2	2	100	None	411.5		1252			1297	2182	2182	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2',6-Trichlorobiphenyl (19)	ng/kg	2	2	100	None	109.8		333.4			345.5	581.3	581.3	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,2'-Dichlorobiphenyl (4)	ng/kg	2	2	100	None	147.9		464.7			476.5	805.0	805.0	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',5,5',6-Octachlorobiphenyl (205)	ng/kg	2	2	100	None	22.1		56.82			62.28	102.5	102.5	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	ng/kg	2	2	100	None	72.74		50.62			108.5	144.3	144.3	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',5,6-Heptachlorobiphenyl (190)	ng/kg	2	2	100	None	351.1		440.0			662.2	973.4	973.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',5',6-Heptachlorobiphenyl (191)	ng/kg	2	2	100	None	63.7		45.42			95.82	127.9	127.9	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',5-Hexachlorobiphenyl (156)	ng/kg	2	2	100	None	1938		415.7			2232	2526	2526	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4',6-Hexachlorobiphenyl (158)	ng/kg	2	2	100	None	1655		516.8			2021	2386	2386	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,4'-Pentachlorobiphenyl (105)	ng/kg	2	2	100	None	4165		176.7			4290	4415	4415	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4,5-Pentachlorobiphenyl (106)	ng/kg	2	2	100	None	937.5		30.83			959.3	981.1	981.1	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,3,3',4',5'-Pentachlorobiphenyl (108)	ng/kg	2	2	100	None	589.4		103.8			662.8	736.2	736.2	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4',6-Pentachlorobiphenyl (110)	ng/kg	2	2	100	None	25480		6255			29903	34326	34326	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',4'-Tetrachlorobiphenyl (56)	ng/kg	2	2	100	None	744.9		82.11			803.0	861.0	861.0	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3',6-Tetrachlorobiphenyl (59)	ng/kg	2	2	100	None	108.3		211.2			257.6	406.9	406.9	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,3'-Trichlorobiphenyl (20)	ng/kg	2	2	100	None	2146.4		4845			5572	8998	8998	J	RWR-FP-5002	RWR-FP-5002-0000-01

Table C-6. Upstream Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	ng/kg	2	2	100	None	782.2		217.9			936.2	1090	1090	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,4,4',5-Pentachlorobiphenyl (114)	ng/kg	2	2	100	None	187.8		3.13			190	192.2	192.2	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,3',4,4',5-Pentachlorobiphenyl (118)	ng/kg	2	2	100	None	13336		1021			14058	14780	14780	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,4,4'-Tetrachlorobiphenyl (60)	ng/kg	2	2	100	None	101.3		99.06			171.4	241.4	241.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3',4,4'-Tetrachlorobiphenyl (66)	ng/kg	2	2	100	None	2559		13.11			2569	2578	2578	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,3,4,5-Tetrachlorobiphenyl (61)	ng/kg	2	2	100	None	3104		1048			3845	4586	4586	J	RWR-SD-5003	RWR-SD-5003-0000-01
2,3,4',5-Tetrachlorobiphenyl (63)	ng/kg	2	1	50	None	32.72					34.27	35.82	32.72	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,4',6-Tetrachlorobiphenyl (64)	ng/kg	2	2	100	None	769.43		571.4			1173	1578	1578	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,4'-Trichlorobiphenyl (22)	ng/kg	2	2	100	None	659.2		1835			1957	3254	3254	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3',4-Trichlorobiphenyl (25)	ng/kg	2	2	100	None	98.04		236.3			265.1	432.2	432.2	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3',5-Trichlorobiphenyl (26)	ng/kg	2	2	100	None	231.46		610.9			663.4	1095	1095	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3,6-Trichlorobiphenyl (24)	ng/kg	2	2	100	None	268.28		126.2			357.5	446.7	446.7	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3-Dichlorobiphenyl (5)	ng/kg	2	1	50	None	3.58					51.18	98.78	98.78	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,3'-Dichlorobiphenyl (6)	ng/kg	2	2	100	None	128.49		430.6			433.0	737.4	737.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,4',5-Trichlorobiphenyl (31)	ng/kg	2	2	100	None	1053.27		2106			2543	4032	4032	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,4',6-Trichlorobiphenyl (32)	ng/kg	2	2	100	None	192.92		426.6			494.6	796.3	796.3	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,4-Dichlorobiphenyl (7)	ng/kg	2	1	50	None	3.58					61.68	119.8	119.8	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,4'-Dichlorobiphenyl (8)	ng/kg	2	2	100	None	666.32		2062			2124	3582	3582	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,5-Dichlorobiphenyl (9)	ng/kg	2	1	50	None	3.58					121.8	240	240	J	RWR-FP-5002	RWR-FP-5002-0000-01
2,6-Dichlorobiphenyl (10)	ng/kg	2	1	50	None	3.58					21.52	39.45	39.45	J	RWR-FP-5002	RWR-FP-5002-0000-01
2-Monochlorobiphenyl (1)	ng/kg	2	2	100	None	31.5		21.33			46.59	61.67	61.67	J	RWR-FP-5002	RWR-FP-5002-0000-01
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	ng/kg	3	0	0	None	0.306					35.82	52.00				
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	3	2	67	None	0.478					216.9	340.6	340.6	J	RWR-FP-5002	RWR-FP-5002-0000-01
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	3	3	100	None	153.17		272.5			393.6	697	697		Esmond Dam	DAM001-SD
3,4,4',5-Tetrachlorobiphenyl (81)	ng/kg	2	0	0	None	35.815					43.91	52.00				
3,4-Dichlorobiphenyl (12)	ng/kg	2	2	100	None	31.94		149.5			137.7	243.4	243.4	J	RWR-FP-5002	RWR-FP-5002-0000-01
4-Chlorobiphenyl (3)	ng/kg	2	1	50	None	14.325					56.78	99.23	99.23	J	RWR-FP-5002	RWR-FP-5002-0000-01
Decachlorobiphenyl (209)	ng/kg	2	2	100	None	1798.94		10360			9125	16450	16450	J	RWR-FP-5002	RWR-FP-5002-0000-01
Pcb Congeners, Total	ng/kg	2	2	100	None	222866		113618			303206	383546	383546	J	RWR-FP-5002	RWR-FP-5002-0000-01
TEQ (PCB)	ng/kg	2	2	100	None	24.5		9.12			30.95	37.4	37.4		RWR-FP-5002	RWR-FP-5002-0000-01
Pesticides/Herbicides																
4,4'-DDD	µg/kg	30	16	53	None	0.152		1.40			2.03	19.3	19.3	J	GMP-SD-5002	GMP-SD-5002-0000-01
4,4'-DDE	µg/kg	29	13	45	None	0.0665					1.9	31.28	31.28		GMP-SD-5002	GMP-SD-5002-0000-01
4,4'-DDT	µg/kg	30	11	37	None	0.1895					2.3	53	53		RCC-BK-3001	RCC-BK-3001Y-01
Aldrin	µg/kg	30	1	3	None	0.0305					0.95	2.5	1.9	J	SD-34	SD-34
alpha-BHC	µg/kg	30	0	0	None	0.0565					0.95	2.5				
alpha-Chlordane	µg/kg	30	19	63	None	0.0425		4.20			3.3	35.92	35.92		RWR-FP-5001	RWR-FP-5001-0000-01
beta-BHC	µg/kg	28	0	0	None	0.0345					0.9	2.5				
delta-BHC	µg/kg	30	1	3	None	0.0475					0.9	2.5	0.12	J	SD-32	SD-32
Dieldrin	µg/kg	30	8	27	None	0.1175					2.05	9.41	9.41		RWR-FP-5001	RWR-FP-5001-0000-01
Endosulfan I	µg/kg	30	1	3	None	0.071					0.9	23.5	0.25	J	SD-39	SD-39
Endosulfan II	µg/kg	30	3	10	None	0.067					1.85	38	38	J	RCC-BK-3001	RCC-BK-3001X-01
Endosulfan Sulfate	µg/kg	29	4	14	None	0.2135					1.82	12.69	12.69	J	RWR-FP-5004	RWR-FP-5004-0000-01
Endrin	µg/kg	30	1	3	None	0.2745					1.75	4.85	2.96		GMP-SD-5002	GMP-SD-5002-0000-01
Endrin Aldehyde	µg/kg	30	0	0	None	0.069					1.7	4.85				
Endrin Ketone	µg/kg	30	3	10	None	0.1165					1.7	20	20	J	SD-37	SD-37
gamma-BHC	µg/kg	30	0	0	None	0.0745					0.95	2.5				
gamma-Chlordane	µg/kg	28	14	50	None	0.03					1.94	12	12		RCC-SD-3003	RCC-SD-3003-01
Heptachlor	µg/kg	30	0	0	None	0.063					0.95	2.5				
Heptachlor Epoxide	µg/kg	30	2	7	None	0.0335					0.95	2.5	2.2	J	SD-37	SD-37
Methoxychlor	µg/kg	30	1	3	None	0.455					7.3	120	7.3	J	SD-32	SD-32
Technical Chlordane	µg/kg	9	8	89	Lnrm	151.9			367.5	1.73	354.6	735.4	735.4		RWR-FP-5001	RWR-FP-5001-0000-01
Toxaphene	µg/kg	30	0	0	None	4.95					80	250				

Table C-6. Upstream Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ancillary																
Percent Clay	pct	13	13	100	Lnrm	0			12.10	2.33	4.4	38	38		GMP-SD-5002	GMP-SD-5002-0000-01
Percent Fines (silt + clay)	pct	13	13	100	Norm	8.38	58.01	32.97			52.06	97	97		GMP-SD-5002	GMP-SD-5002-0000-01
Percent Gravel	pct	13	13	100	Lnrm	0			1.03	5.22	0	8	8		RCC-SD-3003	RCC-SD-3003-01
Percent Moisture	pct	5	5	100	Lnrm	43.3			56.05	1.31	48.5	81.5	81.5		GMP-SD-5007	GMP-SD-5007-0000-01
Percent Sand	pct	13	13	100	Norm	3	41.21	32.17			47.94	91.49	91.49		RWR-SD-5003	RWR-SD-5003-0000-01
Percent Silt	pct	13	13	100	None	0		31.64			7.48	78.24	78.24		RWR-FP-5001	RWR-FP-5001-0000-01
Percent Solids	pct	5	5	100	Norm	18.5	42.26	16.24			51.5	56.7	56.7		RWR-FP-5003	RWR-FP-5003-0000-01
Specific Gravity		5	5	100	None	2.65		0			2.65	2.65	2.65		RCC-FP-3001	RCC-FP-3001-01
													2.65		RCC-FP-3002	RCC-FP-3002-01
													2.65		RCC-SD-3001	RCC-SD-3001-01
													2.65		RCC-SD-3002	RCC-SD-3002-01
													2.65		RCC-SD-3003	RCC-SD-3003-01
Total Organic Carbon	pct	23	23	100	Norm	0.527	6.38	4.06			6.05	14.09	14.09		GMP-SD-5007	GMP-SD-5007-0000-01
Water Content	pct	8	8	100	Lnrm	56			144.4	2.55	98.5	569	569		GMP-SD-5002	GMP-SD-5002-0000-01

Table C-7. Allendale Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	149	134	90	Lnrm	0.24			171.1	10.30	286	5600	5600	J	AD-01	AD-01-FD
1,2,3,4,6,7,8-HpCDF	ng/kg	146	139	95	Lnrm	0.09			85.86	7.95	189.5	2914	2914	J	CMS-SD-4206	CMS-SD-4206-0035-0045
1,2,3,4,7,8,9-HpCDF	ng/kg	148	111	75	Lnrm	0.0245			5.67	9.63	13.38	1710	101.13		CMS-SD-4219	CMS-SD-4219-0075-0085
1,2,3,4,7,8-HxCDD	ng/kg	149	107	72	Lnrm	0.095			4.02	10.11	8.95	1155	123		RES-14-449-03	RES-SS-14-449-03
1,2,3,4,7,8-HxCDF	ng/kg	146	123	84	Lnrm	0.0255			11.53	7.80	20.9	1405	284.03	J	CMS-SD-4222	CMS-SD-4222-0085-0095
1,2,3,6,7,8-HxCDD	ng/kg	148	118	80	Lnrm	0.155			13.89	11.01	27.19	1055	845		CMS-470	CMS-470-B
1,2,3,6,7,8-HxCDF	ng/kg	139	126	91	Lnrm	0.15			14.13	5.90	21.9	1105	243.76		CMS-SD-4219	CMS-SD-4219-0075-0085
1,2,3,7,8,9-HxCDD	ng/kg	149	123	83	Lnrm	0.13			11.97	10.71	21.7	1455	409		CMS-470	CMS-470-B
1,2,3,7,8,9-HxCDF	ng/kg	139	66	47	None	0.0275					2.21	1265	99.2	J	APB-FP-2033	APB-FP-2033-0.502-01
1,2,3,7,8-PeCDD	ng/kg	148	108	73	Lnrm	0.1175			3.87	8.99	6.30	1105	253		CMS-470	CMS-470-B
1,2,3,7,8-PeCDF	ng/kg	145	116	80	Lnrm	0.09			3.80	6.82	5.1	1760	133	EMPC	CMW-FP-2026	CMW-FP-2026-0.502-01
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	74	66	89	Lnrm	0.93			554.1	27.77	678	364758	364758	J	SD-23	SD-23
2,3,4,6,7,8-HxCDF	ng/kg	148	108	73	Lnrm	0.026			5.64	10.44	15.42	2160	93	J	RES-14-449-03	RES-SS-DU-120299B
2,3,4,7,8-PeCDF	ng/kg	149	117	79	Lnrm	0.09			6.11	7.89	10.7	1155	135	J	CMS-487	CMS-487-B
2,3,7,8-TCDD	ng/kg	296	286	97	Lnrm	0.2			878.7	14.13	1591	110000	110000	J	CMS-208	CMS-208-B
2,3,7,8-TCDF	ng/kg	149	133	89	Lnrm	0.105			11.10	7.17	14.5	338	338	J	RES-14-449-03	RES-SS-DU-120299B
OCDD	ng/kg	149	139	93	Lnrm	0.245			1001	11.73	1620	38000	38000	J	AD-01	AD-01-FD
OCDF	ng/kg	144	123	85	Lnrm	0.105			114.8	10.79	286.0	6375	3607	J	CMS-SD-4222	CMS-SD-4222-0125-0135
PCDD/Fs	ng/kg	111	106	95	Lnrm	6.5			2562	9.99	3880	155000	155000		AD-01	AD-01-FD
TEQ	ng/kg	296	296	100	Lnrm	0.52			972.1	11.72	1600	110000	110000		CMS-208	CMS-208-B
Total HpCDD	ng/kg	108	100	93	Lnrm	0.24			275.3	11.34	505.9	9750	9750	J$	RES-14-449-03	RES-SS-14-449-03
Total HpCDF	ng/kg	108	105	97	Lnrm	0.105			138.9	8.31	262.1	3750	3750	$J	CMW-FP-2026	CMW-FP-2026-0.502-01
Total HxCDD	ng/kg	108	89	82	Lnrm	0.155			92.90	9.22	120	5950	5950	J	CMS-470	CMS-470-B
Total HxCDF	ng/kg	108	100	93	Lnrm	0.0275			119.2	10.21	229.8	2210	2210	J	CMW-FP-2026	CMW-FP-2026-0.502-01
Total PeCDD	ng/kg	108	89	82	Lnrm	0.135			24.03	8.48	20.5	2040	2040	J	CMS-470	CMS-470-B
Total PeCDF	ng/kg	108	98	91	Lnrm	0.16			105.7	10.67	165.6	3180	3180	J	CMS-470	CMS-470-A
Total TCDD	ng/kg	108	103	95	Lnrm	0.2			477.9	18.76	662.1	96000	96000		AD-01	AD-01-FD
Total TCDF	ng/kg	108	102	94	Lnrm	0.105			96.47	11.76	91.6	6810	6810	J$	RES-14-449-03	RES-SS-14-449-03
Metals																
Aluminum	mg/kg	78	78	100	Norm	1790	8990	5086			8435	22168	22168	J	APB-SD-4008	APB-SD-4008-0000-01
Antimony	mg/kg	78	33	42	None	0.04					0.775	13.7	13.7	J	RES-14-419-01	RES-SS-14-419-01
Arsenic	mg/kg	90	71	79	Lnrm	0.305			3.03	3.12	4.52	38.25	18	J	CMS-192	CMS-192-A
Barium	mg/kg	90	81	90	Norm	0.4	109.7	92.64			89.95	326	326		APC-SD-2036	APC-DU-110399B
Beryllium	mg/kg	78	63	81	Lnrm	0.115			0.853	3.18	0.95	4.6	4.6		APC-SD-2036	APC-DU-110399B
Cadmium	mg/kg	89	38	43	None	0.03					0.285	5.5	5.5		AD-01	AD-01-FD
Calcium	mg/kg	68	68	100	Lnrm	313			1405	1.94	1395	5140	5140		RES-12-240-01	RES-SS-12-240-01
Chromium	mg/kg	90	90	100	Lnrm	4.1			55.63	3.93	61	536	536	J	RES-14-449-01	RES-SS-14-449-01
Cobalt	mg/kg	78	72	92	Lnrm	0.545			4.91	2.05	4.85	16.5	16.5		APB-SD-4008	APB-SD-4008-0000-01
Copper	mg/kg	78	78	100	Lnrm	1.8			56.40	3.87	74.75	419	419	J	RES-14-449-01	RES-SS-14-449-01
Cyanide	mg/kg	3	1	33	None	0.75					2.4	3.2	2.4		CMS-192	CMS-192-A
Iron	mg/kg	78	78	100	Lnrm	3550			13534	1.84	15900	65000	65000		WRC-SD-2012	WRC-SD-2012-01
Lead	mg/kg	90	90	100	Lnrm	4.6			122.3	4.54	205	1090	1090		APB-FP-2033	APB-FP-2033-000.5-01
Magnesium	mg/kg	68	68	100	Lnrm	358			1467	1.99	1595	7320	7320		RES-12-240-01	RES-SS-12-240-01
Manganese	mg/kg	78	78	100	Lnrm	41.9			256.9	2.27	245	2050	2050		WRC-SD-2012	WRC-SD-2012-01
Mercury	mg/kg	84	69	82	Lnrm	0.0061			0.110	9.93	0.185	3.6	3.6		CMW-SD-2023	CMW-SD-2023-01
Mercury (methyl)	mg/kg	10	10	100	Lnrm	0.000196			0.000556	2.37	0.000473	0.00285	0.00285	J	APB-SD-4009	APB-SD-4009-0000-01
Molybdenum	mg/kg	12	12	100	Norm	1.24	13.12	6.77			12.25	29.6	29.6		CMS-SD-4003	CMS-SD-4003-0000-01
Nickel	mg/kg	78	73	94	Lnrm	0.865			14.05	3.10	16.55	94.6	94.6		APB-SD-4008	APB-SD-4008-0000-01
Potassium	mg/kg	67	67	100	Lnrm	169			604.8	1.75	610	2130	2130		RES-12-551-01	RES-SS-12-551-01
Selenium	mg/kg	89	22	25	None	0.295					0.755	31.85	4.7	J	RES-12-240-01	RES-SS-12-240-01
Silver	mg/kg	90	50	56	Lnrm	0.115			0.504	2.19	0.858	16	16		WRC-SD-2012	WRC-SD-2012-01
Sodium	mg/kg	66	31	47	None	4.075					51.43	488	488		RES-14-398-01	RES-SS-14-398-01

Table C-7. Allendale Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Thallium	mg/kg	75	15	20	None	0.168					0.345	313.5	2.4	J	RES-12-554-01	RES-SS-12-554-01
Vanadium	mg/kg	78	77	99	Lnrm	4.85			24.70	2.19	32.55	111	111	J	CMW-FP-2026	CMW-FP-2026-000.5-01
Zinc	mg/kg	78	72	92	Norm	0.255	299.3	338.6			175	2088	2088	J	CMS-SD-4007	CMS-SD-4007-0000-01
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	30	8	27	None	31.03					1025	4400	88.26	J	CMS-FP-4001	CMS-DU-072001
1,2,4-trichlorobenzene	µg/kg	45	0	0	None	10.5					15.16	2400				
1,2-dichlorobenzene	µg/kg	45	0	0	None	10.5					10.59	2400				
1,3-dichlorobenzene	µg/kg	45	0	0	None	9.84					9.84	2400				
1,4-dichlorobenzene	µg/kg	45	0	0	None	9.55					9.55	2400				
2,2'-oxybis(1-chloropropane)	µg/kg	63	0	0	None	9.60					195	4400				
2,4,5-trichlorophenol	µg/kg	72	1	1	None	22.68					675	11000	80	J	APB-SD-4010	APB-SD-4010-0000-01
2,4,6-trichlorophenol	µg/kg	65	0	0	None	19.95					260	4400				
2,4-dichlorophenol	µg/kg	65	0	0	None	17.53					260	4400				
2,4-dimethylphenol	µg/kg	65	0	0	None	17.75					260	4400				
2,4-dinitrophenol	µg/kg	51	0	0	None	30.36					1900	11000				
2,4-dinitrotoluene	µg/kg	65	0	0	None	19.08					260	4400				
2,6-dinitrotoluene	µg/kg	65	0	0	None	19.21					260	4400				
2-chloronaphthalene	µg/kg	65	0	0	None	17.68					260	4400				
2-chlorophenol	µg/kg	65	0	0	None	9.31					260	4400				
2-methylnaphthalene	µg/kg	85	10	12	None	17.95					180	4400	190	J	AD-01	AD-01-FD
													190	J	AD-04	AD-04-A
2-methylphenol	µg/kg	65	0	0	None	27.42					260	4400				
2-nitroaniline	µg/kg	65	0	0	None	15.89					650	11000				
2-nitrophenol	µg/kg	72	1	1	None	19.53					287.5	5000	5000		CMW-FP-2026	CMW-SD-DU-102899A
3,3'-dichlorobenzidine	µg/kg	65	0	0	None	48.42					260	4400				
3+4-methylphenols	µg/kg	2	0	0	None	490					495	500				
3-nitroaniline	µg/kg	65	0	0	None	12.62					650	11000				
4,6-dinitro-2-methylphenol	µg/kg	65	0	0	None	40.43					650	11000				
4-bromophenyl-phenylether	µg/kg	65	0	0	None	16.77					260	4400				
4-chloro-3-methylphenol	µg/kg	65	0	0	None	12.96					260	4400				
4-chloroaniline	µg/kg	65	0	0	None	41.62					260	4400				
4-chlorophenyl-phenylether	µg/kg	65	0	0	None	21.50					260	4400				
4-methylphenol	µg/kg	71	2	3	None	17.57					280	4400	830		APB-SD-4010	APB-SD-4010-0000-01
4-nitroaniline	µg/kg	65	0	0	None	12.62					650	11000				
4-nitrophenol	µg/kg	58	0	0	None	47.44					1875	11000				
Acenaphthene	µg/kg	86	17	20	None	16.45					195	4400	1200	J	RES-14-366-01	RES-SS-14-366-01
Acenaphthylene	µg/kg	87	16	18	None	14.64					195	4400	970	J	CMS-192	CMS-192-A
Acetophenone	µg/kg	22	0	0	None	260					1725	4400				
Anthracene	µg/kg	87	37	43	None	14.02					210	4200	3500	J	WRC-SD-2011	WRC-SD-2011-000.5-01
Atrazine	µg/kg	22	0	0	None	260					1725	4400				
Bapeq	µg/kg	80	67	84	Lnrm	11			711.0	12.75	1000	14000	14000		RES-14-334-01	RES-SS-14-334-01
Benzaldehyde	µg/kg	30	11	37	None	40.89					950	4400	349.35	J	APB-SD-4008	APB-SD-4008-0000-01
Benzo(a)anthracene	µg/kg	88	71	81	Lnrm	19.88			627.2	8.17	815	8400	8400		RES-14-334-01	RES-SS-14-334-01
Benzo(a)pyrene	µg/kg	88	72	82	Lnrm	11.90			715.1	6.08	880	9618	9618	J	CMS-FP-4001	CMS-DU-072001
Benzo(b)fluoranthene	µg/kg	88	72	82	Lnrm	16.51			838.2	7.49	1100	11383	11383	J	CMS-FP-4001	CMS-DU-072001
Benzo(g,h,i)perylene	µg/kg	88	46	52	Lnrm	24.89			90.74	3.78	255	7473	7473	J	CMS-FP-4001	CMS-DU-072001
Benzo(k)fluoranthene	µg/kg	88	73	83	Lnrm	13.97			900.7	6.23	1250	10519	10519	J	CMS-FP-4001	CMS-DU-072001
Benzoic Acid	µg/kg	2	0	0	None	2400					2450	2500				
Benzyl Alcohol	µg/kg	2	0	0	None	490					495	500				
Bis(2-chloroethoxy)methane	µg/kg	65	0	0	None	14.47					260	4400				
Bis(2-chloroethyl)ether	µg/kg	65	0	0	None	8.38					260	4400				
Bis-(2-chloroisopropyl)ether	µg/kg	2	0	0	None	490					495	500				
Bis(2-ethylhexyl)phthalate	µg/kg	75	33	44	None	22.93					950	12000	12000		WRC-SD-2015	WRC-SD-2015-01

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Butylbenzylphthalate	µg/kg	74	15	20	None	17.04					275	4400	1100	J	APC-SD-2036	APC-SD-2036-01
Caprolactam	µg/kg	22	0	0	None	260					1725	4400				
Carbazole	µg/kg	74	21	28	None	22.15					485	4400	1800	J	RES-14-334-01	RES-SS-14-334-01
Chrysene	µg/kg	88	74	84	Lnrm	20.26			987.2	6.22	1200	11722	11722	J	CMS-FP-4001	CMS-DU-072001
Dibenzo(a,h)anthracene	µg/kg	87	32	37	None	16.13					400	4400	2600	J	RES-14-334-01	RES-SS-14-334-01
Dibenzofuran	µg/kg	73	10	14	None	15.01					253.6	4400	920	J	WRC-SD-2011	WRC-SD-2011-000.5-01
Diethylphthalate	µg/kg	65	0	0	None	16.73					260	4400				
Dimethylphthalate	µg/kg	65	0	0	None	16.86					260	4400				
Di-n-butylphthalate	µg/kg	72	8	11	None	17.30					135	4400	610	EB	RES-14-398-01	RES-SS-14-398-01
Di-n-octylphthalate	µg/kg	72	4	6	None	12.38					210	4400	160	J	APB-SD-4010	APB-SD-4010-0000-01
Fluoranthene	µg/kg	88	76	86	Lnrm	23.28			1368	5.58	1650	22283	22283		CMS-FP-4001	CMS-DU-072001
Fluorene	µg/kg	86	20	23	None	18.32					250	4400	1600	J	WRC-SD-2011	WRC-SD-2011-000.5-01
Hexachlorobenzene	µg/kg	65	0	0	None	16.65					260	4400				
Hexachlorobutadiene	µg/kg	67	0	0	None	10.5					195	4400				
Hexachlorocyclopentadiene	µg/kg	65	0	0	None	16.13					260	4400				
Hexachloroethane	µg/kg	65	0	0	None	9.38					260	4400				
High Molecular Weight Pahs	µg/kg	80	68	85	Lnrm	13.98			4296	8.92	8200	100000	100000		RES-14-334-01	RES-SS-14-334-01
Indeno(1,2,3-cd)pyrene	µg/kg	88	68	77	Lnrm	15.56			497.0	8.55	795	8172	8172	J	CMS-FP-4001	CMS-DU-072001
Isophorone	µg/kg	65	0	0	None	14.76					260	4400				
Low Molecular Weight Pahs	µg/kg	79	59	75	Lnrm	13.98			585.8	8.71	820	20000	20000		WRC-SD-2011	WRC-SD-2011-000.5-01
Naphthalene	µg/kg	88	11	13	None	10.5					180	4400	290	J	AD-01	AD-01-FD
Nitrobenzene	µg/kg	65	0	0	None	16.31					260	4400				
N-nitroso-di-n-propylamine	µg/kg	65	0	0	None	22.81					260	4400				
N-nitroso-diphenylamine	µg/kg	65	0	0	None	15.04					260	4400				
Pentachlorophenol	µg/kg	72	0	0	None	22.30					1000	11000				
Phenanthrene	µg/kg	87	67	77	Lnrm	18.36			689.9	9.31	860	14000	14000		WRC-SD-2011	WRC-SD-2011-000.5-01
Phenol	µg/kg	72	0	0	None	10.50					280	4400				
Pyrene	µg/kg	88	74	84	Lnrm	16.06			1322	7.33	1600	17223	17223	J	CMS-FP-4001	CMS-DU-072001
Total PAH	µg/kg	88	76	86	Lnrm	13.98			5870	9.50	11000	121766	121766	J	CMS-FP-4001	CMS-DU-072001
Total Semi-volatile Organics	µg/kg	14	14	100	None	290		16766			385	45000	45000	J	AD-04	AD-04-A
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,1,1-trichloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,1,2,2-tetrachloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,1,2-trichloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,1-dichloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,1-dichloroethene	µg/kg	2	0	0	None	10.5					11.25	12				
1,1-dichloropropene	µg/kg	2	0	0	None	10.5					11.25	12				
1,2,3-trichlorobenzene	µg/kg	2	0	0	None	10.5					11.25	12				
1,2,3-trichloropropane	µg/kg	2	0	0	None	10.5					11.25	12				
1,2,4-trimethylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
1,2-dibromo-3-chloropropane	µg/kg	2	0	0	None	20.5					22	23.5				
1,2-dibromoethane	µg/kg	2	0	0	None	20.5					22	23.5				
1,2-dichloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
1,2-dichloropropane	µg/kg	2	0	0	None	10.5					11.25	12				
1,3,5-trimethylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
1,3-dichloropropane	µg/kg	2	0	0	None	10.5					11.25	12				
2,2-dichloropropane	µg/kg	2	0	0	None	10.5					11.25	12				
2-chlorotoluene	µg/kg	2	0	0	None	10.5					11.25	12				
4-chlorotoluene	µg/kg	2	0	0	None	10.5					11.25	12				
Benzene	µg/kg	2	0	0	None	10.5					11.25	12				

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Bromobenzene	µg/kg	2	0	0	None	10.5					11.25	12				
Bromochloromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Bromodichloromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Bromoform	µg/kg	2	0	0	None	10.5					11.25	12				
Bromomethane	µg/kg	2	0	0	None	10.5					11.25	12				
Carbon Tetrachloride	µg/kg	2	0	0	None	10.5					11.25	12				
Chlorobenzene	µg/kg	2	0	0	None	10.5					11.25	12				
Chloroethane	µg/kg	2	0	0	None	10.5					11.25	12				
Chloroform	µg/kg	2	0	0	None	10.5					11.25	12				
Chloromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Cis-1,2-dichloroethene	µg/kg	2	0	0	None	10.5					11.25	12				
Cis-1,3-dichloropropene	µg/kg	2	0	0	None	10.5					11.25	12				
Dibromochloromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Dibromomethane	µg/kg	2	0	0	None	10.5					11.25	12				
Dichlorodifluoromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Ethylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
Isopropylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
m&p-Xylene	µg/kg	2	0	0	None	10.5					11.25	12				
Methylene Chloride	µg/kg	2	0	0	None	20.5					22	23.5				
N-butylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
N-propylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
O-xylene	µg/kg	2	0	0	None	10.5					11.25	12				
P-isopropyltoluene	µg/kg	2	0	0	None	10.5					11.25	12				
Sec-butylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
Styrene	µg/kg	2	0	0	None	10.5					11.25	12				
Tert-butylbenzene	µg/kg	2	0	0	None	10.5					11.25	12				
Tetrachloroethene	µg/kg	2	0	0	None	10.5					11.25	12				
Toluene	µg/kg	2	0	0	None	10.5					11.25	12				
Total Volatile Organics	µg/kg	2	2	100	None	41		4.24			44	47	47		CMS-192	CMS-192-A
Total Xylenes	µg/kg	2	0	0	None	10.5					11.25	12				
Trans-1,2-dichloroethene	µg/kg	2	0	0	None	10.5					11.25	12				
Trans-1,3-dichloropropene	µg/kg	2	0	0	None	10.5					11.25	12				
Trichloroethene	µg/kg	2	0	0	None	10.5					11.25	12				
Trichlorofluoromethane	µg/kg	2	0	0	None	10.5					11.25	12				
Vinyl Chloride	µg/kg	2	0	0	None	10.5					11.25	12				
PCB as Aroclors																
Aroclor, Total	µg/kg	148	131	89	Lnrm	0.604			268.1	8.58	320	28000	28000		CMS-607	CMS-607-A
Aroclor-1016	µg/kg	138	1	1	None	0.934					23	6000	46	J	WRC-SD-2010	WRC-SD-2010-01
Aroclor-1221	µg/kg	138	1	1	None	0.958					41.5	5000	93	J	WRC-SD-2010	WRC-SD-2010-01
Aroclor-1232	µg/kg	138	1	1	None	0.840					23.5	13000	46	J	WRC-SD-2010	WRC-SD-2010-01
Aroclor-1242	µg/kg	138	1	1	None	1.05					23	7500	46	J	WRC-SD-2010	WRC-SD-2010-01
Aroclor-1248	µg/kg	139	13	9	None	1.34					26.75	7500	140		WRC-SD-2015	WRC-SD-2015-01
Aroclor-1254	µg/kg	145	131	90	Lnrm	0.604			265.4	8.24	290	28000	28000		CMS-607	CMS-607-A
Aroclor-1260	µg/kg	138	3	2	None	1.50					24	5000	270		WRC-SD-2015	WRC-SD-2015-01
Aroclor-1262	µg/kg	1	0	0												
Aroclor-1268	µg/kg	12	12	100	Lnrm	33.93			66.50	1.73	61.97	156.4	156.4		APB-SD-4008	APB-SD-4008-0000-01

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PCB Congeners																
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	ng/kg	1	1	100	None	7566					7566	7566	7566	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (194)	ng/kg	1	1	100	None	2882					2882	2882	2882	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl	ng/kg	1	1	100	None	859.1					859.1	859.1	859.1	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',5,6-Octachlorobiphenyl (195)	ng/kg	1	1	100	None	1805					1805	1805	1805	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (196)	ng/kg	1	1	100	None	1715					1715	1715	1715	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',5-Heptachlorobiphenyl (170)	ng/kg	1	1	100	None	29732					29732	29732	29732	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4',6-Heptachlorobiphenyl (171)	ng/kg	1	1	100	None	7563					7563	7563	7563	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,4'-Hexachlorobiphenyl (128)	ng/kg	1	1	100	None	59035					59035	59035	59035	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5,5',6-Octachlorobiphenyl (198)	ng/kg	1	1	100	None	8779					8779	8779	8779	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5,5'-Heptachlorobiphenyl (172)	ng/kg	1	1	100	None	1267					1267	1267	1267	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (200)	ng/kg	1	1	100	None	934.2					934.2	934.2	934.2	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (201)	ng/kg	1	1	100	None	463.3					463.3	463.3	463.3	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5,6'-Heptachlorobiphenyl (174)	ng/kg	1	1	100	None	21694					21694	21694	21694	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5',6-Heptachlorobiphenyl (175)	ng/kg	1	1	100	None	221.4					221.35	221.35	221.35	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5',6'-Heptachlorobiphenyl (177)	ng/kg	1	1	100	None	11591					11591	11591	11591	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5-Hexachlorobiphenyl (129)	ng/kg	1	1	100	None	146808					146808	146808	146808	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,5'-Hexachlorobiphenyl (130)	ng/kg	1	1	100	None	12053					12053	12053	12053	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,6,6'-Heptachlorobiphenyl (176)	ng/kg	1	1	100	None	2502					2502	2502	2502	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,6-Hexachlorobiphenyl (131)	ng/kg	1	1	100	None	3224					3224	3224	3224	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4,6'-Hexachlorobiphenyl (132)	ng/kg	1	1	100	None	122182					122182	122182	122182	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',4-Pentachlorobiphenyl (82)	ng/kg	1	1	100	None	21966					21966	21966	21966	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',5,5',6-Heptachlorobiphenyl (178)	ng/kg	1	1	100	None	1435					1435	1435	1435	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',5,6-Hexachlorobiphenyl (134)	ng/kg	1	1	100	None	14548					14548	14548	14548	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',5,6'-Hexachlorobiphenyl (135)	ng/kg	1	1	100	None	31919					31919	31919	31919	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',5-Pentachlorobiphenyl (83)	ng/kg	1	1	100	None	19510					19510	19510	19510	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',6,6'-Hexachlorobiphenyl (136)	ng/kg	1	1	100	None	37081					37081	37081	37081	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3',6-Pentachlorobiphenyl (84)	ng/kg	1	1	100	None	47133					47133	47133	47133	J	CMS-FP-4001	CMS-DU-072001
2,2',3,3'-Tetrachlorobiphenyl (40)	ng/kg	1	1	100	None	12728					12728	12728	12728	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,4',5,5',6-Octachlorobiphenyl (203)	ng/kg	1	1	100	None	1887					1887	1887	1887	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)	ng/kg	1	1	100	None	11157					11157	11157	11157	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,4',5,5',6-Heptachlorobiphenyl (183)	ng/kg	1	1	100	None	2688					2688	2688	2688	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,4',5-Hexachlorobiphenyl (137)	ng/kg	1	1	100	None	11184					11184	11184	11184	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,4'-Pentachlorobiphenyl (85)	ng/kg	1	1	100	None	11629					11629	11629	11629	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4',5,5',6-Heptachlorobiphenyl (187)	ng/kg	1	1	100	None	6103					6103	6103	6103	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,5,5'-Hexachlorobiphenyl (141)	ng/kg	1	1	100	None	13853					13853	13853	13853	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4',5,5'-Hexachlorobiphenyl (146)	ng/kg	1	1	100	None	4028					4028	4028	4028	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4',5,6-Hexachlorobiphenyl (147)	ng/kg	1	1	100	None	85963					85963	85963	85963	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,5-Pentachlorobiphenyl (86)	ng/kg	1	1	100	None	58726					58726	58726	58726	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4',5-Pentachlorobiphenyl (90)	ng/kg	1	1	100	None	35972					35972	35972	35972	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4,6-Pentachlorobiphenyl (88)	ng/kg	1	1	100	None	12763					12763	12763	12763	J	CMS-FP-4001	CMS-DU-072001
2,2',3,4'-Tetrachlorobiphenyl (42)	ng/kg	1	1	100	None	5924					5924	5924	5924	J	CMS-FP-4001	CMS-DU-072001
2,2',3,5,5'-Pentachlorobiphenyl (92)	ng/kg	1	1	100	None	8190					8190	8190	8190	J	CMS-FP-4001	CMS-DU-072001
2,2',3,5,6-Pentachlorobiphenyl (93)	ng/kg	1	1	100	None	87212					87212	87212	87212	J	CMS-FP-4001	CMS-DU-072001
2,2',3,5-Tetrachlorobiphenyl (43)	ng/kg	1	1	100	None	25665					25665	25665	25665	J	CMS-FP-4001	CMS-DU-072001
2,2',3,5'-Tetrachlorobiphenyl (44)	ng/kg	1	1	100	None	21145					21145	21145	21145	J	CMS-FP-4001	CMS-DU-072001
2,2',3,6-Tetrachlorobiphenyl (45)	ng/kg	1	1	100	None	4375					4375	4375	4375	J	CMS-FP-4001	CMS-DU-072001
2,2',3,6'-Tetrachlorobiphenyl (46)	ng/kg	1	1	100	None	1891					1891	1891	1891	J	CMS-FP-4001	CMS-DU-072001
2,2',3'-Trichlorobiphenyl (16)	ng/kg	1	1	100	None	3003					3003	3003	3003	J	CMS-FP-4001	CMS-DU-072001

Table C-7. Allendale Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,2',4,4',5,5'-Hexachlorobiphenyl (153)	ng/kg	1	1	100	None	24357					24357	24357	24357	J	CMS-FP-4001	CMS-DU-072001
2,2',4,5-Tetrachlorobiphenyl (48)	ng/kg	1	1	100	None	1487					1487	1487	1487	J	CMS-FP-4001	CMS-DU-072001
2,2',4,5'-Tetrachlorobiphenyl (49)	ng/kg	1	1	100	None	5466					5466	5466	5466	J	CMS-FP-4001	CMS-DU-072001
2,2',4,6-Tetrachlorobiphenyl (50)	ng/kg	1	1	100	None	3776					3776	3776	3776	J	CMS-FP-4001	CMS-DU-072001
2,2',4-Trichlorobiphenyl (17)	ng/kg	1	1	100	None	2051					2051	2051	2051	J	CMS-FP-4001	CMS-DU-072001
2,2',5-Trichlorobiphenyl (18)	ng/kg	1	1	100	None	2361					2361	2361	2361	J	CMS-FP-4001	CMS-DU-072001
2,2',6-Trichlorobiphenyl (19)	ng/kg	1	1	100	None	1031					1031	1031	1031	J	CMS-FP-4001	CMS-DU-072001
2,2'-Dichlorobiphenyl (4)	ng/kg	1	1	100	None	1260					1260	1260	1260	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',5,5',6-Octachlorobiphenyl (205)	ng/kg	1	1	100	None	127.4					127.4	127.4	127.4	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	ng/kg	1	1	100	None	328.3					328.3	328.3	328.3	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',5,6-Heptachlorobiphenyl (190)	ng/kg	1	1	100	None	2017.64					2018	2018	2018	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',5',6-Heptachlorobiphenyl (191)	ng/kg	1	1	100	None	293.8					293.8	293.8	293.8	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',5-Hexachlorobiphenyl (156)	ng/kg	1	1	100	None	7539					7539	7539	7539	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4',6-Hexachlorobiphenyl (158)	ng/kg	1	1	100	None	10392					10392	10392	10392	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,4'-Pentachlorobiphenyl (105)	ng/kg	1	1	100	None	20467					20467	20467	20467	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4,5-Pentachlorobiphenyl (106)	ng/kg	1	1	100	None	4347					4347	4347	4347	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4',5'-Pentachlorobiphenyl (108)	ng/kg	1	1	100	None	2065					2065	2065	2065	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4',6-Pentachlorobiphenyl (110)	ng/kg	1	1	100	None	150922					150922	150922	150922	J	CMS-FP-4001	CMS-DU-072001
2,3,3',4'-Tetrachlorobiphenyl (56)	ng/kg	1	1	100	None	3670					3670	3670	3670	J	CMS-FP-4001	CMS-DU-072001
2,3,3',6-Tetrachlorobiphenyl (59)	ng/kg	1	1	100	None	1541					1541	1541	1541	J	CMS-FP-4001	CMS-DU-072001
2,3,3'-Trichlorobiphenyl (20)	ng/kg	1	1	100	None	15337					15337	15337	15337	J	CMS-FP-4001	CMS-DU-072001
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	ng/kg	1	1	100	None	2870					2870	2870	2870	J	CMS-FP-4001	CMS-DU-072001
2,3,4,4',5-Pentachlorobiphenyl (114)	ng/kg	1	1	100	None	2634					2634	2634	2634	J	CMS-FP-4001	CMS-DU-072001
2,3',4,4',5-Pentachlorobiphenyl (118)	ng/kg	1	1	100	None	65184					65184	65184	65184	J	CMS-FP-4001	CMS-DU-072001
2,3,4,4'-Tetrachlorobiphenyl (60)	ng/kg	1	1	100	None	3197					3197	3197	3197	J	CMS-FP-4001	CMS-DU-072001
2,3,4,5-Tetrachlorobiphenyl (61)	ng/kg	1	1	100	None	25879					25879	25879	25879	J	CMS-FP-4001	CMS-DU-072001
2,3,4',6-Tetrachlorobiphenyl (64)	ng/kg	1	1	100	None	6444					6444	6444	6444	J	CMS-FP-4001	CMS-DU-072001
2,3,4'-Trichlorobiphenyl (22)	ng/kg	1	1	100	None	6074					6074	6074	6074	J	CMS-FP-4001	CMS-DU-072001
2,3',4-Trichlorobiphenyl (25)	ng/kg	1	1	100	None	729					729.06	729.06	729.06	J	CMS-FP-4001	CMS-DU-072001
2,3',5-Trichlorobiphenyl (26)	ng/kg	1	1	100	None	1581					1581	1581	1581	J	CMS-FP-4001	CMS-DU-072001
2,3,6-Trichlorobiphenyl (24)	ng/kg	1	1	100	None	840					840.38	840.38	840.38	J	CMS-FP-4001	CMS-DU-072001
2,3'-Dichlorobiphenyl (6)	ng/kg	1	1	100	None	1896					1896	1896	1896	J	CMS-FP-4001	CMS-DU-072001
2,4',5-Trichlorobiphenyl (31)	ng/kg	1	1	100	None	4783					4783	4783	4783	J	CMS-FP-4001	CMS-DU-072001
2,4',6-Trichlorobiphenyl (32)	ng/kg	1	1	100	None	791.4					791.4	791.4	791.4	J	CMS-FP-4001	CMS-DU-072001
2,4-Dichlorobiphenyl (7)	ng/kg	1	1	100	None	302.1					302.1	302.1	302.1	J	CMS-FP-4001	CMS-DU-072001
2,4'-Dichlorobiphenyl (8)	ng/kg	1	1	100	None	7374					7374.3	7374.3	7374.3	J	CMS-FP-4001	CMS-DU-072001
2,5-Dichlorobiphenyl (9)	ng/kg	1	1	100	None	398.7					398.7	398.7	398.7	J	CMS-FP-4001	CMS-DU-072001
2,6-Dichlorobiphenyl (10)	ng/kg	1	1	100	None	86.55					86.55	86.55	86.55	J	CMS-FP-4001	CMS-DU-072001
2-Monochlorobiphenyl (1)	ng/kg	1	1	100	None	880.9					880.9	880.9	880.9	J	CMS-FP-4001	CMS-DU-072001
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	2	1	50	None	1332					1332	1332	1332	J	CMS-FP-4001	CMS-DU-072001
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	2	2	100	None	1120		1279			2024	2928	2928	J	CMS-FP-4001	CMS-DU-072001
3,4-Dichlorobiphenyl (12)	ng/kg	1	1	100	None	1251					1251	1251	1251	J	CMS-FP-4001	CMS-DU-072001
4-Chlorobiphenyl (3)	ng/kg	1	1	100	None	1806					1806	1806	1806	J	CMS-FP-4001	CMS-DU-072001
Decachlorobiphenyl (209)	ng/kg	1	1	100	None	12541					12541	12541	12541	J	CMS-FP-4001	CMS-DU-072001
Pcb Congeners, Total	ng/kg	1	1	100	None	1455193					1455193	1455193	1455193	J	CMS-FP-4001	CMS-DU-072001
TEQ (PCB)	ng/kg	1	1	100	None	147					147	147	147		CMS-FP-4001	CMS-DU-072001

Table C-7. Allendale Sed[illegible]nt Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
2,4,5-T	µg/kg	2	0	0	None	30					30.75	31.5				
2,4,5-TP (Silvex)	µg/kg	2	0	0	None	30					30.75	31.5				
2,4-D	µg/kg	2	0	0	None	120					122.5	125				
2,4-DB	µg/kg	2	0	0	None	120					122.5	125				
4,4'-DDD	µg/kg	91	27	30	None	0.02					2.15	43.5	40	J	APB-FP-2033	APB-FP-2033-0.502-01
4,4'-DDE	µg/kg	97	45	46	None	0.0665					2.7	230	230	*	RES-12-555-01	RES-SS-12-555-01
4,4'-DDT	µg/kg	92	25	27	None	0.190					2.05	43.5	29.96	J	CMS-FP-4001	CMS-FP-4001-0000-01
Aldrin	µg/kg	92	1	1	None	0.0305					1	21.5	2.4	J	WRC-SD-2010	WRC-SD-2010-01
alpha-BHC	µg/kg	92	1	1	None	0.0565					1	21.5	2.4	J	WRC-SD-2010	WRC-SD-2010-01
alpha-Chlordane	µg/kg	91	51	56	Lnrm	0.0425			2.44	23.28	2.8	62	62		RES-14-398-01	RES-SS-14-398-01
beta-BHC	µg/kg	89	3	3	None	0.0345					0.975	21.5	6.2	J	CMS-215	CMS-215-A
Dalapon	µg/kg	2	0	0	None	60					62.5	65				
delta-BHC	µg/kg	93	2	2	None	0.0475					1	21.5	2.4	J	SD-20	SD-20
													2.4	J	WRC-SD-2010	WRC-SD-2010-01
Dicamba	µg/kg	2	0	0	None	60					62.5	65				
Dichlorprop	µg/kg	2	0	0	None	120					122.5	125				
Dieldrin	µg/kg	92	30	33	None	0.118					2.45	170	170	J	AD-04	AD-04-A
Dinoseb	µg/kg	2	0	0	None	18					18.5	19				
Endosulfan I	µg/kg	92	4	4	None	0.071					1	28	28	J	AD-01	AD-01-FD
Endosulfan II	µg/kg	94	30	32	None	0.067					2.15	440	440	*	RES-12-551-01	RES-SS-12-551-01
Endosulfan Sulfate	µg/kg	90	9	10	None	0.214					1.95	43.5	9.48		CMS-FP-4001	CMS-DU-072001
Endrin	µg/kg	92	6	7	None	0.275					1.95	43.5	28		APB-FP-2032	APB-FP-2032-01
Endrin Aldehyde	µg/kg	92	8	9	None	0.069					1.9	43.5	38		CMW-SD-2025	CMW-SD-2025-0.502-01
Endrin Ketone	µg/kg	90	5	6	None	0.117					1.9	43.5	34		RES-14-334-01	RES-SS-14-334-01
gamma-BHC	µg/kg	92	3	3	None	0.0745					1	21.5	2.4	J	WRC-SD-2010	WRC-SD-2010-01
gamma-Chlordane	µg/kg	91	47	52	Lnrm	0.03			2.43	1.15	2.95	74	74	*	RES-14-398-01	RES-SS-14-398-01
Heptachlor	µg/kg	92	7	8	None	0.063					1	21.5	4.4		RES-12-551-01	RES-SS-12-551-01
Heptachlor Epoxide	µg/kg	90	4	4	None	0.0335					1	21.5	6.3		RES-12-240-01	RES-SS-12-240-01
MCPA	µg/kg	2	0	0	None	12000					12250	12500				
MCPP	µg/kg	2	0	0	None	12000					12250	12500				
Methoxychlor	µg/kg	96	12	13	None	0.42					9.5	215	35	J	RES-12-551-01	RES-SS-12-551-01
Technical Chlordane	µg/kg	25	14	56	None	0.49		51.47			28.25	965.66	965.7	J	CMS-FP-4001	CMS-DU-072001
Toxaphene	µg/kg	92	1	1	None	4.95					38.5	850	240	J	WRC-SD-2010	WRC-SD-2010-01

Table C-7. Allendale Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ancillary																
Liquid Limit		20	20	100	Lnrm	45			103.9	1.54	100.5	193	193		CMS-SD-4222	CMS-SD-4222-1025-01
Organic Matter	pct	21	21	100	Lnrm	18.4			32.08	1.34	32.5	56.6	56.6		CMS-SD-4210	CMS-SD-4210-0005-01
Percent Ash	pct	21	21	100	Lnrm	4.5			6.13	1.18	6.2	9.2	9.2		CMS-SD-4220	CMS-SD-4220-0006-01
Percent Clay	pct	24	24	100	Norm	0.18	17.46	11.93			14.53	50.01	50.01		CMS-SD-4206	CMS-SD-4206-0510-01/ CMS SD-4206-1015-01
Percent Fines (silt + clay)	pct	47	47	100	None	1.14		34.11			70	97.94	97.94		CMS-SD-4218	CMS-SD-4218-0010-01
Percent Gravel	pct	47	47	100	Lnrm	0			5.24	3.76	0	79	79		CMS-SD-4208	CMS-SD-4208-0007-01
Percent Moisture	pct	29	29	100	Norm	23	57.80	12.32			60.2	76.2	76.2		APB-SD-4008	APB-SD-4008-0000-01
Percent Sand	pct	47	47	100	None	2.07		28.63			26.59	94.16	94.16		CMS-SD-4217	CMS-SD-4217-0409-01
Percent Silt	pct	24	24	100	None	0.37		25.26			57.68	73.09	73.09		CMS-SD-4215	CMS-SD-4215-0012-01
Percent Solids	pct	29	29	100	Lnrm	23.8			40.57	1.33	39.8	77	77		APB-SD-4010	APB-SD-4010-0000-01
Plastic Limit		20	20	100	Lnrm	43			83.47	1.38	87	171	171		CMS-SD-4206	CMS-SD-4206-0510-01/ CMS SD-4206-1015-01
Plasticity Index		20	20	100	Lnrm	1			11.89	4.07	14	96	96		CMS-SD-4222	CMS-SD-4222-1025-01
Specific Gravity		37	37	100	None	1.57		0.350			2.65	2.65	2.65		APB-FP-2028	APB-FP-2028-000.5-01
													2.65		APB-FP-2031	APB-FP-2031-01
													2.65		APB-FP-2032	APB-FP-2032-01
													2.65		APB-FP-2033	APB-FP-2033-000.5-01
													2.65		APB-SD-2029	APB-SD-2029-000.5-01
													2.65		APB-FP-2030	APB-SD-2030-01
													2.65		APB-SD-2034	APB-SD-2034-01
													2.65		APB-SD-2037	APB-SD-2037-01
													2.65		APC-SD-2036	APC-DU-110399B
													2.65		APC-SD-2035	APC-SD-2035-000.5-01
													2.65		APC-SD-2036	APC-SD-2036-01
													2.65		CMW-FP-2026	CMW-FP-2026-000.5-01
													2.65		CMW-FP-2027	CMW-FP-2027-01
													2.65		CMW-SD-2023	CMW-SD-2023-01
													2.65		CMW-SD-2024	CMW-SD-2024-01
													2.65		CMW-SD-2025	CMW-SD-2025-000.5-01
													2.65		WRC-SD-2009	WRC-SD-2009-01
													2.65		WRC-SD-2012	WRC-SD-2012-01
													2.65		WRC-SD-2015	WRC-SD-2015-01
Total Organic Carbon	pct	133	133	100	Norm	0.049	6.15	4.81			6.37	21.54	21.54		CMS-SD-4209	CMS-SD-4209-0510-01
Water Content	pct	29	29	100	Lnrm	38			154.4	1.65	152	336	336		CMS-SD-4212	CMS-SD-4212-0007-01

Table C-8. Oxbow Floodplain Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	7	7	100	Lnrm	20.6			144.2	5.54	213	3440	3440		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,4,6,7,8-HpCDF	ng/kg	7	7	100	Lnrm	8.81			60.02	7.33	72.3	3190	3190		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,4,7,8,9-HpCDF	ng/kg	7	5	71	Lnrm	0.299			3.15	3.84	4.9	93.6	93.6		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,4,7,8-HxCDD	ng/kg	7	7	100	Lnrm	0.61			3.65	4.49	3.87	57.5	57.5		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,4,7,8-HxCDF	ng/kg	7	7	100	Lnrm	1.71			7.93	4.17	8.32	98.2	98.2		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,6,7,8-HxCDD	ng/kg	7	7	100	Lnrm	1.28			9.16	7.32	9.67	504	504		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,6,7,8-HxCDF	ng/kg	7	7	100	Lnrm	1.26			6.69	4.80	8.55	102	102		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,7,8,9-HxCDD	ng/kg	7	6	86	Lnrm	0.345			5.58	7.41	8.36	213	213		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,7,8,9-HxCDF	ng/kg	7	6	86	Lnrm	0.141			2.26	6.58	2.7	62.3	62.3		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,7,8-PeCDD	ng/kg	7	7	100	Lnrm	0.705			3.96	4.28	4.19	52.1	52.1		LPX-SD-4404	LPX-SD-4404-0005-01
1,2,3,7,8-PeCDF	ng/kg	7	7	100	Lnrm	3.8			22.77	4.27	24.4	227	227	EMPC	LPX-SD-4406	LPX-SD-4406-0005-01
2,3,4,6,7,8-HxCDF	ng/kg	7	7	100	Lnrm	1.32			7.00	5.86	7.07	212	212		LPX-SD-4404	LPX-SD-4404-0005-01
2,3,4,7,8-PeCDF	ng/kg	7	7	100	Lnrm	1.01			6.98	5.81	6.3	173	173		LPX-SD-4404	LPX-SD-4404-0005-01
2,3,7,8-TCDD	ng/kg	7	7	100	Norm	12.2	1409	1467			789	4270	4270	J#	LPX-SD-4405	LPX-SD-4405-0005-01
2,3,7,8-TCDF	ng/kg	7	7	100	Lnrm	1.64			6.27	2.73	6.73	23.9	23.9		LPX-SD-4407	LPX-SD-4407-0005-01
OCDD	ng/kg	7	7	100	Lnrm	142			745.0	3.49	1380	4100	4100		LPX-SD-4404	LPX-SD-4404-0005-01
OCDF	ng/kg	7	7	100	Lnrm	11			75.48	5.34	102	1770	1770		LPX-SD-4404	LPX-SD-4404-0005-01
TEQ	ng/kg	7	7	100	Lnrm	346.8			995.1	2.59	795.5	4291	4291		LPX-SD-4405	LPX-SD-4405-0005-01
Total HpCDD	ng/kg	7	7	100	Lnrm	40.3			301.9	6.45	415	10700	10700	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total HpCDF	ng/kg	7	7	100	Lnrm	14.4			112.7	7.16	138	5360	5360	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total HxCDD	ng/kg	7	6	86	Lnrm	2.18			74.51	10.61	96.6	4930	4930	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total HxCDF	ng/kg	7	7	100	Lnrm	15.2			118.9	7.78	131	6590	6590	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total PeCDD	ng/kg	7	6	86	Lnrm	1.46			28.06	7.27	34.9	547	547	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total PeCDF	ng/kg	7	7	100	Lnrm	14.2			110.2	4.98	123	1630	1630	J	LPX-SD-4404	LPX-SD-4404-0005-01
Total TCDD	ng/kg	7	7	100	Lnrm	118			893.3	3.38	833	4460	4460	J	LPX-SD-4405	LPX-SD-4405-0005-01
Total TCDF	ng/kg	7	7	100	Lnrm	20.9			95.37	3.34	124	471	471	J	LPX-SD-4404	LPX-SD-4404-0005-01
Metals																
Antimony	mg/kg	5	5	100	Lnrm	0.922			2.31	2.17	2.63	7.01	7.01		LPX-SD-4404	LPX-SD-4404-0005-01
Arsenic	mg/kg	5	4	80	Lnrm	0.181			2.91	1.15	2.99	12.8	12.8		LPX-SD-4404	LPX-SD-4404-0005-01
Barium	mg/kg	5	5	100	Lnrm	163			248.1	1.59	224	514	514		LPX-SD-4404	LPX-SD-4404-0005-01
Beryllium	mg/kg	5	5	100	Lnrm	2.69			4.13	1.50	3.61	7.9	7.9		LPX-SD-4402	LPX-SD-4402-0005-01
Cadmium	mg/kg	5	4	80	Norm	0.0075	2.61	1.84			2.87	8.25	8.25		LPX-SD-4404	LPX-SD-4404-0005-01
Chromium	mg/kg	5	5	100	Lnrm	18.1			51.93	2.06	46.1	104	104	J	LPX-SD-4402	LPX-SD-4402-0005-01
Cobalt	mg/kg	5	5	100	Lnrm	4.3			11.60	1.97	11.9	22	22		LPX-SD-4404	LPX-SD-4404-0005-01
Copper	mg/kg	5	5	100	Lnrm	17.2			52.38	3.33	36.7	357	357		LPX-SD-4404	LPX-SD-4404-0005-01
Lead	mg/kg	5	5	100	Lnrm	44.4			275.2	3.90	246	1835	1835		LPX-SD-4404	LPX-SD-4404-0005-01
Manganese	mg/kg	5	5	100	Lnrm	809			827.4	1.03	827	859	859		LPX-SD-4404	LPX-SD-4404-0005-01
Molybdenum	mg/kg	5	5	100	Lnrm	2.1			5.61	2.13	5.71	17.3	17.3		LPX-SD-4402	LPX-SD-4402-0005-01
Nickel	mg/kg	5	5	100	Norm	6.91	23.86	11.03			30.7	32.4	32.4		LPX-SD-4402	LPX-SD-4402-0005-01
Selenium	mg/kg	5	3	60	Norm	0.205	1.52				1.52	2.22	2.22		LPX-SD-4404	LPX-SD-4404-0005-01
Silver	mg/kg	5	5	100	Lnrm	0.399			1.17	3.81	1.04	11.1	11.1		LPX-SD-4404	LPX-SD-4404-0005-01
Thallium	mg/kg	5	5	100	Lnrm	0.401			0.633	1.46	0.631	1.036	1.036		LPX-SD-4404	LPX-SD-4404-0005-01
Vanadium	mg/kg	5	5	100	Norm	31.8	53.8	15.83			59.8	71.1	71.1		LPX-SD-4404	LPX-SD-4404-0005-01
Zinc	mg/kg	5	5	100	Lnrm	58.3			240.4	3.92	149	1867	1867		LPX-SD-4404	LPX-SD-4404-0005-01

Table C-8. Oxbow Flooplain Soil Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
PCB as Aroclors																
Aroclor, Total		4	4	100	None	103.11		1654			411.625	3583.3	3583.3	J	LPX-SD-4402	LPX-SD-4402-0005-01
Aroclor 1016	µg/kg	4	0	0	None	8.10					8.31	10.16				
Aroclor 1221	µg/kg	4	0	0	None	8.08					8.295	10.14				
Aroclor 1232	µg/kg	4	0	0	None	8.08					8.295	10.14				
Aroclor 1242	µg/kg	4	0	0	None	8.08					8.295	10.14				
Aroclor 1248	µg/kg	4	0	0	None	8.08					8.295	10.14				
Aroclor 1254	µg/kg	4	3	75	None	8.48	1103.8	1674.1			411.6	3583	3583	J	LPX-SD-4402	LPX-SD-4402-0005-01
Aroclor 1260	µg/kg	4	0	0	None	8.10					8.31	10.16				
Aroclor 1268	µg/kg	4	1	25	None	8.08					9.125	103.11	103.11		LPX-SD-4404	LPX-SD-4404-0005-01
Pesticides/Herbicides																
4,4'-DDD	µg/kg	4	4	100	None	2.46		10.991			6.705	26.58	26.58		LPX-SD-4407	LPX-SD-4407-0005-01
4,4'-DDE	µg/kg	4	4	100	None	2.51		18.781			6.185	42.36	42.36		LPX-SD-4407	LPX-SD-4407-0005-01
4,4'-DDT	µg/kg	4	2	50	None	0.075					0.5175	2.76	2.76	J	LPX-SD-4407	LPX-SD-4407-0005-01
a-BHC	µg/kg	4	0	0	None	0.075					0.075	0.095				
a-chlordane	µg/kg	4	3	75	None	0.07	2.5375	3.4695			1.2	7.68	7.68	J	LPX-SD-4407	LPX-SD-4407-0005-01
aldrin	µg/kg	4	2	50	None	0.07					0.52	1.64	1.64	J	LPX-SD-4402	LPX-SD-4402-0005-01
b-BHC	µg/kg	4	0	0	None	0.065					0.0675	0.08				
d-BHC	µg/kg	4	0	0	None	0.08					0.0825	0.1				
dieldrin	µg/kg	4	3	75	None	0.08	17.35	30.719			2.97	63.38	63.38	J	LPX-SD-4402	LPX-SD-4402-0005-01
endosulfan I	µg/kg	4	0	0	None	0.085					0.085	0.105				
endosulfan II	µg/kg	4	2	50	None	0.08					0.63	3.37	3.37		LPX-SD-4404	LPX-SD-4404-0005-01
endosulfan sulfate	µg/kg	4	0	0	None	0.095					0.0975	0.12				
endrin	µg/kg	4	0	0	None	0.08					0.0825	0.1				
endrin aldehyde	µg/kg	4	2	50	None	0.105					1.0075	9.51	9.51	J	LPX-SD-4402	LPX-SD-4402-0005-01
endrin ketone	µg/kg	4	1	25	None	0.08					0.09	1.73	1.73		LPX-SD-4404	LPX-SD-4404-0005-01
g-chlordane	µg/kg	4	4	100	None	2.08	3.51	2.32			2.515	6.94	6.94		LPX-SD-4407	LPX-SD-4407-0005-01
heptachlor	µg/kg	4	1	25	None	0.075					0.085	0.73	0.73		LPX-SD-4404	LPX-SD-4404-0005-01
heptachlor epoxide	µg/kg	4	1	25	None	0.07					0.0775	0.18	0.18		LPX-SD-4404	LPX-SD-4404-0005-01
Lindane	µg/kg	4	1	25	None	0.07					0.0825	0.76	0.76	J	LPX-SD-4402	LPX-SD-4402-0005-01
Methoxychlor	µg/kg	4	0	0	None	0.11					0.1125	0.14				
Technical Chlordane	µg/kg	4	1	25	None	8.1					9.15	30.08	30.08		LPX-SD-4404	LPX-SD-4404-0005-01
Toxaphene	µg/kg	4	0	0	None	8.1					8.315	10.165				
Ancillary																
Total Organic Carbon	pct	4	4	100	None	4.73		13.34			14.38	36.14	36.14		LPX-SD-4407	LPX-SD-4407-0005-01

Table C-9. Lyman Mill Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	75	61	81	Lnrm	0.46			202.6	11.34	375	2427	2427		LPX-SD-4207	LPX-SD-4207-0000-0010
1,2,3,4,6,7,8-HpCDF	ng/kg	75	67	89	Lnrm	0.285			86.53	6.52	122.5	2385	2097	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,3,4,7,8,9-HpCDF	ng/kg	75	52	69	Lnrm	0.265			2.89	11.66	5.6	1725	170.4	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,3,4,7,8-HxCDD	ng/kg	75	55	73	Lnrm	0.14			2.84	6.54	4.2	1165	31	J	LPX-SD-2050	LPX-SD-2050-01
1,2,3,4,7,8-HxCDF	ng/kg	71	62	87	Lnrm	0.395			15.80	4.44	16.05	1420	241.6	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,3,6,7,8-HxCDD	ng/kg	73	66	90	Lnrm	0.26			15.67	4.84	15.7	1065	104.1		LPX-SD-4207	LPX-SD-4207-0000-0010
1,2,3,6,7,8-HxCDF	ng/kg	71	62	87	Lnrm	0.46			9.83	4.35	9.34	1115	336.5	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,3,7,8,9-HxCDD	ng/kg	75	62	83	Lnrm	0.285			8.89	7.31	11.8	1455	105.2	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,3,7,8,9-HxCDF	ng/kg	65	20	31	None	0.16					1.37	1700	9.77		Lymansville Dam	DAM003-SD
1,2,3,7,8-PeCDD	ng/kg	75	59	79	Lnrm	0.28			3.23	4.72	4.75	1115	40.48		LPX-SD-4201	LPX-SD-4201-0035-0045
1,2,3,7,8-PeCDF	ng/kg	72	60	83	Lnrm	0.22			3.72	5.88	4.5	1775	75.46	J	LPX-SD-4208	LPX-SD-4208-0190-0200
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/Kg	63	50	79	Lnrm	1.42			160.2	38.32	548.9	166500	166500	J	SD-18	SD-18
2,3,4,6,7,8-HxCDF	ng/kg	71	59	83	Lnrm	0.2			6.47	7.94	7.8	2150	87.44	J	LPX-SD-4208	LPX-SD-4208-0190-0200
2,3,4,7,8-PeCDF	ng/kg	75	61	81	Lnrm	0.185			4.47	4.02	5.89	1165	53.8	J	LPX-SD-4208	LPX-SD-4208-0190-0200
2,3,7,8-TCDD	ng/kg	82	81	99	Lnrm	0.35			435.6	10.11	717.5	7987	7987	J	SD-18	SD-18
2,3,7,8-TCDF	ng/kg	75	65	87	Lnrm	0.24			9.13	4.66	11.9	126.3	126.3		LPX-SD-4209	LPX-SD-4209-0145-0155
2,4,6,8-TCDT	ng/kg	1	0	0												
OCDD	ng/kg	75	63	84	Lnrm	0.75			1143	13.21	1980	18864	18864	J	LPX-SD-4207	LPX-SD-4207-0000-0010
OCDF	ng/kg	74	59	80	Lnrm	0.265			100.2	12.76	166	6440	2820	J	LPX-SD-4208	LPX-SD-4208-0190-0200
PCDD/Fs	ng/kg	53	44	83	Lnrm	12.55			1774	17.97	3520	24600	24600		LPX-SD-2050	LPX-SD-2050-01
TEQ	ng/Kg	82	82	100	Lnrm	0.89			491.1	8.55	725	8030	8030		SD-18	SD-18
Total HpCDD	ng/kg	54	51	94	Lnrm	2.3			386.2	5.96	554.5	3710	3710	J	LPX-SD-2050	LPX-SD-2050-01
Total HpCDF	ng/kg	54	52	96	Norm	1.4	326.1	304.2			227	1280	1280	J	LPX-SD-2052	LPX-SD-2052-000.5-01
Total HxCDD	ng/kg	54	50	93	Lnrm	1.25			88.13	4.38	126.4	739	739	J	LPX-SD-2050	LPX-SD-2050-01
Total HxCDF	ng/kg	54	53	98	Norm	0.8	238.2	210.0			175.5	875	875	J	LPX-SD-2052	LPX-SD-2052-000.5-01
Total PeCDD	ng/kg	54	49	91	Lnrm	0.31			20.27	3.93	25.4	209	209	J	LPX-SD-2050	LPX-SD-2050-01
Total PeCDF	ng/kg	54	54	100	Norm	1.4	188.5	168.0			140	783	783	J	LPX-SD-2050	LPX-SD-2050-01
Total TCDD	ng/kg	54	54	100	Lnrm	3.4			549.3	6.24	675.5	7840	7840	J&	LPX-SD-2045	LPX-SD-2045-01
Total TCDF	ng/kg	53	52	98	Lnrm	3.6			110.7	3.90	107	1300	1300	J	LPX-SD-2050	LPX-SD-2050-01
Metals																
Aluminum	mg/kg	57	57	100	Lnrm	1690			7892	1.93	7970	27773	27773	J	LPX-SD-4011	LPX-SD-4011-0000-01
Antimony	mg/kg	56	30	54	Lnrm	0.04			0.339	678.2	0.960	8.2	8.2	J	WRL-SD-2044	WRL-SD-2044-000.5-01
Arsenic	mg/kg	58	53	91	Lnrm	0.27			4.24	2.21	4.4	24.05	14.8		LPX-SD-2053	LPX-SD-2053-0204-01
Barium	mg/kg	58	58	100	Lnrm	10			81.29	2.40	86.6	380	380	J	LPX-SD-4004	LPX-SD-4004-0000-01
Beryllium	mg/kg	57	56	98	Lnrm	0.055			1.02	2.62	1.1	4.36	4.36		LPX-SD-4012	LPX-SD-4012-0000-01
Cadmium	mg/kg	57	40	70	Lnrm	0.025			0.750	6.25	0.93	7	7	J	WRL-SD-2044	WRL-SD-2044-0.502-01
Calcium	mg/kg	48	48	100	None	158		1465			2040	5860	5860		LPX-SD-2050	LPX-SD-2050-01
Chromium	mg/kg	58	58	100	Norm	2.8	89.51	70.18			69.15	259	259	J	LPX-SD-4011	LPX-SD-4011-0000-01
Cobalt	mg/kg	57	40	70	Lnrm	0.6			4.98	3.39	5.7	26.6	26.6		LPX-SD-4012	LPX-SD-4012-0000-01
Copper	mg/kg	57	54	95	Lnrm	2.65			51.49	3.16	63	319	319		LPX-SD-2046	LPX-SD-2046-0.502-01
Cyanide	mg/kg	1	0	0	None	3.75					3.75	3.75				
Iron	mg/kg	57	57	100	Lnrm	4890			13225	1.76	12800	41293	41293		LPX-SD-4012	LPX-SD-4012-0000-01
Lead	mg/kg	58	58	100	Norm	11.5	207.8	147.5			178.5	613	613	J	LPX-SD-4011	LPX-SD-4011-0000-01
Magnesium	mg/kg	48	48	100	Lnrm	358			1459	1.78	1560	3620	3620		Lymansville Dam	DAM003-SD
Manganese	mg/kg	57	57	100	Lnrm	44.1			348.2	2.37	372	1970	1970		LPX-SD-2050	LPX-SD-2050-01
Mercury	mg/kg	57	53	93	Lnrm	0.005			0.159	3.77	0.2	1.2	1.2	J	LPX-SD-2048	LPX-SD-DU-110999A
Mercury (methyl)	mg/kg	8	8	100	Lnrm	0.000259			0.000876	3.21	0.000576	0.00959	0.00959	J	WRL-SD-4005	WRL-SD-4005-0000-01
Molybdenum	mg/kg	9	9	100	Lnrm	1.6			5.08	2.06	5.44	13.4	13.4		LPX-SD-4004	LPX-SD-4004-0000-01
Nickel	mg/kg	57	43	75	Lnrm	1.4			15.97	4.90	18	113	113		LPX-SD-2050	LPX-SD-2050-01
Potassium	mg/kg	47	47	100	Lnrm	218			750.2	1.76	852	1980	1980	J	LPX-SD-2052	LPX-SD-2052-000.5-01
Selenium	mg/kg	57	15	26	None	0.24					0.55	20.05	4.5	J	WRL-SD-2044	WRL-SD-2044-0.502-01
Silver	mg/kg	58	30	52	Lnrm	0.185			0.347	1.45	1.63	14.6	14.6		WRL-SD-2044	WRL-SD-2044-000.5-01
Sodium	mg/kg	47	15	32	None	3.36					29.2	434	434		LPX-SD-2045B	LPX-SD-2045B-02
Thallium	mg/kg	56	13	23	None	0.0543					0.418	5	0.883	J	LPX-SD-4012	LPX-SD-4012-0000-01

Table C-9. Lyman Mill Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Vanadium	mg/kg	57	57	100	Lnrm	4			27.95	1.83	30.2	91.7	91.7		LPX-SD-4012	LPX-SD-4012-0000-01
Zinc	mg/kg	57	56	98	Lnrm	15.4			231.5	3.20	256	2060	2060	J	WRL-SD-2044	WRL-SD-2044-0.502-01
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	9	5	56	None	30.48					55.87	3450	55.87	J	LPX-SD-4011	LPX-SD-4011-0000-01
1,2,4-trichlorobenzene	µg/kg	45	0	0	None	15.16					15.16	2100				
1,2-dichlorobenzene	µg/kg	45	0	0	None	10.59					10.59	2100				
1,3-dichlorobenzene	µg/kg	45	0	0	None	9.84					9.84	2100				
1,4-dichlorobenzene	µg/kg	45	0	0	None	9.55					9.55	2100				
2,2'-oxybis(1-chloropropane)	µg/kg	49	0	0	None	6.9					9.60	2100				
2,4,5-trichlorophenol	µg/kg	52	0	0	None	11.36					22.68	5500				
2,4,6-trichlorophenol	µg/kg	49	0	0	None	10.71					19.95	2100				
2,4-dichlorophenol	µg/kg	49	0	0	None	14.43					17.53	2100				
2,4-dimethylphenol	µg/kg	49	0	0	None	12.99					17.75	2100				
2,4-dinitrophenol	µg/kg	39	0	0	None	30.36					30.36	5500				
2,4-dinitrotoluene	µg/kg	49	0	0	None	5.42					19.08	2100				
2,6-dinitrotoluene	µg/kg	49	0	0	None	7.93					19.21	2100				
2-chloronaphthalene	µg/kg	49	0	0	None	2.94					17.68	2100				
2-chlorophenol	µg/kg	49	0	0	None	9.31					12.09	2100				
2-methylnaphthalene	µg/kg	55	7	13	None	8.67					65.58	2100	98.48		LPX-SD-4012	LPX-SD-4012-0000-01
2-methylphenol	µg/kg	49	0	0	None	11.69					27.42	2100				
2-nitroaniline	µg/kg	49	0	0	None	15.89					17.69	5500				
2-nitrophenol	µg/kg	52	0	0	None	13.36					19.53	2100				
3,3'-dichlorobenzidine	µg/kg	49	0	0	None	48.42					50.94	2100				
3-nitroaniline	µg/kg	49	0	0	None	12.62					33.11	5500				
4,6-dinitro-2-methylphenol	µg/kg	49	0	0	None	7.64					40.43	5500				
4-bromophenyl-phenylether	µg/kg	49	0	0	None	6.62					16.77	2100				
4-chloro-3-methylphenol	µg/kg	49	0	0	None	12.96					14.05	2100				
4-chloroaniline	µg/kg	49	0	0	None	36.59					41.62	2100				
4-chlorophenyl-phenylether	µg/kg	49	0	0	None	8.52					21.50	2100				
4-methylphenol	µg/kg	52	2	4	None	13.61					185	2600	2600		WRL-SD-2041	WRL-SD-DUP01-02
4-nitroaniline	µg/kg	49	0	0	None	11.2					12.62	5500				
4-nitrophenol	µg/kg	50	0	0	None	18.81					251.2	5500				
Acenaphthene	µg/kg	58	13	22	None	4.71					107.3	2100	327		LPX-SD-4012	LPX-SD-4012-0000-01
Acenaphthylene	µg/kg	59	11	19	None	4.34					150	2100	429		LPX-SD-4012	LPX-SD-4012-0000-01
Acetophenone	µg/kg	4	0	0	None	380					2300	3450				
Anthracene	µg/kg	59	20	34	None	14.02					227.0	2100	1124		LPX-SD-4012	LPX-SD-4012-0000-01
Atrazine	µg/kg	4	0	0	None	380					2300	3450				
Bapeq	µg/kg	47	39	83	None	0.05		741.5			540	5300	5300		Lymansville Dam	DAM003-SD
Benzaldehyde	µg/kg	12	9	75	Lnrm	78			205.6	2.52	317.3	3450	459.4		LPX-SD-4013	LPX-SD-071601-A
Benzo(a)anthracene	µg/kg	59	48	81	Lnrm	19.88			508.7	5.37	770	5529	5529		LPX-SD-4013	LPX-SD-071601-A
Benzo(a)pyrene	µg/kg	59	49	83	Lnrm	11.90			527.9	5.83	800	7040	7040		LPX-SD-4013	LPX-SD-071601-A
Benzo(b)fluoranthene	µg/kg	59	50	85	Lnrm	16.51			664.3	4.97	780	8635	8635		LPX-SD-4013	LPX-SD-071601-A
Benzo(g,h,i)perylene	µg/kg	59	38	64	Lnrm	24.89			161.0	9.08	400	5594	5594		LPX-SD-4013	LPX-SD-071601-A
Benzo(k)fluoranthene	µg/kg	59	49	83	Lnrm	13.97			489.3	5.54	810	8122	8122		LPX-SD-4013	LPX-SD-071601-A
Bis(2-chloroethoxy)methane	µg/kg	49	0	0	None	6.11					14.47	2100				
Bis(2-chloroethyl)ether	µg/kg	49	0	0	None	7.59					8.38	2100				
Bis(2-ethylhexyl)phthalate	µg/kg	57	39	68	Lnrm	12.82			211.6	9.25	460	7900	7900	J	LPX-SD-4012	LPX-SD-4012-0000-01
Butylbenzylphthalate	µg/kg	57	15	26	None	10.31					200	2100	1200	J	LPX-SD-4012	LPX-SD-4012-0000-01
Caprolactam	µg/kg	4	0	0	None	380					2300	3450				
Carbazole	µg/kg	57	15	26	None	22.15					200	2100	810		WRL-SD-2041	WRL-SD-DUP01-02
Chrysene	µg/kg	59	51	86	Lnrm	20.26			678.2	4.85	900	9697	9697		LPX-SD-4013	LPX-SD-071601-A
Dibenzo(a,h)anthracene	µg/kg	59	19	32	None	16.13					240	2100	1238		LPX-SD-4013	LPX-SD-071601-A
Dibenzofuran	µg/kg	56	10	18	None	6.72					70.82	2100	274.3		LPX-SD-4013	LPX-SD-071601-A
Diethylphthalate	µg/kg	51	0	0	None	8.09					16.73	2100				
Dimethylphthalate	µg/kg	50	1	2	None	3.79					16.86	2100	180	J	LPX-SD-2045B	LPX-SD-2045B-02
Di-n-butylphthalate	µg/kg	56	7	13	None	8.41					17.30	2100	290	J	LPX-SD-4012	LPX-SD-4012-0000-01

Table C-9. Lyman Mill Se[illegible]nt Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Di-n-octylphthalate	µg/kg	53	4	8	None	12.04					12.38	2100	400	J	LPX-SD-4012	LPX-SD-4012-0000-01
Fluoranthene	µg/kg	59	56	95	Lnrm	23.28			1217	4.58	1100	18647	18647		LPX-SD-4013	LPX-SD-071601-A
Fluorene	µg/kg	59	15	25	None	7.69					180	2100	670.8		LPX-SD-4012	LPX-SD-4012-0000-01
Hexachlorobenzene	µg/kg	49	0	0	None	4.16					16.65	2100				
Hexachlorobutadiene	µg/kg	49	0	0	None	9.14					20.95	2100				
Hexachlorocyclopentadiene	µg/kg	49	0	0	None	5.08					16.13	2100				
Hexachloroethane	µg/kg	49	0	0	None	9.38					10.89	2100				
High Molecular Weight Pahs	µg/kg	47	44	94	None	13.98		8483			4000	40000	40000		Lymansville Dam	DAM003-SD
Indeno(1,2,3-cd)pyrene	µg/kg	59	43	73	Lnrm	15.56			336.6	5.98	530	6063	6063		LPX-SD-4013	LPX-SD-071601-A
Isophorone	µg/kg	49	0	0	None	5.93					14.76	2100				
Low Molecular Weight Pahs	µg/kg	47	35	74	None	13.98		555.3			440	3900	3900		AD-05	AD-05-A
Naphthalene	µg/kg	56	8	14	None	9.03					74.96	2100	185.1		LPX-SD-4012	LPX-SD-4012-0000-01
Nitrobenzene	µg/kg	49	0	0	None	6.84					16.31	2100				
N-nitroso-di-n-propylamine	µg/kg	49	0	0	None	8.26					22.81	2100				
N-nitroso-diphenylamine	µg/kg	49	0	0	None	5.57					15.04	2100				
Pentachlorophenol	µg/kg	52	0	0	None	11.03					22.30	5500				
Phenanthrene	µg/kg	59	47	80	Lnrm	18.36			605.2	5.84	840	8379	8379		LPX-SD-4012	LPX-SD-4012-0000-01
Phenol	µg/kg	52	1	2	None	10.50					54.78	2100	96	JEB	WRL-SD-2041	WRL-SD-DUP01-02
Pyrene	µg/kg	59	52	88	Lnrm	16.06			1044	4.62	1500	14006	14006		LPX-SD-4013	LPX-SD-071601-A
Total PAH	µg/kg	52	49	94	Lnrm	13.98			3960	7.04	5150	95489	95489		LPX-SD-4013	LPX-SD-071601-A
Total Semi-volatile Organics	µg/kg	1	1	100	None	19000					19000	19000	19000	J	AD-05	AD-05-A
PCB as Aroclors																
Aroclor, Total	µg/kg	59	45	76	Lnrm	0.604			83.87	5.19	109	2920	2920		LPX-SD-2046	LPX-SD-2046-0.502-01
Aroclor-1016	µg/kg	63	0	0	None	0.934					17.67	265				
Aroclor-1221	µg/kg	63	0	0	None	0.958					18.46	265				
Aroclor-1232	µg/kg	63	0	0	None	0.840					17.67	265				
Aroclor-1242	µg/kg	63	0	0	None	1.05					17.67	265				
Aroclor-1248	µg/kg	63	16	25	None	1.34					20.75	320	94		LPX-SD-2048	LPX-SD-2048-0.502-01
Aroclor-1254	µg/kg	65	49	75	Lnrm	0.604			84.84	5.22	93	2600	2600	*	LPX-SD-2046	LPX-SD-2046-0.502-01
Aroclor-1260	µg/kg	63	7	11	None	1.50					19	320	320		LPX-SD-2046	LPX-SD-2046-0.502-01
Aroclor-1262	µg/kg	1	0	0												
Aroclor-1268	µg/kg	10	10	100	Lnrm	34.59			85.29	2.28	72.45	313.8	313.8	J	LPX-SD-4013	LPX-SD-4013-0000-01
PCB Congeners																
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	ng/kg	3	3	100	None	3141		10055			10153	22969	22969		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (194)	ng/kg	3	3	100	None	1087		1369			1969	3773	3773	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl	ng/kg	3	3	100	None	477.6		672.2			605.6	1701	1701		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',5,6-Octachlorobiphenyl (195)	ng/kg	3	3	100	None	382.0		625.7			1279	1586	1586	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (196)	ng/kg	3	3	100	None	632.6		1128			1681	2886	2886	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',5-Heptachlorobiphenyl (170)	ng/kg	3	3	100	None	2476		6946			10837	16263	16263	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',6,6'-Octachlorobiphenyl (197)	ng/kg	3	3	100	None	17.12		26.32			60.91	64.32	64.32	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4',6-Heptachlorobiphenyl (171)	ng/kg	3	3	100	None	771.3		2186			3289	5126	5126	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,4'-Hexachlorobiphenyl (128)	ng/kg	3	3	100	None	3402		10127			10390	23359	23359	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5,5',6-Octachlorobiphenyl (198)	ng/kg	3	3	100	None	2632		6278			7423	15078	15078	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5,5',6'-Octachlorobiphenyl (199)	ng/kg	3	3	100	None	181.4		456.0			449.9	1070	1070		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5,5'-Heptachlorobiphenyl (172)	ng/kg	3	3	100	None	336.7		468.2			813.0	1273	1273		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (201)	ng/kg	3	3	100	None	207.4		265.8			581.5	721.6	721.6	J	LPX-SD-4004	LPX-SD-4004-0000-01
2,2',3,3',4,5,6'-Heptachlorobiphenyl (174)	ng/kg	3	3	100	None	1168		8234			14489	16213	16213	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5',6-Heptachlorobiphenyl (175)	ng/kg	2	2	100	None	78.99		229.3			241.2	403.3	403.3		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5',6'-Heptachlorobiphenyl (177)	ng/kg	3	3	100	None	1321		3116			5357	7451	7451	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5-Hexachlorobiphenyl (129)	ng/kg	3	3	100	None	18343		46487			43097	108332	108332	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,5'-Hexachlorobiphenyl (130)	ng/kg	3	3	100	None	1457		3816			3186	8760	8760		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,6,6'-Heptachlorobiphenyl (176)	ng/kg	3	3	100	None	314.8		822.9			1285	1951	1951	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,6-Hexachlorobiphenyl (131)	ng/kg	3	3	100	None	264.6		764.6			671.2	1744	1744	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',4,6'-Hexachlorobiphenyl (132)	ng/kg	3	2	67	None	83.39					6851	23573	23573	J	LPX-SD-4004	LPX-SD-4004-0000-01

Table C-9. Lyman Mill Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,2',3,3',4-Pentachlorobiphenyl (82)	ng/kg	3	3	100	None	1466		6112			8527	13638	13638	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',5,5',6-Heptachlorobiphenyl (178)	ng/kg	3	3	100	None	467.1		853.8			1120	2160	2160	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',5,6-Hexachlorobiphenyl (134)	ng/kg	3	3	100	None	1046		3386			3622	7757	7757	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',5,6'-Hexachlorobiphenyl (135)	ng/kg	3	3	100	None	4580		12188			11183	28202	28202	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',5-Pentachlorobiphenyl (83)	ng/kg	3	3	100	None	4797		17072			17520	38598	38598	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',6,6'-Hexachlorobiphenyl (136)	ng/kg	3	3	100	None	2162		7118			8823	16387	16387	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3',6-Pentachlorobiphenyl (84)	ng/kg	3	3	100	None	2388		12139			20416	25485	25485	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,3'-Tetrachlorobiphenyl (40)	ng/kg	3	3	100	None	2462		10098			19761	20137	20137	J	LPX-SD-4004	LPX-SD-4004-0000-01
2,2',3,4,4',5,5',6-Octachlorobiphenyl (203)	ng/kg	3	3	100	None	1021		2061			1929	4956	4956		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)	ng/kg	3	3	100	None	3746		5014			6715	13526	13526	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,4',5,6'-Heptachlorobiphenyl (182)	ng/kg	2	0	0	None	136.0					151.4	166.8				
2,2',3,4,4',5',6-Heptachlorobiphenyl (183)	ng/kg	3	3	100	None	1018		1950			2200	4828	4828		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,4',5-Hexachlorobiphenyl (137)	ng/kg	3	3	100	None	2174		6030			4897	13710	13710	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,4',6,6'-Heptachlorobiphenyl (184)	ng/kg	2	1	50	None	4.1					85.44	166.8	4.1	J	LPX-SD-4013	LPX-SD-071601-A
2,2',3,4,4'-Pentachlorobiphenyl (85)	ng/kg	3	3	100	None	1324		5776			7248	12874	12874	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,5,5',6-Heptachlorobiphenyl (185)	ng/kg	3	2	67	None	136.0					364.7	811.3	811.3		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4',5,5',6-Heptachlorobiphenyl (187)	ng/kg	3	3	100	None	2435		3229			4837	8827	8827	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,5,5'-Hexachlorobiphenyl (141)	ng/kg	3	3	100	None	2653		5742			3965	13189	13189		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4',5,5'-Hexachlorobiphenyl (146)	ng/kg	3	3	100	None	1554		2686			1765	6308	6308	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,5',6-Hexachlorobiphenyl (144)	ng/kg	2	0	0	None	67.975					75.68	83.39				
2,2',3,4',5,6-Hexachlorobiphenyl (147)	ng/kg	3	3	100	None	10220		29874			29267	68787	68787	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,5-Pentachlorobiphenyl (86)	ng/kg	3	3	100	None	21342		22979			40317	67080	67080	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4',5-Pentachlorobiphenyl (90)	ng/kg	3	3	100	None	9501		30595			39073	70680	70680	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,6-Pentachlorobiphenyl (88)	ng/kg	3	3	100	None	1071		5097			7988	11013	11013	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,4,6'-Pentachlorobiphenyl (89)	ng/kg	2	1	50	None	33.72					58.56	83.39	33.72	J	LPX-SD-4013	LPX-SD-071601-A
2,2',3,4'-Tetrachlorobiphenyl (42)	ng/kg	3	3	100	None	1313		4148			5246	9605	9605	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,5,5'-Pentachlorobiphenyl (92)	ng/kg	3	3	100	None	1634		6258			7869	14150	14150	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,5,6-Pentachlorobiphenyl (93)	ng/kg	3	3	100	None	6739		30117			47300	65584	65584	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,5-Tetrachlorobiphenyl (43)	ng/kg	3	3	100	None	847.9		12203			8210	24681	24681	J	LPX-SD-4004	LPX-SD-4004-0000-01
2,2',3,5'-Tetrachlorobiphenyl (44)	ng/kg	3	3	100	None	4999		14479			18113	33916	33916	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,6-Tetrachlorobiphenyl (45)	ng/kg	3	3	100	None	802.3		1838			2197	4445	4445	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3,6'-Tetrachlorobiphenyl (46)	ng/kg	3	3	100	None	268.5		736.4			1072	1739.3	1739	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',3'-Trichlorobiphenyl (16)	ng/kg	3	3	100	None	1049		2589			2700	6125	6125		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',4,4',5,5'-Hexachlorobiphenyl (153)	ng/kg	3	3	100	None	10118		17927			10748	41478	41478	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',4,5-Tetrachlorobiphenyl (48)	ng/kg	3	3	100	None	891.2		2104			1978	4955	4955		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',4,5'-Tetrachlorobiphenyl (49)	ng/kg	3	3	100	None	2690		8798			9420	20135	20135	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',4,6-Tetrachlorobiphenyl (50)	ng/kg	3	3	100	None	639.3		1760			2873	4113	4113	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',4-Trichlorobiphenyl (17)	ng/kg	3	3	100	None	1018		2735			2659	6358	6358		LPX-SD-4001	LPX-SD-4001-0000-01
2,2',5-Trichlorobiphenyl (18)	ng/kg	3	3	100	None	1071		1756			2595	4573	4573	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,2',6-Trichlorobiphenyl (19)	ng/kg	3	3	100	None	222.6		532.7			570.2	1269	1269		LPX-SD-4001	LPX-SD-4001-0000-01
2,2'-Dichlorobiphenyl (4)	ng/kg	3	3	100	None	260.5		937.1			1137	2133	2133		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',5,5',6-Octachlorobiphenyl (205)	ng/kg	3	3	100	None	49.42		87.17			106.0	220.5	220.5	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	ng/kg	3	3	100	None	86.53		165.3			199.6	412.0	412.0		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',5,6-Heptachlorobiphenyl (190)	ng/kg	3	3	100	None	432.1		932.0			1219	2289	2289	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',5',6-Heptachlorobiphenyl (191)	ng/kg	3	3	100	None	70.78		153.3			165.8	370.7	370.7		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',5-Hexachlorobiphenyl (156)	ng/kg	3	3	100	None	1513		4232			4042	9773	9773	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,4',6-Hexachlorobiphenyl (158)	ng/kg	3	2	67	None	33.36					1688	3060	3060	J	LPX-SD-4004	LPX-SD-4004-0000-01
2,3,3',4,4'-Pentachlorobiphenyl (105)	ng/kg	3	3	100	None	3550		9198			10593	21789	21789		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4,5-Pentachlorobiphenyl (106)	ng/kg	3	3	100	None	994.9		3251			3342	7420	7420	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4',5'-Pentachlorobiphenyl (108)	ng/kg	3	3	100	None	376.8		1286			1294	2916	2916	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4',6-Pentachlorobiphenyl (110)	ng/kg	3	3	100	None	13580		49756			76047	111898	111898	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',4'-Tetrachlorobiphenyl (56)	ng/kg	3	3	100	None	1427		5953			9650	12997	12997	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3',6-Tetrachlorobiphenyl (59)	ng/kg	3	3	100	None	417.4		1123			1225	2636	2636	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,3'-Trichlorobiphenyl (20)	ng/kg	3	3	100	None	8166		15803			13964	37973	37973	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	ng/kg	3	3	100	None	535.3		1594			1738	3694	3694	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4,4',5-Pentachlorobiphenyl (114)	ng/kg	2	2	100	None	188.4		669.3			661.68	1135	1135	J	LPX-SD-4001	LPX-SD-4001-0000-01

Table C-9. Lyman Mill Se[illegible]nt Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
2,3',4,4',5-Pentachlorobiphenyl (118)	ng/kg	3	3	100	None	11257		39270			42483	89280	89280		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4,4'-Tetrachlorobiphenyl (60)	ng/kg	3	3	100	None	414.8		1846			592.3	3697	3697	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3',4,4'-Tetrachlorobiphenyl (66)	ng/kg	3	3	100	None	4242		16940			24809	37842	37842	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4,5-Tetrachlorobiphenyl (61)	ng/kg	3	3	100	None	9692		22213			27017	53782	53782	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4',5-Tetrachlorobiphenyl (63)	ng/kg	3	2	67	None	67.98					286.0	729.8	729.8		LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4',6-Tetrachlorobiphenyl (64)	ng/kg	3	3	100	None	1819		5394			6863	12599	12599	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,4'-Trichlorobiphenyl (22)	ng/kg	3	3	100	None	2050		3988			4404	9826	9826		LPX-SD-4001	LPX-SD-4001-0000-01
2,3',4-Trichlorobiphenyl (25)	ng/kg	3	3	100	None	339.6		806.4			670.5	1872	1872		LPX-SD-4001	LPX-SD-4001-0000-01
2,3',5-Trichlorobiphenyl (26)	ng/kg	3	3	100	None	913.7		1826			1276	4241	4241	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3,6-Trichlorobiphenyl (24)	ng/kg	3	3	100	None	261.2		1831			1709	3898	3898	J	LPX-SD-4001	LPX-SD-4001-0000-01
2,3-Dichlorobiphenyl (5)	ng/kg	2	1	50	None	6.8					129.2	251.5	251.5		LPX-SD-4001	LPX-SD-4001-0000-01
2,3'-Dichlorobiphenyl (6)	ng/kg	3	3	100	None	229.3		707.3			235.2	1457	1457	J	LPX-SD-4004	LPX-SD-4004-0000-01
2,4',5-Trichlorobiphenyl (31)	ng/kg	3	3	100	None	2821		7887			6853	18044	18044		LPX-SD-4001	LPX-SD-4001-0000-01
2,4',6-Trichlorobiphenyl (32)	ng/kg	3	3	100	None	343.1		1380			1819	3101	3101		LPX-SD-4001	LPX-SD-4001-0000-01
2,4-Dichlorobiphenyl (7)	ng/kg	3	3	100	None	68.41		255.3			240.9	570.8	570.8		LPX-SD-4001	LPX-SD-4001-0000-01
2,4'-Dichlorobiphenyl (8)	ng/kg	3	3	100	None	881.2		5171			7312	11111	11111		LPX-SD-4001	LPX-SD-4001-0000-01
2,5-Dichlorobiphenyl (9)	ng/kg	3	3	100	None	79.79		325.1			372.5	728.9	728.9		LPX-SD-4001	LPX-SD-4001-0000-01
2,6-Dichlorobiphenyl (10)	ng/kg	3	3	100	None	14.05		54.79			76.5	123.3	123.3		LPX-SD-4001	LPX-SD-4001-0000-01
2-Monochlorobiphenyl (1)	ng/kg	3	3	100	None	100.8		557.8			1065	1068	1068	J	LPX-SD-4004	LPX-SD-4004-0000-01
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	ng/kg	3	0	0	None	67.975					75.68	83.39				
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	4	2	50	None	161.6					166.8	573.2	573.2	J	LPX-SD-4004	LPX-SD-4004-0000-01
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	4	4	100	None	628.4		1258			1732	3623	3623		LPX-SD-4001	LPX-SD-4001-0000-01
3,4,4',5-Tetrachlorobiphenyl (81)	ng/kg	2	0	0	None	67.975					75.68	83.39				
3,4-Dichlorobiphenyl (12)	ng/kg	3	3	100	None	210.0		1035			1145	2277	2277	J	LPX-SD-4001	LPX-SD-4001-0000-01
4-Chlorobiphenyl (3)	ng/kg	3	3	100	None	162.4		1203			2093	2371	2371		LPX-SD-4001	LPX-SD-4001-0000-01
Decachlorobiphenyl (209)	ng/kg	3	3	100	None	3157		12877			11855	28499	28499	J	LPX-SD-4001	LPX-SD-4001-0000-01
Pcb Congeners, Total	ng/kg	3	3	100	None	236490		589745			812949	1415882	1415882	J	LPX-SD-4001	LPX-SD-4001-0000-01
TEQ (PCB)	ng/kg	3	3	100	None	17		27.20			18.6	64.9	64.9		LPX-SD-4004	LPX-SD-4004-0000-01
Pesticides/Herbicides																
4,4'-DDD	µg/kg	63	18	29	None	0.152					2	50.19	50.19	J	LPX-SD-4013	LPX-SD-4013-0000-01
4,4'-DDE	µg/kg	63	22	35	None	0.0665					1.9	42.93	42.93		LPX-SD-4011	LPX-SD-4011-0000-01
4,4'-DDT	µg/kg	65	21	32	None	0.190					1.9	39	39	J	WRL-SD-2071	WRL-SD-2071-01
Aldrin	µg/kg	63	1	2	None	0.0305					0.95	13.5	0.58	J	SD-12	SD-12
alpha-BHC	µg/kg	63	0	0	None	0.0565					0.95	13.5				
alpha-Chlordane	µg/kg	66	39	59	Lnrm	0.0425			2.99	48.61	3.8	140.8	140.8		LPX-SD-4004	LPX-SD-4004-0000-01
beta-BHC	µg/kg	62	0	0	None	0.0345					0.95	13.5				
delta-BHC	µg/kg	59	0	0	None	0.0475					0.95	13.5				
Dieldrin	µg/kg	63	15	24	None	0.118					2	27.5	17	P	WRL-BK-2004	WRL-BK-2004Z-01
Endosulfan I	µg/kg	59	0	0	None	0.071					0.95	13.5				
Endosulfan II	µg/kg	63	14	22	None	0.067					2.03	290	290	EB*	LPX-SD-2046	LPX-SD-2046-0.502-01
Endosulfan Sulfate	µg/kg	62	4	6	None	0.214					1.55	27.5	10.55		WRL-SD-4005	WRL-SD-4005-0000-01
Endrin	µg/kg	63	3	5	None	0.275					1.48	27.5	9.5		LPX-SD-2046	LPX-SD-2046-0.502-01
Endrin Aldehyde	µg/kg	59	0	0	None	0.069					1.39	27.5				
Endrin Ketone	µg/kg	57	0	0	None	0.117					1.27	27.5				
gamma-BHC	µg/kg	62	2	3	None	0.0745					0.95	13.5	7		WRL-SD-2041	WRL-SD-DUP01-02
gamma-Chlordane	µg/kg	64	33	52	Lnrm	0.03			2.8	1	2.8	69.88	69.88		LPX-SD-4011	LPX-SD-4011-0000-01
Heptachlor	µg/kg	63	3	5	None	0.063					0.948	13.5	0.81	J	LPX-SD-4013	LPX-SD-071601-A
Heptachlor Epoxide	µg/kg	61	2	3	None	0.0335					0.95	13.5	6	P	WRL-SD-2042	WRL-SD-2042-02
Methoxychlor	µg/kg	62	3	5	None	0.625					1.51	135	39		LPX-SD-2046	LPX-SD-2046-0.502-01
Technical Chlordane	µg/kg	11	10	91	Norm	17	1150	629.2			992.2	2213	2213		LPX-SD-4004	LPX-SD-4004-0000-01
Toxaphene	µg/kg	63	0	0	None	4.95					36.91	550				

Table C-9. Lyman Mill Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ancillary																
Ash	pct	14	14	100	None	2.7		1.20			5.25	8.5	8.5		LPX-SD-4201	LPX-SD-4201-1031-01
Liquid Limit		14	14	100	Norm	37	142.6	64.83			150	273	273		LPX-SD-4201	LPX-SD-4201-1031-01
Organic Matter	pct	14	14	100	None	18		9.85			26.7	59.6	59.6		LPX-SD-4209	LPX-SD-4209-0812-01
Percent Clay	pct	21	21	100	Norm	1.23	21.68	12.31			26.42	45.2	45.2		LPX-SD-4210	LPX-SD-4210-0015-01
Percent Fines (silt + clay)	pct	39	39	100	None	3		29.72			83	99.81	99.81		LPX-SD-4004	LPX-SD-4004-0000-01
Percent Gravel	pct	39	39	100	None	0		14.35			0	77.18	77.18		LPX-SD-4206	LPX-SD-4206-1823-01
Percent Moisture	pct	19	19	100	None	37.7		9.29			67.7	85.7	85.7		LPX-SD-4012	LPX-SD-4012-0000-01
Percent Sand	pct	39	39	100	None	0.19		23.69			16	80	80		WRL-SD-2038	WRL-SD-2038-01
Percent Silt	pct	21	21	100	None	3.51		19.22			66.25	85.05	85.05		LPX-SD-4013	LPX-SD-071601-A
Percent Solids	pct	19	19	100	None	14.3		9.29			32.3	62.3	62.3		LPX-SD-4209	LPX-SD-4209-0812-01
Plastic Limit		14	14	100	Lnrm	35			82.37	1.43	87.5	168	168		LPX-SD-4201	LPX-SD-4201-1031-01
Plasticity Index		14	14	100	Norm	2	55.43	38.90			57	105	105		LPX-SD-4201	LPX-SD-4201-0010-01
													105		LPX-SD-4201	LPX-SD-4201-1031-01
Specific Gravity		31	31	100	None	1.7		0.294			2.65	2.65	2.65		LPX-SD-2045	LPX-SD-2045-01
													2.65		LPX-SD-2046	LPX-SD-2046-000.5-01
													2.65		LPX-SD-2047	LPX-SD-2047-01
													2.65		LPX-SD-2048	LPX-SD-2048-000.5-01
													2.65		LPX-SD-2049	LPX-SD-2049-01
													2.65		LPX-SD-2050	LPX-SD-2050-01
													2.65		LPX-SD-2051	LPX-SD-2051-01
													2.65		LPX-SD-2052	LPX-SD-2052-000.5-01
													2.65		LPX-SD-2053	LPX-SD-2053-000.5-01
													2.65		LPX-SD-2048	LPX-SD-DU-110999A
													2.65		WRL-SD-2040	WRL-DU-102599A
													2.65		WRL-SD-2038	WRL-SD-2038-01
													2.65		WRL-SD-2039	WRL-SD-2039-01
													2.65		WRL-SD-2041	WRL-SD-2041-01
													2.65		WRL-SD-2042	WRL-SD-2042-01
													2.65		WRL-SD-2043	WRL-SD-2043-01
													2.65		WRL-SD-2044	WRL-SD-2044-000.5-01
Total Organic Carbon	pct	73	73	100	Norm	0.101	8.31	5.77			8.49	26.99	26.99		LPX-SD-4201	LPX-SD-4201-3942-01
Water Content	pct	22	22	100	Lnrm	71			242.8	1.67	248	635	635		LPX-SD-4012	LPX-SD-4012-0000-01

Table C-10. Manton Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	13	13	100	Lnrm	5.3			96.69	6.02	161	921	921		WRM-SD-2055	WRM-SD-2055-01
1,2,3,4,6,7,8-HpCDF	ng/kg	13	13	100	Norm	1.4	108.7	107.8			50.6	305	305	J	WRM-SD-2057	WRM-SD-2057-01
1,2,3,4,7,8,9-HpCDF	ng/kg	13	8	62	None	0.22		0.957			5.69	1705000	16.5	J	WRM-SD-2054	WRM-SD-2054-01
1,2,3,4,7,8-HxCDD	ng/kg	13	8	62	None	0.14		0.427			4.85	1155000	8.8	J	WRM-SD-2057	WRM-SD-2057-01
													8.8		WRM-SD-2055	WRM-SD-2055-01
1,2,3,4,7,8-HxCDF	ng/kg	13	8	62	None	0.5		11.11			21	1405000	41	J	WRM-SD-2054	WRM-SD-2054-01
1,2,3,6,7,8-HxCDD	ng/kg	13	12	92	None	0.15		291214			12.2	1050000	31.9		WRM-SD-2055	WRM-SD-2055-01
1,2,3,6,7,8-HxCDF	ng/kg	13	7	54	None	2.2					15.6	1105000	22.2	J	WRM-SD-2054	WRM-SD-2054-01
1,2,3,7,8,9-HxCDD	ng/kg	13	12	92	None	0.1		402155			8.1	1450000	31.7	J	WRM-SD-2057	WRM-SD-2057-01
1,2,3,7,8,9-HxCDF	ng/kg	13	6	46	None	0.05					2.68	1255000	3	J	WRM-SD-2055	WRM-SD-2055-01
1,2,3,7,8-PeCDD	ng/kg	13	8	62	None	0.08		0.519			2.16	1100000	17.3	J	WRM-SD-2057	WRM-SD-2057-01
1,2,3,7,8-PeCDF	ng/kg	13	7	54	None	1.2					3.7	1755000	21.2	EMPC	WRM-SD-2054	WRM-SD-2054-01
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	10	10	100	Lnrm	18.8			214.0	5.09	258.5	2110	2110		Manton Dam	DAM004-SD
2,3,4,6,7,8-HxCDF	ng/kg	13	9	69	None	0.17		5.85			7	2150000	28.9	J	WRM-SD-2054	WRM-SD-2054-01
2,3,4,7,8-PeCDF	ng/kg	13	9	69	None	0.17		4.81			6.7	1150000	18.7	J	WRM-SD-2054	WRM-SD-2054-01
													18.7	J	WRM-SD-2057	WRM-SD-2057-01
2,3,7,8-TCDD	ng/kg	13	13	100	Lnrm	6.4			170.62	5.65	190	2620	2620	J$	WRM-SD-2054	WRM-SD-2054-01
2,3,7,8-TCDF	ng/kg	13	10	77	None	0.16		9.98			11.2	259500	64.2	J	WRM-SD-2057	WRM-SD-2057-01
OCDD	ng/kg	13	13	100	Lnrm	49.5			694.07	5.62	522	12330	12330	$	MAP-SD-2058	MAP-SD-2058-01
OCDF	ng/kg	13	13	100	Lnrm	1.9			66.47	8.51	201	1340	1340		MAP-SD-2058	MAP-SD-2058-01
PCDD/Fs	ng/kg	3	3	100	None	1830		3418			2100	7880	7880		WRM-SD-2054	WRM-SD-2054-01
TEQ	ng/kg	13	13	100	Lnrm	16.3			190.84	4.96	191	2670	2670		WRM-SD-2054	WRM-SD-2054-01
Total HpCDD	ng/kg	11	11	100	Lnrm	7			156.06	7.35	132	1740	1740	J	WRM-SD-2055	WRM-SD-2055-01
Total HpCDF	ng/kg	11	10	91	Lnrm	0.7			56.36	12.32	94.3	1030	1030	J	MAP-SD-2058	MAP-SD-2058-01
Total HxCDD	ng/kg	11	10	91	Lnrm	0.75			14.63	11.23	9.1	319	319	JEB	WRM-SD-2057	WRM-SD-2057-01
Total HxCDF	ng/kg	11	9	82	Lnrm	1.25			56.83	14.54	116	650	650	J	WRM-SD-2057	WRM-SD-2057-01
Total PeCDD	ng/kg	11	11	100	Lnrm	0.38			4.19	6.08	2.3	101	101	J	WRM-SD-2057	WRM-SD-2057-01
Total PeCDF	ng/kg	11	11	100	Lnrm	0.38			30.64	11.79	75.8	1030	1030	J	WRM-SD-2057	WRM-SD-2057-01
Total TCDD	ng/kg	11	11	100	Lnrm	8			155.13	5.87	134	2680	2680	J$	WRM-SD-2054	WRM-SD-2054-01
Total TCDF	ng/kg	11	10	91	Lnrm	1.85			37.48	5.15	69.4	313	313	J	WRM-SD-2054	WRM-SD-2054-01
Metals																
Aluminum	mg/kg	13	13	100	Lnrm	1800			3932	1.80	4390	10700	10700		WRM-SD-2054	WRM-SD-2054-01
Antimony	mg/kg	13	5	38	None	0.285					0.66	5.3	5.3	J	WRM-SD-2055	WRM-SD-2055-01
Arsenic	mg/kg	13	11	85	Lnrm	0.6			1.66	3.59	2.6	13.7	13.7	J	MAP-SD-2061	MAP-SD-2061-01
Barium	mg/kg	13	13	100	Lnrm	16.3			48.65	2.10	45.1	155	155		WRM-SD-2055	WRM-SD-2055-01
Beryllium	mg/kg	13	13	100	Lnrm	0.23			0.627	1.96	0.71	1.8	1.8		WRM-SD-2054	WRM-SD-2054-01
Cadmium	mg/kg	13	7	54	Lnrm	0.11			0.83		0.96	23.9	23.9		WRM-SD-2055	WRM-SD-2055-01
Calcium	mg/kg	13	13	100	Lnrm	560			1233	1.76	1390	3260	3260		WRM-SD-2057	WRM-SD-2057-01
Chromium	mg/kg	13	13	100	Lnrm	4.2			28.74	3.60	21.6	310	310	J	WRM-SD-2057	WRM-SD-2057-01
Cobalt	mg/kg	13	13	100	Lnrm	1.6			4.26	2.05	3.5	17.3	17.3		WRM-SD-2057	WRM-SD-2057-01
Copper	mg/kg	13	13	100	Lnrm	1.5			33.48	6.71	51.3	1110	1110		WRM-SD-2055	WRM-SD-2055-01
Cyanide	mg/kg	2	0	0	None	1.1					1.15	1.2				
Iron	mg/kg	13	13	100	Lnrm	3370			9427	2.10	9970	37900	37900	J	MAP-SD-2061	MAP-SD-2061-01
Lead	mg/kg	13	13	100	Lnrm	8.9			95.51	5.31	115	1230	1230	J	MAP-SD-2061	CMS-DU-092100A

Table C-10. Manton Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Magnesium	mg/kg	13	13	100	Lnrm	363			876.4	1.94	707	2460	2460		WRM-SD-2054	WRM-SD-2054-01
Manganese	mg/kg	13	13	100	Lnrm	67.6			233.6	2.05	241	525	525		WRM-SD-2054	WRM-SD-2054-01
Mercury	mg/kg	13	3	23	None	0.005					0.005	0.31	0.31	J	WRM-SD-2054	WRM-SD-2054-01
Nickel	mg/kg	13	7	54	Lnrm	0.365			12.8		12.8	187	187	J	WRM-SD-2055	WRM-SD-2055-01
Potassium	mg/kg	11	4	36	None	32.72					34.8	1110	1110		WRM-SD-2055	WRM-SD-2055-01
Selenium	mg/kg	12	1	8	None	0.23					0.243	5.2	2.9	J	WRM-SD-2054	WRM-SD-2054-01
Silver	mg/kg	13	2	15	None	0.265					0.28	4.6	4.6		WRM-SD-2055	WRM-SD-2055-01
Sodium	mg/kg	11	8	73	None	1.41		29.88			90.5	415	415		WRM-SD-2054	WRM-SD-2054-01
Thallium	mg/kg	13	0	0	None	0.495					0.52	5.2				
Vanadium	mg/kg	13	13	100	Lnrm	4.8			11.63	2.15	8.6	44.4	44.4		WRM-SD-2054	WRM-SD-2054-01
Zinc	mg/kg	13	13	100	Lnrm	14.2			107.4	3.69	161	1050	1050		WRM-SD-2055	WRM-SD-2055-01
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	11	2	18	None	120					250	495	180	J	MAP-SD-2061	CMS-DU-092100A
2,2'-oxybis(1-chloropropane)	µg/kg	11	0	0	None	200					460	495				
2,4,5-trichlorophenol	µg/kg	11	0	0	None	500					1150	1250				
2,4,6-trichlorophenol	µg/kg	11	0	0	None	200					460	495				
2,4-dichlorophenol	µg/kg	11	0	0	None	200					460	495				
2,4-dimethylphenol	µg/kg	11	0	0	None	200					460	495				
2,4-dinitrophenol	µg/kg	11	0	0	None	500					1150	1250				
2,4-dinitrotoluene	µg/kg	11	1	9	None	200					460	1200	1200	J	WRM-SD-2055	WRM-SD-2055-01
2,6-dinitrotoluene	µg/kg	11	0	0	None	200					460	495				
2-chloronaphthalene	µg/kg	11	0	0	None	200					460	495				
2-chlorophenol	µg/kg	11	1	9	None	200					460	1800	1800	J	WRM-SD-2055	WRM-SD-2055-01
2-methylnaphthalene	µg/kg	11	3	27	None	100					250	495	490	J	MAP-SD-2061	CMS-DU-092100A
2-methylphenol	µg/kg	11	0	0	None	200					460	495				
2-nitroaniline	µg/kg	11	0	0	None	500					1150	1250				
2-nitrophenol	µg/kg	11	0	0	None	200					460	495				
3,3'-dichlorobenzidine	µg/kg	11	0	0	None	200					460	495				
3-nitroaniline	µg/kg	11	0	0	None	500					1150	1250				
4,6-dinitro-2-methylphenol	µg/kg	11	0	0	None	500					1150	1250				
4-bromophenyl-phenylether	µg/kg	11	0	0	None	200					460	495				
4-chloro-3-methylphenol	µg/kg	11	1	9	None	200					460	2200	2200	J	WRM-SD-2055	WRM-SD-2055-01
4-chloroaniline	µg/kg	11	0	0	None	200					460	495				
4-chlorophenyl-phenylether	µg/kg	11	0	0	None	200					460	495				
4-methylphenol	µg/kg	11	0	0	None	200					460	495				
4-nitroaniline	µg/kg	11	0	0	None	500					1150	1250				
4-nitrophenol	µg/kg	11	1	9	None	500					1150	2200	2200	J	WRM-SD-2055	WRM-SD-2055-01
Acenaphthene	µg/kg	13	7	54	Lnrm	48			48		480	2300	2300		MAP-SD-2061	MAP-SD-2061-01
Acenaphthylene	µg/kg	13	7	54	Lnrm	130			130		230	495	420	J	MAP-SD-2061	MAP-SD-2061-01
Acetophenone	µg/kg	11	0	0	None	200					460	495				
Anthracene	µg/kg	13	8	62	Lnrm	100			213.7	9.34	495	5900	5900		MAP-SD-2061	MAP-SD-2061-01
Atrazine	µg/kg	11	0	0	None	200					460	495				
Bapeq	µg/kg	3	3	100	None	970		2182			3600	5300	5300		Manton Dam	DAM004-SD
Benzaldehyde	µg/kg	11	3	27	None	34					250	495	170	JEB	WRM-SD-2055	WRM-SD-2055-01
Benzo(a)anthracene	µg/kg	13	12	92	Lnrm	20			875.1	9.91	980	21000	21000	*	MAP-SD-2061	CMS-DU-092100A
Benzo(a)pyrene	µg/kg	13	12	92	Lnrm	32			945.7	6.01	820	15000	15000	J*	MAP-SD-2061	MAP-SD-2061-01
Benzo(b)fluoranthene	µg/kg	13	12	92	Lnrm	26			1379	8.97	1500	24000	24000	J*	MAP-SD-2061	CMS-DU-092100A
Benzo(g,h,i)perylene	µg/kg	13	11	85	Lnrm	23			485.2	11.97	520	6300	6300	J	MAP-SD-2061	MAP-SD-2061-01

Table C-10. Manton Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Benzo(k)fluoranthene	µg/kg	13	10	77	Lnrm	100			516.1	5.81	490	4600	4600	J	MAP-SD-2061	MAP-SD-2061-01
Bis(2-chloroethoxy)methane	µg/kg	11	0	0	None	200					460	495				
Bis(2-chloroethyl)ether	µg/kg	11	0	0	None	200					460	495				
Bis(2-ethylhexyl)phthalate	µg/kg	11	11	100	Lnrm	60			571.4	6.62	360	50000	50000	J*	WRM-SD-2055	WRM-SD-2055-01
Butylbenzylphthalate	µg/kg	11	3	27	None	64					250	495	98	J	MAP-SD-2059	MAP-SD-2059-01
Caprolactam	µg/kg	11	0	0	None	200					460	495				
Carbazole	µg/kg	11	6	55	Lnrm	52			52		320	1600	1600		MAP-SD-2061	MAP-SD-2061-01
Chrysene	µg/kg	13	12	92	Lnrm	24			1003	8.27	950	19000	19000	*	MAP-SD-2061	CMS-DU-092100A
Dibenzo(a,h)anthracene	µg/kg	13	8	62	Lnrm	78			141.5	5.96	450	1300	1300		MAP-SD-2061	MAP-SD-2061-01
Dibenzofuran	µg/kg	11	5	45	None	27					310	1500	1500		MAP-SD-2061	CMS-DU-092100A
Diethylphthalate	µg/kg	11	0	0	None	200					460	495				
Dimethylphthalate	µg/kg	11	0	0	None	200					460	495				
Di-n-butylphthalate	µg/kg	11	1	9	None	200					460	1800	1800	J	WRM-SD-2055	WRM-SD-2055-01
Di-n-octylphthalate	µg/kg	11	0	0	None	200					460	495				
Fluoranthene	µg/kg	13	13	100	Lnrm	38			1511	11.79	2000	51000	51000	*	MAP-SD-2061	CMS-DU-092100A
Fluorene	µg/kg	13	7	54	Lnrm	71			71		470	2200	2200		MAP-SD-2061	MAP-SD-2061-01
Hexachlorobenzene	µg/kg	11	0	0	None	200					460	495				
Hexachlorobutadiene	µg/kg	11	0	0	None	200					460	495				
Hexachlorocyclopentadiene	µg/kg	11	0	0	None	200					460	495				
Hexachloroethane	µg/kg	11	0	0	None	200					460	495				
High Molecular Weight Pahs	µg/kg	3	3	100	None	7000		16703			28000	40000	40000		Manton Dam	DAM004-SD
Indeno(1,2,3-cd)pyrene	µg/kg	13	11	85	Lnrm	28			594.1	11.72	720	7700	7700	J	MAP-SD-2061	MAP-SD-2061-01
Isophorone	µg/kg	11	0	0	None	200					460	495				
Low Molecular Weight Pahs	µg/kg	3	3	100	None	770		5218			4100	11000	11000		Manton Dam	DAM004-SD
Naphthalene	µg/kg	13	6	46	None	67					250	880	880	J	MAP-SD-2061	CMS-DU-092100A
Nitrobenzene	µg/kg	11	0	0	None	200					460	495				
N-nitroso-di-n-propylamine	µg/kg	11	1	9	None	200					460	1400	1400	J	WRM-SD-2055	WRM-SD-2055-01
N-nitroso-diphenylamine	µg/kg	11	0	0	None	200					460	495				
Pentachlorophenol	µg/kg	11	1	9	None	500					1150	1400	1400	J	WRM-SD-2055	WRM-SD-2055-01
Phenanthrene	µg/kg	13	11	85	Lnrm	23			845.8	17.49	1200	40000	40000	*	MAP-SD-2061	CMS-DU-092100A
Phenol	µg/kg	11	1	9	None	200					460	1900	1900	JEB	WRM-SD-2055	WRM-SD-2055-01
Pyrene	µg/kg	13	13	100	Lnrm	33			1388	11.90	1900	42000	42000	*	MAP-SD-2061	CMS-DU-092100A
													42000	*	MAP-SD-2061	MAP-SD-2061-01
Total PAH	µg/kg	3	3	100	None	7800		21652			32000	51000	51000		Manton Dam	DAM004-SD
PCB as Aroclors																
Aroclor, Total	µg/kg	3	3	100	None	196		104.22			227	390	390			
Aroclor-1016	µg/kg	13	0	0	None	5.08					5.08	34.5				
Aroclor-1221	µg/kg	13	0	0	None	2.11					2.11	70				
Aroclor-1232	µg/kg	13	0	0	None	1.35					1.35	34.5				
Aroclor-1242	µg/kg	13	0	0	None	4.64					4.64	34.5				
Aroclor-1248	µg/kg	13	0	0	None	1.08					1.075	34.5				
Aroclor-1254	µg/kg	13	4	31	None	1.26					1.26	2200	2200			
Aroclor-1260	µg/kg	13	0	0	None	4.64					4.64	34.5				
Aroclor-1262	µg/kg	2	0	0	None											
Aroclor-1268	µg/kg	2	2	100	None	16		0.707			16.5	17	17			

Table C-10. Manton Sediment Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
PCB Congeners																
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	ng/kg	2	0	0	None	0.383					0.383	0.383				
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	2	0	0	None	0.599					0.599	0.599				
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	2	2	100	None	425		241.1			595.5	766	766		Manton Dam	DAM004-SD
Pesticides/Herbicides																
4,4'-DDD	µg/kg	13	3	23	None	0.095					0.095	52	52		WRM-SD-2057	WRM-SD-2057-01
4,4'-DDE	µg/kg	13	4	31	None	0.069					0.069	48	48		WRM-SD-2057	WRM-SD-2057-01
4,4'-DDT	µg/kg	13	0	0	None	0.0525					0.0525	3.45				
Aldrin	µg/kg	13	0	0	None	0.107					0.107	1.75				
alpha-BHC	µg/kg	13	0	0	None	0.184					0.184	1.75				
alpha-Chlordane	µg/kg	13	3	23	None	0.06					0.06	13	13		Manton Dam	DAM004-SD
beta-BHC	µg/kg	13	0	0	None	0.106					0.106	1.75				
delta-BHC	µg/kg	13	0	0	None	0.0865					0.0865	1.75				
Dieldrin	µg/kg	13	0	0	None	0.0535					0.0535	3.45				
Endosulfan I	µg/kg	13	2	15	None	0.0675					0.0675	3.1	3.1		Manton Dam	DAM04A-SD
Endosulfan II	µg/kg	13	2	15	None	0.056					0.056	13	13		Manton Dam	DAM004-SD
Endosulfan Sulfate	µg/kg	13	0	0	None	0.068					0.068	3.45				
Endrin	µg/kg	13	0	0	None	0.059					0.059	3.45				
Endrin Aldehyde	µg/kg	13	0	0	None	0.897					0.897	3.45				
Endrin Ketone	µg/kg	13	0	0	None	0.065					0.065	3.45				
gamma-BHC	µg/kg	13	0	0	None	0.074					0.074	1.75				
gamma-Chlordane	µg/kg	13	4	31	None	0.061					0.061	7.3	7.3		Manton Dam	DAM004-SD
Heptachlor	µg/kg	13	0	0	None	0.130					0.130	1.75				
Heptachlor Epoxide	µg/kg	13	0	0	None	0.066					0.066	1.75				
Methoxychlor	µg/kg	13	0	0	None	0.075					0.075	17.5				
Technical Chlordane	µg/kg	2	0	0												
Toxaphene	µg/kg	13	0	0	None	100					125	175				
Ancillary																
Clay	pct	10	10	100	Lnrm	1			4.27	3.21	3.15	21.5	21.5		WRM-SD-2055	WRM-SD-2055-01
Fines (silt + clay)	pct	10	10	100	Lnrm	4.3			15.96	2.98	14.75	67.9	67.9		WRM-SD-2055	WRM-SD-2055-01
Gravel	pct	10	10	100	Lnrm	0.1			7.09	9.92	19.45	62.7	62.7		MAP-SD-2061	MAP-SD-2061-01
Percent Solids	pct	11	11	100	None	31.3		19.03			69.9	85.7	85.7		MAP-SD-2060	MAP-SD-2060-01
Sand	pct	10	10	100	Lnrm	29.6			45.70	1.40	45.05	87.5	87.5		MAP-SD-2059	MAP-SD-2059-01
Silt	pct	10	10	100	Lnrm	2.4			11.20	3.09	12	46.4	46.4		WRM-SD-2055	WRM-SD-2055-01
Specific Gravity		11	11	100	None	2.65		0			2.65	2.65	2.65		MAP-SD-2061	CMS-DU-092100A
													2.65		MAP-SD-2058	MAP-SD-2058-01
													2.65		MAP-SD-2059	MAP-SD-2059-01
													2.65		MAP-SD-2060	MAP-SD-2060-01
													2.65		MAP-SD-2060	MAP-SD-2060-01
													2.65		MAP-SD-2061	MAP-SD-2061-01
													2.65		WRM-SD-2055	WRM-SD-2055-01
													2.65		WRM-SD-2056	WRM-SD-2056-01
													2.65		WRM-SD-2057	WRM-SD-2057-01
													2.65		WRM-SD-2062	WRM-SD-2062-01
													2.65		WRM-SD-2056	CMS-DU-091900A
Total Organic Carbon	pct	12	12	100	Norm	0.198	3.49	2.68			3.89	7.97	7.97		WRM-SD-2055	WRM-SD-2055-01

Table C-11. Downstream of Man[illegible] Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	ng/kg	15	9	60	Lnrm	5.52			112.7	4.86	130	631	631		Olneyville Dam	DAM006-SD
1,2,3,4,6,7,8-HpCDF	ng/kg	15	11	73	Lnrm	0.2			32.01	3.04	28.39	2670	2670	$	WRD-SD-2063	WRD-SD-2063-01
1,2,3,4,7,8,9-HpCDF	ng/kg	15	5	33	None	0.24					1.39	105	105		WRD-SD-2063	WRD-SD-2063-01
1,2,3,4,7,8-HxCDD	ng/kg	15	6	40	None	0.14					1.4	19	19		WRD-SD-2063	WRD-SD-2063-01
1,2,3,4,7,8-HxCDF	ng/kg	12	10	83	None	1.26		2.07			4.1	592	592		WRD-SD-2063	WRD-SD-2063-01
1,2,3,6,7,8-HxCDD	ng/kg	13	12	92	Lnrm	0.93			7.32	3.48	6.95	46.1	46.1		Olneyville Dam	DAM006-SD
1,2,3,6,7,8-HxCDF	ng/kg	13	12	92	None	1.26		48.48			3.2	178	178		WRD-SD-2063	WRD-SD-2063-01
1,2,3,7,8,9-HxCDD	ng/kg	15	13	87	Lnrm	0.4			5.49	4.69	5.2	62.6	62.6		WRD-SD-2063	WRD-SD-2063-01
1,2,3,7,8,9-HxCDF	ng/kg	6	1	17	None	2.60					7.7	1250000	7.7	EMPC	WRD-SD-2063	WRD-SD-2063-01
1,2,3,7,8-PeCDD	ng/kg	15	6	40	None	0.265					1.6	8.5	8.5		WRD-SD-2063	WRD-SD-2063-01
1,2,3,7,8-PeCDF	ng/kg	12	8	67	None	0.62		1.18			1.91	1755000	37.2		WRD-SD-2063	WRD-SD-2063-01
1,2,4,5,7,8-hexachloro(9h)xanthene	ng/kg	15	9	60	Lnrm	5.91			52.76	4.98	345	49351	49351	J	SD-01	SD-01
2,3,4,6,7,8-HxCDF	ng/kg	13	10	77	None	0.98		1.08			2.51	223	223		WRD-SD-2063	WRD-SD-2063-01
2,3,4,7,8-PeCDF	ng/kg	15	11	73	Lnrm	0.285			1.57	2.00	1.63	92.9	92.9		WRD-SD-2063	WRD-SD-2063-01
2,3,7,8-TCDD	ng/kg	15	14	93	Lnrm	1.37			67.87	4.39	119.8	404.9	404.9	J	SD-04	SD-04
2,3,7,8-TCDF	ng/kg	15	12	80	Lnrm	0.215			6.12	4.28	5.83	101	101		WRD-SD-2063	WRD-SD-2063-01
2,4,6,8-TCDT	ng/kg	1	0	0												
OCDD	ng/kg	15	6	40	None	38.35					652	6260	6260		Olneyville Dam	DAM006-SD
OCDF	ng/kg	13	6	46	None	4.40					39.7	1250	1250	J	WRD-SD-2063	WRD-SD-2063-01
PCDD/Fs	ng/kg	12	3	25	None	31.85					283.3	6680	6680		Olneyville Dam	DAM006-SD
TEQ	ng/kg	15	15	100	Lnrm	19.2			95.11	2.88	132	471	471	J	WRD-SD-2063	WRD-SD-2063-01
Total HpCDD	ng/kg	3	3	100	None	105		562.2			242	1140	1140	J	WRD-SD-2063	WRD-SD-2063-01
Total HpCDF	ng/kg	3	3	100	None	40.3		2127			111	3760	3760	J$	WRD-SD-2063	WRD-SD-2063-01
Total HxCDD	ng/kg	3	3	100	None	23.3		241.3			43.5	451	451	JEB	WRD-SD-2063	WRD-SD-2063-01
Total HxCDF	ng/kg	3	3	100	None	45.6		1109			54.2	1970	1970	J	WRD-SD-2063	WRD-SD-2063-01
Total PeCDD	ng/kg	3	3	100	None	7.3		21.65			8.1	45.2	45.2	J	WRD-SD-2063	WRD-SD-2063-01
Total PeCDF	ng/kg	3	3	100	None	56		560.1			63.8	1030	1030	J	WRD-SD-2063	WRD-SD-2063-01
Total TCDD	ng/kg	3	3	100	None	143		95.52			157	315	315	J	WRD-SD-2063	WRD-SD-2063-01
Total TCDF	ng/kg	3	3	100	None	62.1		280.3			71.2	552	552	J	WRD-SD-2063	WRD-SD-2063-01
Metals																
Aluminum	mg/kg	6	6	100	Lnrm	3000			4840	1.69	4275	10700	10700		Dyerville Dam	DAM005-SD
Antimony	mg/kg	6	1	17	None	0.3					3.95	5	3.4	J	WRD-SD-2063	WRD-SD-2063-01
Arsenic	mg/kg	6	3	50	None	1.2					5	10	6.3	J	WRD-SD-2063	WRD-SD-2063-01
Barium	mg/kg	6	6	100	Lnrm	31.7			93.87	2.01	111	228	228		WRD-SD-2063	WRD-SD-2063-01
Beryllium	mg/kg	6	6	100	Norm	0.28	0.875	0.434			0.81	1.5	1.5		Dyerville Dam	DAM005-SD
Cadmium	mg/kg	6	3	50	None	0.29					1.5	95.1	95.1		WRD-SD-2063	WRD-SD-2063-01
Calcium	mg/kg	6	6	100	Norm	789	2022	713.9			2275	2750	2750		Olneyville Dam	DAM006-SD
Chromium	mg/kg	6	6	100	Lnrm	10.7			58.61	3.15	55 7	385	385		Dyerville Dam	DAM005-SD
Cobalt	mg/kg	6	6	100	Lnrm	3.4			6.06	1.47	5.95	9.2	9.2		Olneyville Dam	DAM006-SD
Copper	mg/kg	6	6	100	Norm	12.5	99.13	70.33			88.7	210	210		Dyerville Dam	DAM005-SD
Cyanide	mg/kg	3	0	0	None	1.3					1.4	1.65				
Iron	mg/kg	6	6	100	Norm	7960	14355	5514			15350	22200	22200	J	WRD-SD-2063	WRD-SD-2063-01
Lead	mg/kg	6	6	100	Norm	39.8	252.0	176.5			240	553	553	J	WRD-SD-2063	WRD-SD-2063-01
Magnesium	mg/kg	6	6	100	Lnrm	835			1472	1.59	1490	2770	2770		Dyerville Dam	DAM005-SD
Manganese	mg/kg	6	6	100	Lnrm	184			433.1	2.06	458.5	1000	1000		Olneyville Dam	DAM006-SD
Mercury	mg/kg	6	3	50	None	0.005					0.133	1.06	1.06		Dyerville Dam	DAM005-SD
Nickel	mg/kg	6	5	83	Norm	1.295	25.7	8.30			27.65	35	35		Dyerville Dam	DAM005-SD
Potassium	mg/kg	3	0	0	None	33.34					34.15	36.74				
Selenium	mg/kg	6	0	0	None	0.235					2.28	5.05				
Silver	mg/kg	6	0	0	None	0.27					0.8	1.5				

Table C-11. Downstream of Manton Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Sodium	mg/kg	3	2	67	None	1.56					110	132	132		WRD-SD-2063	WRD-SD-2063-01
Thallium	mg/kg	6	0	0	None	0.505					2.43	5.05				
Vanadium	mg/kg	6	5	83	Lnrm	8.9			13.14	1.84	13.8	28.4	28.4		Dyerville Dam	DAM005-SD
Zinc	mg/kg	6	6	100	Lnrm	55.9			355.5	3.40	366	1930	1930		Dyerville Dam	DAM005-SD
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/kg	3	0	0	None	200					230	495				
1,2,4-trichlorobenzene	µg/kg	9	0	0	None	205					230	300				
1,2-dichlorobenzene	µg/kg	9	0	0	None	205					230	300				
1,3-dichlorobenzene	µg/kg	9	0	0	None	205					230	300				
1,4-dichlorobenzene	µg/kg	9	0	0	None	205					230	300				
2,2'-oxybis(1-chloropropane)	µg/kg	12	0	0	None	200					230	495				
2,4,5-trichlorophenol	µg/kg	12	0	0	None	500					600	1250				
2,4,6-trichlorophenol	µg/kg	12	0	0	None	200					230	495				
2,4-dichlorophenol	µg/kg	12	0	0	None	200					230	495				
2,4-dimethylphenol	µg/kg	12	0	0	None	200					230	495				
2,4-dinitrophenol	µg/kg	12	0	0	None	500					600	1250				
2,4-dinitrotoluene	µg/kg	12	0	0	None	200					230	495				
2,6-dinitrotoluene	µg/kg	12	0	0	None	200					230	495				
2-chloronaphthalene	µg/kg	12	0	0	None	200					230	495				
2-chlorophenol	µg/kg	12	0	0	None	200					230	495				
2-methylnaphthalene	µg/kg	12	3	25	None	31					212.5	495	57	J	SD-03	SD-03
2-methylphenol	µg/kg	12	0	0	None	200					230	495				
2-nitroaniline	µg/kg	12	0	0	None	500					600	1250				
2-nitrophenol	µg/kg	12	0	0	None	200					230	495				
3,3'-dichlorobenzidine	µg/kg	12	0	0	None	200					230	495				
3-nitroaniline	µg/kg	12	0	0	None	500					600	1250				
4,6-dinitro-2-methylphenol	µg/kg	12	0	0	None	500					600	1250				
4-bromophenyl-phenylether	µg/kg	12	0	0	None	200					230	495				
4-chloro-3-methylphenol	µg/kg	12	0	0	None	200					230	495				
4-chloroaniline	µg/kg	12	0	0	None	200					230	495				
4-chlorophenyl-phenylether	µg/kg	12	0	0	None	200					230	495				
4-methylphenol	µg/kg	12	0	0	None	200					230	495				
4-nitroaniline	µg/kg	12	0	0	None	500					600	1250				
4-nitrophenol	µg/kg	12	0	0	None	500					600	1250				
Acenaphthene	µg/kg	15	10	67	Lnrm	68			90.23	1.93	190	450	450		Lonigan Dam	DAM007-SD
Acenaphthylene	µg/kg	15	9	60	Norm	43	63.67	56.91			205	330	330	J	SD-01	SD-01
Acetophenone	µg/kg	3	0	0	None	200					230	495				
Anthracene	µg/kg	15	13	87	Lnrm	54			275.7	2.45	260	1100	1100		Lonigan Dam	DAM007-SD
Atrazine	µg/kg	3	1	33	None	73					200	495	73	J	DYP-SD-2066	DYP-SD-2066-01
Bapeq	µg/kg	12	12	100	Lnrm	83			1200	4.37	2000	6000	6000		Olneyville Dam	DAM006-SD
Benzaldehyde	µg/kg	3	2	67	None	86					93	200	93	JEB	WRD-SD-2063	WRD-SD-2063-01
Benzo(a)anthracene	µg/kg	15	15	100	Lnrm	56			778.0	3.97	1100	4500	4500	*	SD-01	SD-01
Benzo(a)pyrene	µg/kg	15	15	100	Lnrm	63			848.2	3.74	1300	4200	4200		Olneyville Dam	DAM006-SD
Benzo(b)fluoranthene	µg/kg	15	15	100	Lnrm	92			1279	3.79	1800	6500	6500		Olneyville Dam	DAM006-SD
Benzo(g,h,i)perylene	µg/kg	15	15	100	Lnrm	45			546.1	3.72	650	3200	3200		Olneyville Dam	DAM006-SD
Benzo(k)fluoranthene	µg/kg	15	15	100	Lnrm	44			440.5	3.67	640	2800	2800		Olneyville Dam	DAM006-SD
Bis(2-chloroethoxy)methane	µg/kg	12	0	0	None	200					230	495				
Bis(2-chloroethyl)ether	µg/kg	12	0	0	None	200					230	495				
Bis(2-ethylhexyl)phthalate	µg/kg	12	12	100	Lnrm	21			358.7	4.56	520	3700	3700	J	SD-01	SD-01
Butylbenzylphthalate	µg/kg	12	4	33	None	76					222.5	495	340	J	DYP-SD-2066	DYP-SD-2066-01

Table C-11. Downstream of Man[illegible] Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Caprolactam	µg/kg	3	0	0	None	200					230	495				
Carbazole	µg/kg	12	8	67	Norm	37	126.8	143.2			212.5	450	450		SD-03	SD-03
Chrysene	µg/kg	15	15	100	Lnrm	74			863.1	3.81	1300	5400	5400		Olneyville Dam	DAM006-SD
Dibenzo(a,h)anthracene	µg/kg	15	12	80	Lnrm	38			163.6	3.36	220	680	680		SD-01	SD-01
Dibenzofuran	µg/kg	12	5	42	None	64					202.5	300	190	J	SD-03	SD-03
Diethylphthalate	µg/kg	12	0	0	None	200					230	495				
Dimethylphthalate	µg/kg	12	0	0	None	200					230	495				
Di-n-butylphthalate	µg/kg	12	4	33	None	45					207.5	495	86	J	SD-02	SD-02
Di-n-octylphthalate	µg/kg	12	0	0	None	200					230	495				
Fluoranthene	µg/kg	15	15	100	Lnrm	130			1854	3.88	2600	9300	9300		Olneyville Dam	DAM006-SD
Fluorene	µg/kg	15	12	80	Norm	33	131.7	127.6			210	350	350		Lonigan Dam	DAM007-SD
Hexachlorobenzene	µg/kg	12	0	0	None	200					230	495				
Hexachlorobutadiene	µg/kg	12	0	0	None	200					230	495				
Hexachlorocyclopentadiene	µg/kg	12	0	0	None	200					230	495				
Hexachloroethane	µg/kg	12	0	0	None	200					230	495				
High Molecular Weight Pahs	µg/kg	12	12	100	Lnrm	650			8745	4.32	14000	47000	47000		Olneyville Dam	DAM006-SD
Indeno(1,2,3-cd)pyrene	µg/kg	15	15	100	Lnrm	45			667.3	4.06	850	4000	4000		Olneyville Dam	DAM006-SD
Isophorone	µg/kg	12	0	0	None	200					230	495				
Low Molecular Weight Pahs	µg/kg	12	12	100	Norm	71	2727	2522			2050	7500	7500		Lonigan Dam	DAM007-SD
Naphthalene	µg/kg	15	6	40	None	39					210	495	230		Lonigan Dam	DAM007-SD
Nitrobenzene	µg/kg	12	0	0	None	200					230	495				
N-nitroso-di-n-propylamine	µg/kg	12	0	0	None	200					230	495				
N-nitroso-diphenylamine	µg/kg	12	0	0	None	200					230	495				
Pentachlorophenol	µg/kg	12	0	0	None	500					600	1250				
Phenanthrene	µg/kg	15	15	100	Lnrm	71			1018	3.88	1600	5200	5200		Lonigan Dam	DAM007-SD
Phenol	µg/kg	12	0	0	None	200					230	495				
Pyrene	µg/kg	15	15	100	Lnrm	100			1514	4.20	2300	11000	11000	*J	SD-01	SD-01
Total PAH	µg/kg	12	12	100	Lnrm	720			10180	4.36	16500	53000	53000		Olneyville Dam	DAM006-SD
PCB as Aroclors																
Aroclor, Total	µg/kg	12	3	25	None	41.5					49.25	1420	1420		Dyerville Dam	DAM005-SD
Aroclor-1016	µg/kg	15	0	0	None	5.08					21.25	30				
Aroclor-1221	µg/kg	15	0	0	None	2.11					43	60				
Aroclor-1232	µg/kg	15	0	0	None	1.35					21.25	30				
Aroclor-1242	µg/kg	15	2	13	None	4.64					22.25	250	250		Lonigan Dam	DAM007-SD
Aroclor-1248	µg/kg	15	0	0	None	1.08					21.25	30				
Aroclor-1254	µg/kg	15	4	27	None	1.26					24	1300	1300		Dyerville Dam	DAM005-SD
Aroclor-1260	µg/kg	15	0	0	None	4.64					21.25	30				
Aroclor-1262	µg/kg	3	0	0												
Aroclor-1268	µg/kg	3	1	33	None	120					120	120	120		Dyerville Dam	DAM005-SD
PCB Congeners																
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	ng/kg	3	0	0												
3,3',4,4',5-Pentachlorobiphenyl (126)	ng/kg	3	0	0												
3,3',4,4'-Tetrachlorobiphenyl (77)	ng/kg	3	3	100	None	253		101.9			330	455	455		Lonigan Dam	DAM007-SD

Table C-11. Downstream of Manton Sediment Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
4,4'-DDD	µg/kg	15	10	67	Lnrm	0.095			1.78	13.19	3	92	92	*	WRD-SD-2063	WRD-SD-2063-01
4,4'-DDE	µg/kg	15	11	73	Lnrm	0.069			1.66	5.71	3.6	250	12		Olneyville Dam	DAM006-SD
4,4'-DDT	µg/kg	11	8	73	Lnrm	0.0525			4.12	2.93	6.3	520	520	*	WRD-SD-2063	WRD-SD-2063-01
Aldrin	µg/kg	15	1	7	None	0.107					1.08	1.55	0.51	J	SD-09	SD-09
alpha-BHC	µg/kg	15	0	0	None	0.184					1.1	1.55				
alpha-Chlordane	µg/kg	15	7	47	None	0.06					1.2	24	24		Lonigan Dam	DAM007-SD
beta-BHC	µg/kg	15	0	0	None	0.106					1.15	130				
delta-BHC	µg/kg	15	0	0	None	0.0865					1.1	1.55				
Dieldrin	µg/kg	14	4	29	None	0.0535					2.2	250	30		Dyerville Dam	DAM005-SD
Endosulfan I	µg/kg	15	1	7	None	0.0675					1.1	5	5		Lonigan Dam	DAM007-SD
Endosulfan II	µg/kg	15	2	13	None	0.056					2.23	12	12		Olneyville Dam	DAM006-SD
													12		Lonigan Dam	DAM007-SD
Endosulfan Sulfate	µg/kg	11	1	9	None	0.068					2.1	250	11		Dyerville Dam	DAM005-SD
Endrin	µg/kg	15	1	7	None	0.059					2.1	3	1.9	J	SD-09	SD-09
Endrin Aldehyde	µg/kg	15	3	20	None	0.15					2.13	5.4	5.4		Lonigan Dam	DAM007-SD
Endrin Ketone	µg/kg	9	1	11	None	0.065					2.05	250	7.7		Olneyville Dam	DAM006-SD
gamma-BHC	µg/kg	15	0	0	None	0.074					1.1	1.55				
gamma-Chlordane	µg/kg	14	2	14	None	0.061					1.1	17	17		Lonigan Dam	DAM007-SD
Heptachlor	µg/kg	15	2	13	None	0.1295					1.05	1.55	0.43	J	SD-09	SD-09
Heptachlor Epoxide	µg/kg	15	2	13	None	0.066					1.08	2.7	2.7	J	SD-01	SD-01
Methoxychlor	µg/kg	12	0	0	None	0.075					10.5	1300				
Technical Chlordane	µg/kg	3	0	0												
Toxaphene	µg/kg	15	0	0	None	100					120	155				
Ancillary																
Percent Clay	pct	3	3	100	None	1.1		2.23			4.3	5.4	5.4		DYP-SD-2066	DYP-SD-2066-01
Percent Fines (silt + clay)	pct	3	3	100	None	8.1		15.40			25.7	38.8	38.8		WRD-SD-2063	WRD-SD-2063-01
Percent Gravel	pct	3	3	100	None	0		25.49			15.9	49.9	49.9		DYP-SD-2065	DYP-SD-2065-01
Percent Sand	pct	3	3	100	None	42		17.77			45.3	74.3	74.3		DYP-SD-2066	DYP-SD-2066-01
Percent Silt	pct	3	3	100	None	7		13.75			20.3	34.5	34.5		WRD-SD-2063	WRD-SD-2063-01
Percent Solids	pct	3	3	100	None	44.1		19.46			54.2	81.7	81.7		DYP-SD-2065	DYP-SD-2065-01
Specific Gravity		3	3	100	None	2.65		0			2.65	2.65	2.65		DYP-SD-2065	DYP-SD-2065-01
													2.65		DYP-SD-2066	DYP-SD-2066-01
													2.65		WRD-SD-2063	WRD-SD-2063-01
Total Organic Carbon	pct	15	15	100	Lnrm	0.135			1.98	3.06	1.93	7.43	7.43		SD-04	SD-04

Table C-12. Assapumpset Su[illegible] Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	1	0	0	None	3					3	3				
1,2,3,4,6,7,8-HpCDF	pg/L	1	0	0	None	1.8					1.8	1.8				
1,2,3,4,7,8,9-HpCDF	pg/L	1	0	0	None	2.3					2.3	2.3				
1,2,3,4,7,8-HxCDD	pg/L	1	0	0	None	2					2	2				
1,2,3,4,7,8-HxCDF	pg/L	1	0	0	None	1.3					1.3	1.3				
1,2,3,6,7,8-HxCDD	pg/L	1	0	0	None	1.85					1.85	1.85				
1,2,3,6,7,8-HxCDF	pg/L	1	0	0	None	1.2					1.2	1.2				
1,2,3,7,8,9-HxCDD	pg/L	1	0	0	None	1.95					1.95	1.95				
1,2,3,7,8,9-HxCDF	pg/L	1	0	0	None	1.4					1.4	1.4				
1,2,3,7,8-PeCDD	pg/L	1	0	0	None	1.75					1.75	1.75				
1,2,3,7,8-PeCDF	pg/L	1	0	0	None	1.2					1.2	1.2				
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	1	0	0	None											
2,3,4,6,7,8-HxCDF	pg/L	1	0	0	None	1.25					1.25	1.25				
2,3,4,7,8-PeCDF	pg/L	1	0	0	None	1.25					1.25	1.25				
2,3,7,8-TCDD	pg/L	1	0	0	None	1.6					1.6	1.6				
2,3,7,8-TCDF	pg/L	1	0	0	None	1.4					1.4	1.4				
OCDD	pg/L	1	0	0	None	7					7	7				
OCDF	pg/L	1	0	0	None	4.05					4.05	4.05				
PCDD/Fs	pg/L	1	0	0	None	2.5					2.5	2.5				
TEQ	pg/L	1	1	100	None	0.03					0.03	0.03	0.03		RAB-SD-3004	RAB-SW-3004-01
Total HpCDD	pg/L	1	0	0	None	3					3	3				
Total HpCDF	pg/L	1	0	0	None	2					2	2				
Total HxCDD	pg/L	1	0	0	None	1.95					1.95	1.95				
Total HxCDF	pg/L	1	0	0	None	1.3					1.3	1.3				
Total PeCDD	pg/L	1	0	0	None	1.75					1.75	1.75				
Total PeCDF	pg/L	1	0	0	None	1.2					1.2	1.2				
Total TCDD	pg/L	1	0	0	None	1.6					1.6	1.6				
Total TCDF	pg/L	1	0	0	None	1.4					1.4	1.4				
Metals (total)																
Aluminum	µg/L	3	3	100	None	47.3		124.2			48.4	263	263		RAB-SD-3004	RAB-SW-3004-01
Antimony	µg/L	3	1	33	None	0.02					0.118	2.5	0.118		RAB-SW-5004	RAB-SW-5004-01
Arsenic	µg/L	3	2	67	None	0.45					0.491	3	0.491		RAB-SW-5004	RAB-SW-5004-01
Barium	µg/L	3	3	100	None	21.1		2.20			21.3	25	25		RAB-SD-3004	RAB-SW-3004-01
Beryllium	µg/L	3	2	67	None	0.0467					0.0487	0.5	0.0487	J	RAB-SW-5004	RAB-SW-5004-01
Cadmium	µg/L	3	2	67	None	0.00794					0.00964	0.5	0.00964	J	RAB-SW-5004	RAB-SW-5004-01
Calcium	µg/L	1	1	100	None	8650					8650	8650	8650		RAB-SD-3004	RAB-SW-3004-01
Chromium	µg/L	3	1	33	None	0.5					2.3	6	2.3	J	RAB-SW-5004	RAB-SW-5004-01
Cobalt	µg/L	3	2	67	None	0.114					0.117	0.5	0.117		RAB-SW-5004	RAB-SW-5004-01
Copper	µg/L	3	3	100	None	0.658		1.64			0.666	3.5	3.5		RAB-SD-3004	RAB-SW-3004-01
Iron	µg/L	3	3	100	None	832		159.9			834	1110	1110		RAB-SD-3004	RAB-SW-3004-01
Lead	µg/L	3	2	67	None	0.357					0.366	1	0.366		RAB-SW-5004	RAB-SW-5004-01
Magnesium	µg/L	1	1	100	None	1650					1650	1650	1650		RAB-SD-3004	RAB-SW-3004-01
Manganese	µg/L	3	3	100	None	104		35.51			105	166	166		RAB-SD-3004	RAB-SW-3004-01
Mercury	µg/L	3	2	67	None	0.00215					0.00223	0.1	0.00223		RAB-SW-5004	RAB-SW-5004-01
Molybdenum	µg/L	2	2	100	None	0.368		0.00495			0.372	0.375	0.375	J	RAB-SW-5004	RAB-SW-5004-01
Nickel	µg/L	3	3	100	None	1.26		0.477			1.29	2.1	2.1	J	RAB-SD-3004	RAB-SW-3004-01
Potassium	µg/L	1	1	100	None	1540					1540	1540	1540		RAB-SD-3004	RAB-SW-3004-01
Selenium	µg/L	3	2	67	None	0.0597					0.0815	2.5	0.0815	J	RAB-SW-5004	RAB-SW-5004-01
Silver	µg/L	3	1	33	None	0.00671					0.5	1.34	0.00671	J	RAB-SW-5004	RAB-SW-5004-01
Sodium	µg/L	1	1	100	None	18600					18600	18600	18600		RAB-SD-3004	RAB-SW-3004-01
Thallium	µg/L	3	2	67	None	0.00511					0.00594	3.5	0.00594	J	RAB-SW-5004	RAB-SW-5004-01

Table C-12. Assapumpset Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Vanadium	µg/L	3	1	33	None	0.0358					1	4	0.0358	J	RAB-SW-5004	RAB-SW-5004-01
Zinc	µg/L	3	3	100	None	1.52		37.49			1.6	66.5	66.5		RAB-SD-3004	RAB-SW-3004-01
Metals (dissolved)																
Aluminum	µg/L	3	2	67	None	19					19.1	34.4	19.1	J	RAB-SW-5004	RAB-SW-5004-01
Antimony	µg/L	3	1	33	None	0.02					0.0585	2.5	0.0585		RAB-SW-5004	RAB-SW-5004-01
Arsenic	µg/L	3	2	67	None	0.385					0.407	3	0.407		RAB-SW-5004	RAB-SW-5004-01
Barium	µg/L	3	2	67	None	10.8					18.1	18.5	18.5		RAB-SW-5004	RAB-SW-5004-01
Beryllium	µg/L	3	2	67	None	0.0307					0.0324	0.5	0.0324	J	RAB-SW-5004	RAB-SW-5004-01
Cadmium	µg/L	3	2	67	None	0.00345					0.00641	0.5	0.00641	J	RAB-SW-5004	RAB-SW-5004-01
Calcium	µg/L	1	1	100	None	8590					8590	8590	8590		RAB-SD-3004	RAB-SW-3004-01F
Chromium	µg/L	3	1	33	None	0.5					1.29	6	1.29	J	RAB-SW-5004	RAB-SW-5004-01
Cobalt	µg/L	3	2	67	None	0.0962					0.098	0.5	0.098		RAB-SW-5004	RAB-SW-5004-01
Copper	µg/L	3	2	67	None	0.557					1.62	3.4	3.4		RAB-SD-3004	RAB-SW-3004-01F
Iron	µg/L	3	3	100	None	496		32.05			551	552	552		RAB-SW-5004	RAB-SW-5004-01
Lead	µg/L	3	2	67	None	0.206					0.232	1	0.232		RAB-SW-5004	RAB-SW-5004-01
Magnesium	µg/L	1	1	100	None	1610					1610	1610	1610		RAB-SD-3004	RAB-SW-3004-01F
Manganese	µg/L	3	3	100	None	23.2		59.87			23.4	127	127		RAB-SD-3004	RAB-SW-3004-01F
Mercury	µg/L	3	2	67	None	0.00151					0.00162	0.1	0.00162		RAB-SW-5004	RAB-SW-5004-01
Molybdenum	µg/L	2	2	100	None	0.317		0.0113			0.325	0.333	0.333	J	RAB-SW-5004	RAB-SW-5004-01
Nickel	µg/L	3	2	67	None	1					1.11	1.13	1.13	J	RAB-SW-5004	RAB-SW-5004-01
Potassium	µg/L	1	1	100	None	1530					1530	1530	1530		RAB-SD-3004	RAB-SW-3004-01F
Selenium	µg/L	3	1	33	None	0.0339					0.2	2.5	0.0339	J	RAB-SW-5004	RAB-SW-5004-01
Silver	µg/L	3	1	33	None	0.00334					0.5	1.34	0.00334	J	RAB-SW-5004	RAB-SW-5004-01
Sodium	µg/L	1	0	0	None	9300					9300	9300				
Thallium	µg/L	3	2	67	None	0.00806					0.00954	3.5	0.00954	J	RAB-SW-5004	RAB-SW-5004-01
Vanadium	µg/L	3	0	0	None	1					4	4				
Zinc	µg/L	3	2	67	None	1.14					2.4	20.6	20.6		RAB-SD-3004	RAB-SW-3004-01F
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/L	2	0	0	None	0.00119					2.50	5				
1,2,4-trichlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2-dichlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,3-dichlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,4-dichlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
2,2'-oxybis(1-chloropropane)	µg/L	1	0	0	None	5					5	5				
2,4,5-trichlorophenol	µg/L	2	0	0	None	12.5					19.5	26.5				
2,4,6-trichlorophenol	µg/L	1	0	0	None	5					5	5				
2,4-dichlorophenol	µg/L	1	0	0	None	5					5	5				
2,4-dimethylphenol	µg/L	1	0	0	None	5					5	5				
2,4-dinitrophenol	µg/L	1	0	0	None	12.5					12.5	12.5				
2,4-dinitrotoluene	µg/L	1	0	0	None	5					5	5				
2,6-dinitrotoluene	µg/L	1	0	0	None	5					5	5				
2-chloronaphthalene	µg/L	1	0	0	None	5					5	5				
2-chlorophenol	µg/L	1	0	0	None	5					5	5				
2-methylnaphthalene	µg/L	2	0	0	None	0.00119					2.50	5				
2-methylphenol	µg/L	1	0	0	None	5					5	5				
2-nitroaniline	µg/L	1	0	0	None	12.5					12.5	12.5				
2-nitrophenol	µg/L	2	0	0	None	5					5.25	5.5				
3,3'-dichlorobenzidine	µg/L	1	0	0	None	5					5	5				
3-nitroaniline	µg/L	1	0	0	None	12.5					12.5	12.5				
4,6-dinitro-2-methylphenol	µg/L	1	0	0	None	12.5					12.5	12.5				
4-bromophenyl-phenylether	µg/L	1	0	0	None	5					5	5				
4-chloro-3-methylphenol	µg/L	1	0	0	None	5					5	5				
4-chloroaniline	µg/L	1	0	0	None	5					5	5				
4-chlorophenyl-phenylether	µg/L	1	0	0	None	5					5	5				
4-methylphenol	µg/L	2	0	0	None	5					5.25	5.5				

Table C-12. Assapumpset Su[illegible] Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
4-nitroaniline	µg/L	1	0	0	None	12.5					12.5	12.5				
4-nitrophenol	µg/L	2	0	0	None	12.5					19.5	26.5				
Acenaphthene	µg/L	2	0	0	None	0.00119					2.50	5				
Acenaphthylene	µg/L	2	0	0	None	0.00119					2.50	5				
Acetophenone	µg/L	1	0	0	None	5					5	5				
Anthracene	µg/L	2	0	0	None	0.00119					2.50	5				
Atrazine	µg/L	1	0	0	None	5					5	5				
Bapeq	µg/L	1	0	0	None	1.5					1.5	1.5				
Benzaldehyde	µg/L	2	0	0	None	0.00119					2.50	5				
Benzo(a)anthracene	µg/L	2	0	0	None	0.00119					2.50	5				
Benzo(a)pyrene	µg/L	2	0	0	None	0.00119					2.50	5				
Benzo(b)fluoranthene	µg/L	2	0	0	None	0.00119					2.50	5				
Benzo(g,h,i)perylene	µg/L	2	0	0	None	0.00119					2.50	5				
Benzo(k)fluoranthene	µg/L	2	0	0	None	0.00119					2.50	5				
Bis(2-chloroethoxy)methane	µg/L	1	0	0	None	5					5	5				
Bis(2-chloroethyl)ether	µg/L	1	0	0	None	5					5	5				
Bis(2-ethylhexyl)phthalate	µg/L	2	1	50	None	1					3.25	5.5	1	J	RAB-SD-3004	RAB-SW-3004-01
Butylbenzylphthalate	µg/L	2	0	0	None	5					5.25	5.5				
Caprolactam	µg/L	1	0	0	None	5					5	5				
Carbazole	µg/L	2	0	0	None	5					5.25	5.5				
Chrysene	µg/L	2	0	0	None	0.00119					2.50	5				
Dibenzo(a,h)anthracene	µg/L	2	0	0	None	0.00119					2.50	5				
Dibenzofuran	µg/L	2	0	0	None	0.00119					2.50	5				
Diethylphthalate	µg/L	1	0	0	None	5					5	5				
Dimethylphthalate	µg/L	1	0	0	None	5					5	5				
Di-n-butylphthalate	µg/L	2	0	0	None	5					5.25	5.5				
Di-n-octylphthalate	µg/L	2	0	0	None	5					5.25	5.5				
Fluoranthene	µg/L	2	0	0	None	0.00119					2.50	5				
Fluorene	µg/L	2	0	0	None	0.00119					2.50	5				
Hexachlorobenzene	µg/L	1	0	0	None	5					5	5				
Hexachlorobutadiene	µg/L	2	0	0	None	0.5					2.75	5				
Hexachlorocyclopentadiene	µg/L	1	0	0	None	5					5	5				
Hexachloroethane	µg/L	1	0	0	None	5					5	5				
High Molecular Weight Pahs	µg/L	1	0	0	None	5					5	5				
Indeno(1,2,3-cd)pyrene	µg/L	2	0	0	None	0.00119					2.50	5				
Isophorone	µg/L	1	0	0	None	5					5	5				
Low Molecular Weight Pahs	µg/L	1	0	0	None	5					5	5				
Naphthalene	µg/L	3	0	0	None	0.00119					0.5	5				
Nitrobenzene	µg/L	1	0	0	None	5					5	5				
N-nitroso-di-n-propylamine	µg/L	1	0	0	None	5					5	5				
N-nitroso-diphenylamine	µg/L	1	0	0	None	5					5	5				
Pentachlorophenol	µg/L	2	0	0	None	12.5					19.5	26.5				
Phenanthrene	µg/L	2	0	0	None	0.00119					2.50	5				
Phenol	µg/L	2	0	0	None	5					5.25	5.5				
Pyrene	µg/L	2	0	0	None	0.00119					2.50	5				
Total PAH	µg/L	2	0	0	None	0.0226					2.51	5				
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1,1-trichloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1,2,2-tetrachloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1,2-trichloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1-dichloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1-dichloroethene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,1-dichloropropene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2,3-trichlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2,3-trichloropropane	µg/L	1	0	0	None	0.5					0.5	0.5				

Table C-12. Assapumpset Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
1,2,4-trimethylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2-dibromo-3-chloropropane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2-dibromoethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2-dichloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,2-dichloropropane	µg/L	1	0	0	None	0.5					0.5	0.5				
1,3,5-trimethylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
1,3-dichloropropane	µg/L	1	0	0	None	0.5					0.5	0.5				
2,2-dichloropropane	µg/L	1	0	0	None	0.5					0.5	0.5				
2-chlorotoluene	µg/L	1	0	0	None	0.5					0.5	0.5				
4-chlorotoluene	µg/L	1	0	0	None	0.5					0.5	0.5				
Benzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Bromobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Bromochloromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Bromodichloromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Bromoform	µg/L	1	0	0	None	0.5					0.5	0.5				
Bromomethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Carbon Tetrachloride	µg/L	1	0	0	None	0.5					0.5	0.5				
Chlorobenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Chloroethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Chloroform	µg/L	1	0	0	None	0.5					0.5	0.5				
Chloromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Cis-1,2-dichloroethene	µg/L	1	0	0	None	0.5					0.5	0.5				
Cis-1,3-dichloropropene	µg/L	1	0	0	None	0.5					0.5	0.5				
Dibromochloromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Dibromomethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Dichlorodifluoromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Ethylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Isopropylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
m&p-Xylene	µg/L	1	0	0	None	0.5					0.5	0.5				
Methylene Chloride	µg/L	1	0	0	None	0.5					0.5	0.5				
N-butylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
N-propylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
O-xylene	µg/L	1	0	0	None	0.5					0.5	0.5				
P-isopropyltoluene	µg/L	1	0	0	None	0.5					0.5	0.5				
Sec-butylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Styrene	µg/L	1	0	0	None	0.5					0.5	0.5				
Tert-butylbenzene	µg/L	1	0	0	None	0.5					0.5	0.5				
Tetrachloroethene	µg/L	1	0	0	None	0.5					0.5	0.5				
Toluene	µg/L	1	0	0	None	0.5					0.5	0.5				
Total Volatile Organics	µg/L	1	0	0	None	0.5					0.5	0.5				
Total Xylenes	µg/L	1	0	0	None	0.5					0.5	0.5				
Trans-1,2-dichloroethene	µg/L	1	0	0	None	0.5					0.5	0.5				
Trans-1,3-dichloropropene	µg/L	1	0	0	None	0.5					0.5	0.5				
Trichloroethene	µg/L	1	0	0	None	0.5					0.5	0.5				
Trichlorofluoromethane	µg/L	1	0	0	None	0.5					0.5	0.5				
Vinyl Chloride	µg/L	1	0	0	None	0.5					0.5	0.5				
PCB as Aroclors																
Aroclor, Total	µg/L	2	0	0	None	0.0952					0.548	1				
Aroclor-1016	µg/L	2	0	0	None	0.0119					0.256	0.5				
Aroclor-1221	µg/L	2	0	0	None	0.0119					0.506	1				
Aroclor-1232	µg/L	1	0	0	None	0.0119					0.0119	0.0119				
Aroclor-1242	µg/L	2	0	0	None	0.0119					0.256	0.5				
Aroclor-1248	µg/L	2	0	0	None	0.0119					0.256	0.5				
Aroclor-1254	µg/L	2	0	0	None	0.0119					0.256	0.5				
Aroclor-1260	µg/L	2	0	0	None	0.0119					0.256	0.5				
Aroclor-1268	µg/L	1	0	0	None	0.0119					0.0119	0.0119				

Table C-12. Assapumpset Su[illegible] Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
4,4'-DDD	µg/L	2	0	0	None	0.00095					0.0255	0.05				
4,4'-DDE	µg/L	2	0	0	None	0.00095					0.0255	0.05				
4,4'-DDT	µg/L	2	0	0	None	0.00095					0.0255	0.05				
Aldrin	µg/L	2	0	0	None	0.00095					0.0130	0.025				
alpha-BHC	µg/L	2	0	0	None	0.00095					0.0130	0.025				
alpha-Chlordane	µg/L	2	0	0	None	0.00095					0.0130	0.025				
beta-BHC	µg/L	2	1	50	None	0.00098					0.0130	0.025	0.00098	J	RAB-SW-5004	RAB-SW-5004-01
delta-BHC	µg/L	2	0	0	None	0.00095					0.0130	0.025				
Dieldrin	µg/L	2	0	0	None	0.00095					0.0255	0.05				
Endosulfan I	µg/L	2	0	0	None	0.00095					0.0130	0.025				
Endosulfan II	µg/L	2	0	0	None	0.00095					0.0255	0.05				
Endosulfan Sulfate	µg/L	2	0	0	None	0.00095					0.0255	0.05				
Endrin	µg/L	2	0	0	None	0.00095					0.0255	0.05				
Endrin Aldehyde	µg/L	1	0	0	None	0.00095					0.00095	0.00095				
Endrin Ketone	µg/L	2	0	0	None	0.00095					0.0255	0.05				
gamma-BHC	µg/L	2	1	50	None	0.0006					0.0128	0.025	0.0006	J	RAB-SW-5004	RAB-SW-5004-01
gamma-Chlordane	µg/L	2	0	0	None	0.00095					0.0130	0.025				
Heptachlor	µg/L	2	0	0	None	0.00095					0.0130	0.025				
Heptachlor Epoxide	µg/L	2	0	0	None	0.00095					0.0130	0.025				
Methoxychlor	µg/L	2	0	0	None	0.00095					0.125	0.25				
Technical Chlordane	µg/L	1	0	0	None	0.119					0.119	0.119				
Toxaphene	µg/L	2	0	0	None	0.0238					1.26	2.5				
Ancillary																
Total Organic Carbon	mg/L	1	1	100	None	6.18					6.18	6.18	6.18		RAB-SW-5004	RAB-SW-5004-01
Biochemical Oxygen Demand	mg/L	1	1	100	None	2.4					2.4	2.4	2.4		RAB-SW-5004	RAB-SW-5004-01
Dissolved Organic Carbon	mg/L	1	1	100	None	6.06					6.06	6.06	6.06		RAB-SW-5004	RAB-SW-5004-01
Hardness	mg/L	2	2	100	None	39.1		0.07071			39.15	39.2	39.2		RAB-SW-5004	RAB-SW-5004-01
Nitrate	mg/L	1	1	100	None	0.149					0.149	0.149	0.149		RAB-SW-5004	RAB-SW-5004-01
Nitrite-N	mg/L	1	1	100	None	0.0051					0.0051	0.0051	0.0051		RAB-SW-5004	RAB-SW-5004-01
Nitrogen, Ammonia	mg/L	1	1	100	None	0.011					0.011	0.011	0.011	J	RAB-SW-5004	RAB-SW-5004-01
Nitrogen, Dissolved	mg/L	1	1	100	None	0.49					0.49	0.49	0.49		RAB-SW-5004	RAB-SW-5004-01
Nitrogen, Total	mg/L	1	1	100	None	0.54					0.54	0.54	0.54		RAB-SW-5004	RAB-SW-5004-01
Phosphate	mg/L	1	1	100	None	0.0023					0.0023	0.0023	0.0023		RAB-SW-5004	RAB-SW-5004-01
Phosphorus, Dissolved	mg/L	1	1	100	None	0.013					0.013	0.013	0.013	J	RAB-SW-5004	RAB-SW-5004-01
Phosphorus, Total	mg/L	1	1	100	None	0.013					0.0130	0.0130	0.013	J	RAB-SW-5004	RAB-SW-5004-01
Total Suspended Solids	mg/L	1	1	100	None	3.6					3.6	3.6	3.6		RAB-SW-5004	RAB-SW-5004-01

Table C-13. Upstream Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	3	1	33	None	3.6					4.2	12.4	12.4	J	RCC-SD-3001	RCC-SW-3001-01
1,2,3,4,6,7,8-HpCDF	pg/L	3	0	0	None	2.2					2.65	2.65				
1,2,3,4,7,8,9-HpCDF	pg/L	3	0	0	None	2.45					2.8	3.4				
1,2,3,4,7,8-HxCDD	pg/L	3	0	0	None	2.1					2.4	2.7				
1,2,3,4,7,8-HxCDF	pg/L	3	0	0	None	1.35					1.65	2.2				
1,2,3,6,7,8-HxCDD	pg/L	3	0	0	None	2					2.25	2.55				
1,2,3,6,7,8-HxCDF	pg/L	3	0	0	None	1.25					1.55	2.05				
1,2,3,7,8,9-HxCDD	pg/L	3	0	0	None	2.05					2.3	2.65				
1,2,3,7,8,9-HxCDF	pg/L	3	0	0	None	1.5					1.85	2.4				
1,2,3,7,8-PeCDD	pg/L	3	0	0	None	1.7					2.05	2.4				
1,2,3,7,8-PeCDF	pg/L	3	0	0	None	1.3					1.45	1.8				
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	3	0	0												
2,3,4,6,7,8-HxCDF	pg/L	3	0	0	None	1.35					1.65	2.15				
2,3,4,7,8-PeCDF	pg/L	3	0	0	None	1.4					1.5	1.9				
2,3,7,8-TCDD	pg/L	3	0	0	None	1.7					2	2.65				
2,3,7,8-TCDF	pg/L	3	0	0	None	1.35					1.75	2.4				
OCDD	pg/L	3	0	0	None	5.95					14.75	39.95				
OCDF	pg/L	3	0	0	None	5.05					5.05	5.55				
PCDD/Fs	pg/L	3	1	33	None	2.85					4.1	24.6	24.6		RCC-SD-3001	RCC-SW-3001-01
TEQ	pg/L	3	3	100	None	0.036		0.0469			0.042	0.12	0.12		RCC-SD-3001	RCC-SW-3001-01
Total HpCDD	pg/L	3	1	33	None	3.6					4.2	24.6	24.6	J	RCC-SD-3001	RCC-SW-3001-01
Total HpCDF	pg/L	3	0	0	None	2.45					2.65	2.95				
Total HxCDD	pg/L	3	0	0	None	2.05					2.3	2.65				
Total HxCDF	pg/L	3	0	0	None	1.35					1.65	2.2				
Total PeCDD	pg/L	3	0	0	None	1.7					2.05	2.4				
Total PeCDF	pg/L	3	0	0	None	1.35					1.45	1.85				
Total TCDD	pg/L	3	0	0	None	1.7					2	2.65				
Total TCDF	pg/L	3	0	0	None	1.35					1.75	2.4				
Metals (total)																
Aluminum	µg/L	6	5	83	Lnrm	10.7			122.9	4.73	112	583	583		RCC-SD-3002	RCC-SW-DU-111099A
Antimony	µg/L	6	2	33	None	0.168					2.5	2.5	0.173		RWR-SW-5002	RWR-SW-5002-01
Arsenic	µg/L	6	2	33	None	0.539					3	3	0.55		RWR-SW-5002	RWR-SW-5002-01
Barium	µg/L	6	6	100	Lnrm	19.5			24.82	1.25	24.7	35.7	35.7		RCC-SD-3003	RCC-SW-3003-01
Beryllium	µg/L	6	2	33	None	0.0532					0.5	0.5	0.0551	J	RWR-SW-5002	RWR-SW-5002-01
Cadmium	µg/L	6	2	33	None	0.0184					0.5	0.5	0.022	J	RWR-SW-5002	RWR-SW-5002-01
Calcium	µg/L	4	4	100	None	8340		14652			9040	38100	38100		RCC-SD-3003	RCC-SW-3003-01
Chromium	µg/L	6	3	50	None	0.5					6	8.3	8.3		RCC-SD-3002	RCC-SW-DU-111099A
Cobalt	µg/L	6	2	33	None	0.115					0.5	0.5	0.12		RWR-SW-5001	RWR-SW-5001-01
Copper	µg/L	6	6	100	Lnrm	1.71			7.10	3.38	9.05	25.8	25.8		RCC-SD-3002	RCC-SW-3002-01
Iron	µg/L	6	6	100	Lnrm	657			916.7	1.48	771	1590	1590		RCC-SD-3002	RCC-SW-DU-111099A
Lead	µg/L	6	5	83	Lnrm	0.878			3.22	7.37	3.9	21.4	21.4		RCC-SD-3002	RCC-SW-DU-111099A
Magnesium	µg/L	4	4	100	None	1410		2672			1450	6780	6780		RCC-SD-3003	RCC-SW-3003-01
Manganese	µg/L	6	6	100	None	122		161.6			143	531	531		RCC-SD-3003	RCC-SW-3003-01
Mercury	µg/L	6	2	33	None	0.00188					0.1	0.1	0.00193		RWR-SW-5001	RWR-SW-5001-01
Molybdenum	µg/L	2	2	100	None	0.668		0.116			0.75	0.832	0.832	J	RWR-SW-5002	RWR-SW-5002-01
Nickel	µg/L	6	5	83	Lnrm	1			2.31	2.91	2.34	6.3	6.3		RCC-SD-3002	RCC-SW-DU-111099A
Potassium	µg/L	4	4	100	None	1830		1664			1910	5210	5210		RCC-SD-3003	RCC-SW-3003-01
Selenium	*µg/L*	*6*	*1*	*17*	*None*	*0.0868*					*2.5*	*2.5*	*0.0868*	*J*	*RWR-SW-5002*	*RWR-SW-5002-01*
Silver	µg/L	6	0	0	None	0.5					0.65	1.34				
Sodium	µg/L	4	4	100	None	16800		2176			20600	21600	21600			
Thallium	µg/L	6	2	33	None	0.0064					3.5	3.5	0.00741			

Table C-13. Upstream Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Vanadium	µg/L	6	3	50	None	1					4	4.2	4.2			
Zinc	µg/L	6	6	100	Norm	6.22	36.10	30.55			32.15	76	76			
Metals (dissolved)																
Aluminum	µg/L	5	2	40	None	7					12.5	25.1	25.1	J	RWR-SW-5002	RWR-SW-5002-01
Antimony	µg/L	5	1	20	None	0.02					2.5	2.5	0.164		RWR-SW-5002	RWR-SW-5002-01
Arsenic	µg/L	5	2	40	None	0.414					3	3	0.444		RWR-SW-5002	RWR-SW-5002-01
Barium	µg/L	5	2	40	None	7.75					15.3	17.9	17.9		RWR-SW-5002	RWR-SW-5002-01
Beryllium	µg/L	5	2	40	None	0.032					0.5	0.5	0.0366	J	RWR-SW-5002	RWR-SW-5002-01
Cadmium	µg/L	5	3	60	Lnrm	0.0114			0.0114		0.5	4	4		RCC-SD-3001	RCC-SW-3001-01F
Calcium	µg/L	3	3	100	None	7210		17867			7500	38300	38300		RCC-SD-3003	RCC-SW-3003-01F
Chromium	µg/L	5	0	0	None	0.5					0.5	6				
Cobalt	µg/L	5	2	40	None	0.0894					0.5	0.5	0.099		RWR-SW-5002	RWR-SW-5002-01
Copper	µg/L	5	4	80	Lnrm	0.5			1.74	2.02	1.44	5.5	5.5		RCC-SD-3002	RCC-SW-3002-01F
Iron	µg/L	5	5	100	Lnrm	173			295.6	1.67	267	510	510		RWR-SW-5001	RWR-SW-5001-01
Lead	µg/L	5	2	40	None	0.433					1	1	0.542		RWR-SW-5002	RWR-SW-5002-01
Magnesium	µg/L	3	3	100	None	1220		3233			1220	6820	6820		RCC-SD-3003	RCC-SW-3003-01F
Manganese	µg/L	5	5	100	Lnrm	45.7			116.7	2.31	107	451	451		RCC-SD-3003	RCC-SW-3003-01F
Mercury	µg/L	5	2	40	None	0.00121					0.1	0.1	0.00128		RWR-SW-5001	RWR-SW-5001-01
Molybdenum	µg/L	2	2	100	None	0.565		0.156			0.676	0.786	0.786	J	RWR-SW-5002	RWR-SW-5002-01
Nickel	µg/L	5	4	80	Lnrm	0.916			1.56	2.74	1.16	23.2	23.2		RCC-SD-3001	RCC-SW-3001-01F
Potassium	µg/L	3	3	100	None	1740		2035			1750	5270	5270		RCC-SD-3003	RCC-SW-3003-01F
Selenium	µg/L	5	0	0	None	0.2					2.5	2.5				
Silver	µg/L	5	0	0	None	0.5					0.5	1.34				
Sodium	µg/L	3	2	67	None	8500					20600	21200	21200		RCC-SD-3001	RCC-SW-3001-01F
Thallium	µg/L	5	2	40	None	0.0067					3.5	3.5	0.00908	J	RWR-SW-5002	RWR-SW-5002-01
Vanadium	µg/L	5	2	40	None	0.127					1	1	0.324	J	RWR-SW-5002	RWR-SW-5002-01
Zinc	µg/L	5	5	100	Norm	5.28	17.98	13.06			16.7	34.3	34.3		RCC-SD-3002	RCC-SW-3002-01F
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/L	5	0	0	None	0.00116					5	5				
1,2,4-trichlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2-dichlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,3-dichlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,4-dichlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
2,2'-oxybis(1-chloropropane)	µg/L	3	0	0	None	5					5	5				
2,4,5-trichlorophenol	µg/L	5	0	0	None	12.5					12.5	25				
2,4,6-trichlorophenol	µg/L	3	0	0	None	5					5	5				
2,4-dichlorophenol	µg/L	3	0	0	None	5					5	5				
2,4-dimethylphenol	µg/L	3	0	0	None	5					5	5				
2,4-dinitrophenol	µg/L	3	0	0	None	12.5					12.5	12.5				
2,4-dinitrotoluene	µg/L	3	0	0	None	5					5	5				
2,6-dinitrotoluene	µg/L	3	0	0	None	5					5	5				
2-chloronaphthalene	µg/L	3	0	0	None	5					5	5				
2-chlorophenol	µg/L	3	0	0	None	5					5	5				
2-methylnaphthalene	µg/L	5	0	0	None	0.00116					5	5				
2-methylphenol	µg/L	3	0	0	None	5					5	5				
2-nitroaniline	µg/L	3	0	0	None	12.5					12.5	12.5				
2-nitrophenol	µg/L	5	0	0	None	5					5	5				
3,3'-dichlorobenzidine	µg/L	3	0	0	None	5					5	5				
3-nitroaniline	µg/L	3	0	0	None	12.5					12.5	12.5				
4,6-dinitro-2-methylphenol	µg/L	3	0	0	None	12.5					12.5	12.5				

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
4-bromophenyl-phenylether	µg/L	3	0	0	None	5					5	5				
4-chloro-3-methylphenol	µg/L	3	0	0	None	5					5	5				
4-chloroaniline	µg/L	3	0	0	None	5					5	5				
4-chlorophenyl-phenylether	µg/L	3	0	0	None	5					5	5				
4-methylphenol	µg/L	5	0	0	None	5					5	5				
4-nitroaniline	µg/L	3	0	0	None	12.5					12.5	12.5				
4-nitrophenol	µg/L	5	0	0	None	12.5					12.5	25				
Acenaphthene	µg/L	5	0	0	None	0.00116					5	5				
Acenaphthylene	µg/L	5	0	0	None	0.00116					5	5				
Acetophenone	µg/L	3	0	0	None	5					5	5				
Anthracene	µg/L	5	0	0	None	0.00116					5	5				
Atrazine	µg/L	3	0	0	None	5					5	5				
Bapeq	µg/L	3	0	0	None	1.5					1.5	1.5				
Benzaldehyde	µg/L	5	0	0	None	0.00116					5	5				
Benzo(a)anthracene	µg/L	5	0	0	None	0.00116					5	5				
Benzo(a)pyrene	µg/L	5	0	0	None	0.00116					5	5				
Benzo(b)fluoranthene	µg/L	5	0	0	None	0.00116					5	5				
Benzo(g,h,i)perylene	µg/L	5	0	0	None	0.00116					5	5				
Benzo(k)fluoranthene	µg/L	5	0	0	None	0.00116					5	5				
Bis(2-chloroethoxy)methane	µg/L	3	0	0	None	5					5	5				
Bis(2-chloroethyl)ether	µg/L	3	0	0	None	5					5	5				
Bis(2-ethylhexyl)phthalate	µg/L	5	0	0	None	5					5	5				
Butylbenzylphthalate	µg/L	5	0	0	None	5					5	5				
Caprolactam	µg/L	3	0	0	None	5					5	5				
Carbazole	µg/L	5	0	0	None	5					5	5				
Chrysene	µg/L	5	0	0	None	0.00116					5	5				
Dibenzo(a,h)anthracene	µg/L	5	0	0	None	0.00116					5	5				
Dibenzofuran	µg/L	5	0	0	None	0.00116					5	5				
Diethylphthalate	µg/L	3	0	0	None	5					5	5				
Dimethylphthalate	µg/L	3	0	0	None	5					5	5				
Di-n-butylphthalate	µg/L	5	0	0	None	5					5	5				
Di-n-octylphthalate	µg/L	5	0	0	None	5					5	5				
Fluoranthene	µg/L	5	0	0	None	0.00116					5	5				
Fluorene	µg/L	5	0	0	None	0.00116					5	5				
Hexachlorobenzene	µg/L	3	0	0	None	5					5	5				
Hexachlorobutadiene	µg/L	5	0	0	None	0.5					5	5				
Hexachlorocyclopentadiene	µg/L	3	0	0	None	5					5	5				
Hexachloroethane	µg/L	3	0	0	None	5					5	5				
High Molecular Weight Pahs	µg/L	3	0	0	None	5					5	5				
Indeno(1,2,3-cd)pyrene	µg/L	5	0	0	None	0.00116					5	5				
Isophorone	µg/L	3	0	0	None	5					5	5				
Low Molecular Weight Pahs	µg/L	3	0	0	None	5					5	5				
Naphthalene	µg/L	7	0	0	None	0.00116					0.5	5				
Nitrobenzene	µg/L	3	0	0	None	5					5	5				
N-nitroso-di-n-propylamine	µg/L	3	0	0	None	5					5	5				
N-nitroso-diphenylamine	µg/L	3	0	0	None	5					5	5				
Pentachlorophenol	µg/L	5	0	0	None	12.5					12.5	25				
Phenanthrene	µg/L	5	0	0	None	0.00116					5	5				
Phenol	µg/L	5	0	0	None	5					5	5				
Pyrene	µg/L	5	0	0	None	0.00116					5	5				
Total PAH	µg/L	5	0	0	None	0.0219					5	5				

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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1,1-trichloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1,2,2-tetrachloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1,2-trichloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1-dichloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1-dichloroethene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,1-dichloropropene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2,3-trichlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2,3-trichloropropane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2,4-trimethylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2-dibromo-3-chloropropane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2-dibromoethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2-dichloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,2-dichloropropane	µg/L	2	0	0	None	0.5					0.5	0.5				
1,3,5-trimethylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
1,3-dichloropropane	µg/L	2	0	0	None	0.5					0.5	0.5				
2,2-dichloropropane	µg/L	2	0	0	None	0.5					0.5	0.5				
2-chlorotoluene	µg/L	2	0	0	None	0.5					0.5	0.5				
4-chlorotoluene	µg/L	2	0	0	None	0.5					0.5	0.5				
Benzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Bromobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Bromochloromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Bromodichloromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Bromoform	µg/L	2	0	0	None	0.5					0.5	0.5				
Bromomethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Carbon Tetrachloride	µg/L	2	0	0	None	0.5					0.5	0.5				
Chlorobenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Chloroethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Chloroform	µg/L	2	0	0	None	0.5					0.5	0.5				
Chloromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Cis-1,2-dichloroethene	µg/L	2	0	0	None	0.5					0.5	0.5				
Cis-1,3-dichloropropene	µg/L	2	0	0	None	0.5					0.5	0.5				
Dibromochloromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Dibromomethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Dichlorodifluoromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Ethylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Isopropylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
m&p-Xylene	µg/L	2	0	0	None	0.5					0.5	0.5				
Methylene Chloride	µg/L	2	0	0	None	0.5					0.5	0.5				
N-butylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
N-propylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
O-xylene	µg/L	2	0	0	None	0.5					0.5	0.5				
P-isopropyltoluene	µg/L	2	0	0	None	0.5					0.5	0.5				
Sec-butylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Styrene	µg/L	2	0	0	None	0.5					0.5	0.5				
Tert-butylbenzene	µg/L	2	0	0	None	0.5					0.5	0.5				
Tetrachloroethene	µg/L	2	0	0	None	0.5					0.5	0.5				
Toluene	µg/L	2	0	0	None	0.5					0.5	0.5				
Total Volatile Organics	µg/L	2	0	0	None	0.5					0.5	0.5				
Total Xylenes	µg/L	2	0	0	None	0.5					0.5	0.5				
Trans-1,2-dichloroethene	µg/L	2	0	0	None	0.5					0.5	0.5				
Trans-1,3-dichloropropene	µg/L	2	0	0	None	0.5					0.5	0.5				
Trichloroethene	µg/L	2	0	0	None	0.5					0.5	0.5				
Trichlorofluoromethane	µg/L	2	0	0	None	0.5					0.5	0.5				
Vinyl Chloride	µg/L	2	0	0	None	0.5					0.5	0.5				

Table C-13. Upstream Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
PCB as Aroclors																
Aroclor, Total	µg/L	5	0	0	None	0.0923					1	1				
Aroclor-1016	µg/L	5	0	0	None	0.0115					0.5	0.5				
Aroclor-1221	µg/L	5	0	0	None	0.0115					1	1				
Aroclor-1232	µg/L	2	0	0	None	0.0115					0.0117	0.0119				
Aroclor-1242	µg/L	5	0	0	None	0.0115					0.5	0.5				
Aroclor-1248	µg/L	5	0	0	None	0.0115					0.5	0.5				
Aroclor-1254	µg/L	5	0	0	None	0.0115					0.5	0.5				
Aroclor-1260	µg/L	5	0	0	None	0.0115					0.5	0.5				
Aroclor-1268	µg/L	2	0	0	None	0.0115					0.0117	0.0119				
Pesticides/Herbicides																
4,4'-DDD	µg/L	5	0	0	None	0.000925					0.05	0.05				
4,4'-DDE	µg/L	5	0	0	None	0.000925					0.05	0.05				
4,4'-DDT	µg/L	5	0	0	None	0.000925					0.05	0.05				
Aldrin	µg/L	5	0	0	None	0.000925					0.025	0.025				
alpha-BHC	µg/L	5	0	0	None	0.000925					0.025	0.025				
alpha-Chlordane	µg/L	5	0	0	None	0.000925					0.025	0.025				
beta-BHC	µg/L	5	1	20	None	0.000925					0.025	0.025	0.00105	J	RWR-SW-5002	RWR-SW-5002-01
delta-BHC	µg/L	5	0	0	None	0.000925					0.025	0.025				
Dieldrin	µg/L	5	0	0	None	0.000925					0.05	0.05				
Endosulfan I	µg/L	5	0	0	None	0.000925					0.025	0.025				
Endosulfan II	µg/L	5	0	0	None	0.000925					0.05	0.05				
Endosulfan Sulfate	µg/L	5	0	0	None	0.000925					0.05	0.05				
Endrin	µg/L	5	0	0	None	0.000925					0.05	0.05				
Endrin Aldehyde	µg/L	2	0	0	None	0.000925					0.000938	0.00095				
Endrin Ketone	µg/L	5	0	0	None	0.000925					0.05	0.05				
gamma-BHC	µg/L	5	1	20	None	0.00075					0.025	0.025	0.00075	J	RWR-SW-5002	RWR-SW-5002-01
gamma-Chlordane	µg/L	5	0	0	None	0.000925					0.025	0.025				
Heptachlor	µg/L	5	0	0	None	0.000925					0.025	0.025				
Heptachlor Epoxide	µg/L	5	0	0	None	0.000925					0.025	0.025				
Methoxychlor	µg/L	5	0	0	None	0.000925					0.25	0.25				
Technical Chlordane	µg/L	2	0	0	None	0.115					0.117	0.119				
Toxaphene	µg/L	5	0	0	None	0.0231					2.5	2.5				
Ancillary																
Total Organic Carbon	mg/L	2	2	100	None	5.36		0.113			5.44	5.52	5.52		RWR-SW-5001	RWR-SW-5001-01
Biochemical Oxygen Demand	mg/L	2	2	100	None	2.4		0.283			2.6	2.8	2.8		RWR-SW-5001	RWR-SW-5001-01
Dissolved Organic Carbon	mg/L	2	2	100	None	5.53		0.0778			5.585	5.64	5.64		RWR-SW-5001	RWR-SW-5001-01
Hardness	mg/L	2	2	100	None	27.9		0.283			28.1	28.3	28.3		RWR-SW-5002	RWR-SW-5002-01
Nitrate	mg/L	2	2	100	None	0.602		0.0552			0.641	0.68	0.68		RWR-SW-5002	RWR-SW-5002-01
Nitrite-N	mg/L	2	2	100	None	0.125		0.003536			0.1275	0.13	0.13		RWR-SW-5001	RWR-SW-5001-01
Nitrogen, Ammonia	mg/L	2	2	100	None	0.34		0.0757			0.3935	0.447	0.447	J	RWR-SW-5001	RWR-SW-5001-01
Nitrogen, Dissolved	mg/L	2	2	100	None	1.29		0.007071			1.295	1.3	1.3		RWR-SW-5002	RWR-SW-5002-01
Nitrogen, Total	mg/L	2	2	100	None	1.3		0.0566			1.34	1.38	1.38		RWR-SW-5001	RWR-SW-5001-01
pH	SU	1	1	100	None	6.6					6.6	6.6	6.6		Esmond Dam	DAM001-SW
Phosphate	mg/L	2	2	100	None	0.0538		0.00601			0.05805	0.0623	0.0623		RWR-SW-5002	RWR-SW-5002-01
Phosphorus, Dissolved	mg/L	2	2	100	None	0.0753		0.000778			0.07585	0.0764	0.0764	J	RWR-SW-5002	RWR-SW-5002-01
Phosphorus, Total	mg/L	2	2	100	None	0.0753		0.0122			0.08395	0.0926	0.0926		RWR-SW-5002	RWR-SW-5002-01
Temperature	C	1	1	100	None	10					10	10	10		Esmond Dam	DAM001-SW
Total Suspended Solids	mg/L	2	2	100	None	2.4					2.4	2.4	2.4		RWR-SW-5001	RWR-SW-5001-01
													2.4		RWR-SW-5002	RWR-SW-5002-01

Table C-14. Source Area Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	4	4	100	None	7.9		2367			67	4780	4780		CMW-SD-2019	CMW-SW-2019-01
1,2,3,4,6,7,8-HpCDF	pg/L	4	3	75	None	4.3		25.2			17.48	991	991		CMW-SD-2019	CMW-SW-2019-01
1,2,3,4,7,8,9-HpCDF	pg/L	4	1	25	None	38.9					39.3	59.6	59.6	EMPC	CMW-SD-2019	CMW-SW-2019-01
1,2,3,4,7,8-HxCDD	pg/L	4	1	25	None	15.6					15.75	81.7	81.7		CMW-SD-2019	CMW-SW-2019-01
1,2,3,4,7,8-HxCDF	pg/L	4	2	50	None	2.8					4.08	73	73		CMW-SD-2019	CMW-SW-2019-01
1,2,3,6,7,8-HxCDD	pg/L	4	2	50	None	6.4					9.75	232	232		CMW-SD-2019	CMW-SW-2019-01
1,2,3,6,7,8-HxCDF	pg/L	4	2	50	None	2.8					3.78	57.9	57.9		CMW-SD-2019	CMW-SW-2019-01
1,2,3,7,8,9-HxCDD	pg/L	4	2	50	None	7.2					21.15	196	196		CMW-SD-2019	CMW-SW-2019-01
1,2,3,7,8,9-HxCDF	pg/L	4	2	50	None	2.2					25.9	45.5	6.3	J	CMW-SD-2019	CMW-SW-2019-01
1,2,3,7,8-PeCDD	pg/L	4	1	25	None	6.7					6.75	35.4	35.4	J	CMW-SD-2019	CMW-SW-2019-01
1,2,3,7,8-PeCDF	pg/L	4	1	25	None	9.2					9.3	14.1	14.1	J	CMW-SD-2019	CMW-SW-2019-01
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	4	1	25	None	398					398	398	398	J	CMW-SD-2019	CMW-SW-2019-01
2,3,4,6,7,8-HxCDF	pg/L	4	1	25	None	15.25					15.4	78.2	78.2		CMW-SD-2019	CMW-SW-2019-01
2,3,4,7,8-PeCDF	pg/L	4	1	25	None	16.85					17	28.2	28.2	J	CMW-SD-2019	CMW-SW-2019-01
2,3,7,8-TCDD	pg/L	4	2	50	None	2.3					15.4	12740	12740	J	CMW-SD-2019	CMW-SW-2019-01
2,3,7,8-TCDF	pg/L	4	1	25	None	2.35					2.35	53.1	53.1	J	CMW-SD-2019	CMW-SW-2019-01
OCDD	pg/L	4	3	75	None	15.85		651.3			400.4	27700	27700	J	CMW-SD-2019	CMW-SW-2019-01
OCDF	pg/L	4	4	100	None	14.5		959.9			38.45	1950	1950	J	CMW-SD-2019	CMW-SW-2019-01
PCDD/Fs	pg/L	4	4	100	None	58.3		28189			618	56800	56800		CMW-SD-2019	CMW-SW-2019-01
TEQ	pg/L	4	4	100	None	0.34		6443			20.5	12900	12900		CMW-SD-2019	CMW-SW-2019-01
Total HpCDD	pg/L	4	4	100	None	12		4005			118.5	8090	8090	J	CMW-SD-2019	CMW-SW-2019-01
Total HpCDF	pg/L	4	3	75	None	9.1		47.2			56.3	2310	2310	J	CMW-SD-2019	CMW-SW-2019-01
Total HxCDD	pg/L	4	4	100	None	4.7		686.4			8.4	1380	1380	J	CMW-SD-2019	CMW-SW-2019-01
Total HxCDF	pg/L	4	3	75	None	0.9		23.4			16.5	1370	1370	J	CMW-SD-2019	CMW-SW-2019-01
Total PeCDD	pg/L	4	1	25	None	1.7					1.88	104	104	J	CMW-SD-2019	CMW-SW-2019-01
Total PeCDF	pg/L	4	2	50	None	1.4					5.23	493	493	J	CMW-SD-2019	CMW-SW-2019-01
Total TCDD	pg/L	4	2	50	None	1.85					15.3	12870	12870	J	CMW-SD-2019	CMW-SW-2019-01
Total TCDF	pg/L	4	1	25	None	1.55					1.73	555	555	J	CMW-SD-2019	CMW-SW-2019-01
Metals (total)																
Aluminum	µg/L	5	2	40	None	18.1					45.25	6190	6190		CMW-SD-2019	CMW-SW-2019-01
Antimony	µg/L	5	0	0	None	2.5					2.5	2.5				
Arsenic	µg/L	5	5	100	Norm	6.1	8.5	1.87			8.7	10.9	10.9		CMW-SD-2019	CMW-SW-2019-01
Barium	µg/L	5	5	100	Lnrm	17.8			31.34	1.90	25	91.7	91.7		CMW-SD-2019	CMW-SW-2019-01
Beryllium	µg/L	5	0	0	None	0.5					0.5	0.55				
Cadmium	µg/L	5	0	0	None	0.5					0.5	0.5				
Calcium	µg/L	5	5	100	Norm	14300	18880	3754			19700	23500	23500		CMW-SD-2019	CMW-SW-2019-01
Chromium	µg/L	5	1	20	None	0.5					0.5	23.1	23.1		CMW-SD-2019	CMW-SW-2019-01
Cobalt	µg/L	5	0	0	None	0.5					0.5	0.5				
Copper	µg/L	5	5	100	Lnrm	2.5			14.23	3.62	14.8	91.4	91.4		CMW-SD-2019	CMW-SW-2019-01
Iron	µg/L	5	5	100	Lnrm	628			2601	4.48	1540	29100	29100		CMW-SD-2019	CMW-SW-2019-01
Lead	µg/L	5	1	20	None	1					1	223	223		CMW-SD-2019	CMW-SW-2019-01
Magnesium	µg/L	5	5	100	Lnrm	1280			2120	1.68	2180	4750	4750		CMW-SD-2019	CMW-SW-2019-01
Manganese	µg/L	5	5	100	Lnrm	14.1			169.0	4.73	226	1030	1030		CMW-SD-2019	CMW-SW-2019-01
Mercury	µg/L	5	0	0	None	0.1					0.1	0.1				
Nickel	µg/L	5	5	100	None	4.4		6.22			5.5	18.8	18.8		CMW-SD-2019	CMW-SW-2019-01
Potassium	µg/L	5	5	100	Lnrm	1490			2489	1.66	2650	5370	5370	J	CMW-SD-2019	CMW-SW-2019-01
Selenium	µg/L	5	2	40	None	2.5					2.5	7.8	7.8		CMW-SD-2020	CMW-SW-2020-01
Silver	µg/L	5	3	60	Norm	0.5	1				1	1.5	1.5	J	CMW-SD-2019	CMW-SW-2019-01
Sodium	µg/L	5	5	100	Lnrm	15600			24663	1.52	20900	39700	39700		CMW-SD-2019	CMW-SW-2019-01
Thallium	µg/L	5	1	20	None	3.5					3.5	11.2	11.2	J	CMW-SD-2022	CMW-SW-2022-01
Vanadium	µg/L	5	1	20	None	1					1	22	22		CMW-SD-2019	CMW-SW-2019-01
Zinc	µg/L	5	5	100	Lnrm	27.9			56.24	2.69	35.4	292	292		CMW-SD-2019	CMW-SW-2019-01

Table C-14. Source Area Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Metals (dissolved)																
Aluminum	µg/L	5	0	0	None	11.7					19.5	39.85				
Antimony	µg/L	5	0	0	None	2.5					2.5	2.5				
Arsenic	µg/L	5	5	100	Norm	7.4	7.78	0.259			7.8	8.1	8.1			
Barium	µg/L	5	2	40	None	4.15					68	206	206			
Beryllium	µg/L	5	0	0	None	0.5					0.5	1.25				
Cadmium	µg/L	5	0	0	None	0.5					0.5	0.5				
Calcium	µg/L	5	5	100	Norm	5380	16536	6903			18300	22700	22700		CMW-SD-2019	CMW-SW-2019-01F
Chromium	µg/L	5	0	0	None	0.5					0.5	0.5				
Cobalt	µg/L	5	0	0	None	0.5					0.5	0.5				
Copper	µg/L	5	5	100	Lnrm	2.2			6.06	2.35	5.7	16	16		CMW-SD-2019	CMW-SW-2019-01F
Iron	µg/L	5	5	100	None	514		3257			760	7950	7950		CMW-SD-2019	CMW-SW-2019-01F
Lead	µg/L	5	0	0	None	1					1	1				
Magnesium	µg/L	5	5	100	Norm	462	1790.4	933.8			2130	2860	2860		CMW-SD-2019	CMW-SW-2019-01F
Manganese	µg/L	5	5	100	Lnrm	9.6			127.7	5.30	170	862	862		CMW-SD-2019	CMW-SW-2019-01F
Mercury	µg/L	5	0	0	None	0.1					0.1	0.1				
Nickel	µg/L	5	5	100	Lnrm	3.4			4.55	1.41	4	8.2	8.2		CMW-SD-2019	CMW-SW-2019-01F
Potassium	µg/L	5	5	100	Norm	613	2494.6	1440			2610	4410	4410	J	CMW-SD-2019	CMW-SW-2019-01F
Selenium	µg/L	5	0	0	None	2.5					2.5	2.5				
Silver	µg/L	5	1	20	None	0.5					0.5	1.6	1.6	J	CMW-SD-2021	CMW-SW-2021-01F
Sodium	µg/L	5	4	80	Norm	3805	28900	15550			23800	47500	47500		CMW-SD-2019	CMW-SW-2019-01F
Thallium	µg/L	5	1	20	None	3.5					3.5	7	7	J	CMW-SD-2022	CMW-SW-2022-01F
Vanadium	µg/L	5	0	0	None	1					1	1				
Zinc	µg/L	5	4	80	Norm	5.9	75.5	20.74			78.2	105	105		CMW-SD-2022	CMW-SW-2022-01F
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/L	5	0	0	None	5					5	5				
2,2'-oxybis(1-chloropropane)	µg/L	5	0	0	None	5					5	5				
2,4,5-trichlorophenol	µg/L	5	0	0	None	12.5					12.5	12.5				
2,4,6-trichlorophenol	µg/L	5	0	0	None	5					5	5				
2,4-dichlorophenol	µg/L	5	0	0	None	5					5	5				
2,4-dimethylphenol	µg/L	5	0	0	None	5					5	5				
2,4-dinitrophenol	µg/L	5	0	0	None	12.5					12.5	12.5				
2,4-dinitrotoluene	µg/L	5	0	0	None	5					5	5				
2,6-dinitrotoluene	µg/L	5	0	0	None	5					5	5				
2-chloronaphthalene	µg/L	5	0	0	None	5					5	5				
2-chlorophenol	µg/L	5	0	0	None	5					5	5				
2-methylnaphthalene	µg/L	5	0	0	None	5					5	5				
2-methylphenol	µg/L	5	0	0	None	5					5	5				
2-nitroaniline	µg/L	5	0	0	None	12.5					12.5	12.5				
2-nitrophenol	µg/L	5	0	0	None	5					5	5				
3,3'-dichlorobenzidine	µg/L	5	0	0	None	5					5	5				
3-nitroaniline	µg/L	5	0	0	None	12.5					12.5	12.5				
4,6-dinitro-2-methylphenol	µg/L	5	0	0	None	12.5					12.5	12.5				
4-bromophenyl-phenylether	µg/L	5	0	0	None	5					5	5				
4-chloro-3-methylphenol	µg/L	5	0	0	None	5					5	5				
4-chloroaniline	µg/L	5	0	0	None	5					5	5				
4-chlorophenyl-phenylether	µg/L	5	0	0	None	5					5	5				
4-methylphenol	µg/L	5	0	0	None	5					5	5				
4-nitroaniline	µg/L	5	0	0	None	12.5					12.5	12.5				
4-nitrophenol	µg/L	5	0	0	None	12.5					12.5	12.5				
Acenaphthene	µg/L	5	0	0	None	5					5	5				
Acenaphthylene	µg/L	5	0	0	None	5					5	5				
Acetophenone	µg/L	5	0	0	None	5					5	5				
Anthracene	µg/L	5	0	0	None	5					5	5				

Table C-14. Source Area Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Atrazine	µg/L	5	0	0	None	5					5	5				
Bapeq	µg/L	5	0	0	None	1.5					1.5	1.5				
Benzaldehyde	µg/L	5	0	0	None	5					5	5				
Benzo(a)anthracene	µg/L	5	0	0	None	5					5	5				
Benzo(a)pyrene	µg/L	5	0	0	None	5					5	5				
Benzo(b)fluoranthene	µg/L	5	0	0	None	5					5	5				
Benzo(g,h,i)perylene	µg/L	5	0	0	None	5					5	5				
Benzo(k)fluoranthene	µg/L	5	0	0	None	5					5	5				
Bis(2-chloroethoxy)methane	µg/L	5	0	0	None	5					5	5				
Bis(2-chloroethyl)ether	µg/L	5	0	0	None	5					5	5				
Bis(2-ethylhexyl)phthalate	µg/L	5	0	0	None	5					5	5				
Butylbenzylphthalate	µg/L	5	0	0	None	5					5	5				
Caprolactam	µg/L	5	0	0	None	5					5	5				
Carbazole	µg/L	5	0	0	None	5					5	5				
Chrysene	µg/L	5	0	0	None	5					5	5				
Dibenzo(a,h)anthracene	µg/L	5	0	0	None	5					5	5				
Dibenzofuran	µg/L	5	0	0	None	5					5	5				
Diethylphthalate	µg/L	5	0	0	None	5					5	5				
Dimethylphthalate	µg/L	5	0	0	None	5					5	5				
Di-n-butylphthalate	µg/L	5	0	0	None	5					5	5				
Di-n-octylphthalate	µg/L	5	0	0	None	5					5	5				
Fluoranthene	µg/L	5	0	0	None	5					5	5				
Fluorene	µg/L	5	0	0	None	5					5	5				
Hexachlorobenzene	µg/L	5	0	0	None	5					5	5				
Hexachlorobutadiene	µg/L	5	0	0	None	5					5	5				
Hexachlorocyclopentadiene	µg/L	5	0	0	None	5					5	5				
Hexachloroethane	µg/L	5	0	0	None	5					5	5				
High Molecular Weight Pahs	µg/L	5	0	0	None	5					5	5				
Indeno(1,2,3-cd)pyrene	µg/L	5	0	0	None	5					5	5				
Isophorone	µg/L	5	0	0	None	5					5	5				
Low Molecular Weight Pahs	µg/L	5	0	0	None	5					5	5				
Naphthalene	µg/L	5	0	0	None	5					5	5				
Nitrobenzene	µg/L	5	0	0	None	5					5	5				
N-nitroso-di-n-propylamine	µg/L	5	0	0	None	5					5	5				
N-nitroso-diphenylamine	µg/L	5	0	0	None	5					5	5				
Pentachlorophenol	µg/L	5	0	0	None	12.5					12.5	12.5				
Phenanthrene	µg/L	5	0	0	None	5					5	5				
Phenol	µg/L	5	1	20	None	2					5	5	2	J	CMW-SD-2019	CMW-SW-2019-01
Pyrene	µg/L	5	0	0	None	5					5	5				
Total PAH	µg/L	5	0	0	None	5					5	5				
PCB as Aroclors																
Aroclor, Total	µg/L	5	1	20	None	1					1	4.6	4.6		CMW-SD-2019	CMW-SW-2019-01
Aroclor-1016	µg/L	5	0	0	None	0.5					0.5	0.5				
Aroclor-1221	µg/L	5	0	0	None	1					1	1				
Aroclor-1232	µg/L	5	0	0	None	0.5					0.5	0.5				
Aroclor-1242	µg/L	5	0	0	None	0.5					0.5	0.5				
Aroclor-1248	µg/L	5	0	0	None	0.5					0.5	0.5				
Aroclor-1254	µg/L	5	1	20	None	0.5					0.5	4.6	4.6		CMW-SD-2019	CMW-SW-2019-01
Aroclor-1260	µg/L	5	0	0	None	0.5					0.5	0.5				

Table C-14. Source Area Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Pesticides/Herbicides																
4,4'-DDD	µg/L	5	0	0	None	0.05					0.05	0.05				
4,4'-DDE	µg/L	5	0	0	None	0.05					0.05	0.05				
4,4'-DDT	µg/L	5	0	0	None	0.05					0.05	0.05				
Aldrin	µg/L	5	0	0	None	0.025					0.025	0.025				
alpha-BHC	µg/L	5	0	0	None	0.025					0.025	0.025				
alpha-Chlordane	µg/L	5	0	0	None	0.025					0.025	0.025				
beta-BHC	µg/L	5	0	0	None	0.025					0.025	0.025				
delta-BHC	µg/L	5	0	0	None	0.025					0.025	0.025				
Dieldrin	µg/L	5	0	0	None	0.05					0.05	0.05				
Endosulfan I	µg/L	5	0	0	None	0.025					0.025	0.025				
Endosulfan II	µg/L	5	0	0	None	0.05					0.05	0.05				
Endosulfan Sulfate	µg/L	5	1	20	None	0.05					0.05	0.49	0.49		CMW-SD-2019	CMW-SW-2019-01
Endrin	µg/L	5	1	20	None	0.05					0.05	0.21	0.21		CMW-SD-2019	CMW-SW-2019-01
Endrin Aldehyde	µg/L	5	0	0	None	0.05					0.05	0.05				
Endrin Ketone	µg/L	5	0	0	None	0.05					0.05	0.05				
gamma-BHC	µg/L	5	0	0	None	0.025					0.025	0.025				
gamma-Chlordane	µg/L	5	1	20	None	0.025					0.025	0.12	0.12		CMW-SD-2019	CMW-SW-2019-01
Heptachlor	µg/L	5	0	0	None	0.025					0.025	0.025				
Heptachlor Epoxide	µg/L	5	0	0	None	0.025					0.025	0.025				
Methoxychlor	µg/L	5	0	0	None	0.25					0.25	0.25				
Toxaphene	µg/L	5	0	0	None	2.5					2.5	2.5				

Table C-15. Allendale Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	16	9	56	None	4.7		9.2			8.05	2190	2190	J	APB-SD-2029	APB-SW-2029-01
1,2,3,4,6,7,8-HpCDF	pg/L	16	9	56	None	2.4		1.2			8.5	580	580	J	APB-SD-2029	APB-SW-2029-01
1,2,3,4,7,8,9-HpCDF	pg/L	16	2	13	None	15.5					25.2	50	50	J	APB-SD-2029	APB-SW-2029-01
1,2,3,4,7,8-HxCDD	pg/L	16	2	13	None	10					14.3	28.3	28.3	EMPC	APB-SD-2029	APB-SW-2029-01
1,2,3,4,7,8-HxCDF	pg/L	16	2	13	None	3.85					11.15	42.7	42.7	J	APB-SD-2029	APB-SW-2029-01
1,2,3,6,7,8-HxCDD	pg/L	16	3	19	None	3.5					10.6	95.3	95.3	J	APB-SD-2029	APB-SW-2029-01
1,2,3,6,7,8-HxCDF	pg/L	16	2	13	None	3.1					3.25	34.2	34.2	J	APB-SD-2029	APB-SW-2029-01
1,2,3,7,8,9-HxCDD	pg/L	16	2	13	None	13.7					14.33	93.5	93.5	J	APB-SD-2029	APB-SW-2029-01
1,2,3,7,8,9-HxCDF	pg/L	16	0	0	None	21.5					22.35	44.15				
1,2,3,7,8-PeCDD	pg/L	16	1	6	None	6.4					8.65	14	14	EMPC	APB-SD-2029	APB-SW-2029-01
1,2,3,7,8-PeCDF	pg/L	16	1	6	None	8.75					10.25	36.4	36.4	EMPC	APB-SD-2029	APB-SW-2029-01
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	16	2	13	None	223.4					247.2	271	271	J	CMW-SD-2024	CMW-SW-2024-01
2,3,4,6,7,8-HxCDF	pg/L	16	2	13	None	14.5					19.65	43.6	43.6	J	APB-SD-2029	APB-SW-2029-01
2,3,4,7,8-PeCDF	pg/L	16	1	6	None	16.05					17.95	19.1	18.3	J	APB-SD-2029	APB-SW-2029-01
2,3,7,8-TCDD	pg/L	16	8	50	None	1.75					3.4	4000	4000	J	APB-SD-2029	APB-SW-2029-01
2,3,7,8-TCDF	pg/L	16	2	13	None	2.25					4.18	30.9	30.9	J	APB-SD-2029	APB-SW-2029-01
OCDD	pg/L	16	15	94	None	9.3		3725			45	14890	14890	J	APB-SD-2029	APB-SW-2029-01
OCDF	pg/L	16	9	56	None	5.1		1.8			20.5	1180	1180	J	APB-SD-2029	APB-SW-2029-01
PCDD/Fs	pg/L	16	15	94	Lnrm	9.3			120.0	9.18	69.1	27600	27600		APB-SD-2029	APB-SW-2029-01
TEQ	pg/L	16	16	100	None	3.1		1025			8.1	4090	4090		APB-SD-2029	APB-SW-2029-01
Total HpCDD	pg/L	16	9	56	None	2.6		12.8			11.8	4130	4130	J	APB-SD-2029	APB-SW-2029-01
Total HpCDF	pg/L	16	9	56	None	1		2.6			3.88	1400	1400	J	APB-SD-2029	APB-SW-2029-01
Total HxCDD	pg/L	16	4	25	None	0.5					2.33	626	626	J	APB-SD-2029	APB-SW-2029-01
Total HxCDF	pg/L	16	6	38	None	0.35					2.1	741	741	J	APB-SD-2029	APB-SW-2029-01
Total PeCDD	pg/L	16	2	13	None	0.7					1.78	49.5	49.5	J	APB-SD-2029	APB-SW-2029-01
Total PeCDF	pg/L	16	2	13	None	0.65					1.65	270	270	J	APB-SD-2029	APB-SW-2029-01
Total TCDD	pg/L	16	8	50	None	1.2					4.25	4100	4100	J	APB-SD-2029	APB-SW-2029-01
Total TCDF	pg/L	16	2	13	None	0.65					2.4	234	234	J	APB-SD-2029	APB-SW-2029-01
Metals (total)																
Aluminum	µg/L	20	19	95	None	18.3		1132			69.7	5070	5070		APB-SD-2029	APB-SW-2029-01
Antimony	µg/L	20	4	20	None	0.183					1.05	4.7	0.186		WRC-SW-4004	WRC-SW-4004-01
Arsenic	µg/L	20	11	55	None	0.558		0.0268			1.1	12.5	12.5		APB-SD-2029	APB-SW-2029-01
Barium	µg/L	20	19	95	None	9.5		61.30			19.05	271	271		WRC-SD-2015	WRC-SW-2015-01
Beryllium	µg/L	20	4	20	None	0.0467					0.05	1	0.05	J	WRC-SW-4001	WRC-SW-4001-01
Cadmium	µg/L	20	4	20	None	0.0196					0.15	0.5	0.0253	J	WRC-SW-4002	WRC-SW-4002-01
Calcium	µg/L	16	16	100	None	7230		11043			8470	36800	36800		CMW-SD-2025	CMW-SW-2025-01
Chromium	µg/L	20	3	15	None	0.15					0.5	42	42		APB-SD-2029	APB-SW-2029-01
Cobalt	µg/L	20	6	30	None	0.126					0.3	5.4	5.4		APB-SD-2029	APB-SW-2029-01
Copper	µg/L	20	20	100	None	1.6		18.52			2.5	83.1	83.1		APB-SD-2029	APB-SW-2029-01
Iron	µg/L	20	20	100	None	229		25117			502	113000	113000		APB-SD-2029	APB-SW-2029-01
Lead	µg/L	20	11	55	None	0.55		0.134			1.37	156	156		APB-SD-2029	APB-SW-2029-01
Magnesium	µg/L	16	16	100	None	1190		1843			1370	5920	5920		CMW-SD-2023	CMW-SW-DU-102799B
													5920		CMW-SD-2025	CMW-SW-2025-01
Manganese	µg/L	20	20	100	None	37.4		588.1			114	2600	2600		APB-SD-2029	APB-SW-2029-01
Mercury	µg/L	20	4	20	None	0.00211					0.05	0.1	0.00319		WRC-SW-4002	WRC-SW-4002-01
Molybdenum	µg/L	4	4	100	None	0.961		0.0691			1.06	1.1	1.1	J	WRC-SW-4001	WRC-SW-4001-01
													1.1	J	WRC-SW-4002	WRC-SW-4002-01
Nickel	µg/L	20	15	75	None	0.65		1.08			1.7	34.3	34.3	J	APB-SD-2029	APB-SW-2029-01
Potassium	µg/L	16	16	100	None	2160		884.7			2445	4650	4650	J	CMW-SD-2025	CMW-SW-2025-01
Selenium	µg/L	20	2	10	None	0.2					0.9	10.8	10.8		APB-SD-2029	APB-SW-2029-01
Silver	µg/L	20	4	20	None	0.2					0.25	1.8	1.8	J	CMW-SD-2023	CMW-SW-DU-102799B
													1.8	J	CMW-SD-2025	CMW-SW-2025-01
Sodium	µg/L	15	15	100	Lnrm	18300			22664	1.14	22600	29700	29700		WRC-SD-2015	WRC-SW-2015-01
Thallium	µg/L	20	9	45	None	0.00607					1.18	14.5	14.5		CMW-SD-2024	CMW-SW-2024-01

Table C-15. Allendale Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Vanadium	µg/L	20	9	45	None	0.0352					0.25	18.3	18.3		APB-SD-2029	APB-SW-2029-01
Zinc	µg/L	20	14	70	None	5.92		18.48			11	500	500		APB-SD-2029	APB-SW-2029-01
Metals (dissolved)																
Aluminum	µg/L	18	12	67	Lnrm	7			29.74	2.17	32.18	140	140		WRC-SD-2011	WRC-SW-2011-01F
Antimony	µg/L	18	3	17	None	0.02					1.05	2.5	0.191		WRC-SW-4003	WRC-SW-4003-01
Arsenic	µg/L	18	8	44	None	0.424					1.1	11.3	11.3		CMW-SD-2024	CMW-SW-2024-01F
Barium	µg/L	18	17	94	None	13.6		88.70			197	254	254		CMW-SD-2024	CMW-SW-2024-01F
Beryllium	µg/L	18	4	22	None	0.0331					0.05	0.65	0.0435	J	WRC-SW-4002	WRC-SW-4002-01
Cadmium	µg/L	18	4	22	None	0.0129					0.15	0.5	0.0175	J	WRC-SW-4003	WRC-SW-4003-01
Calcium	µg/L	14	14	100	None	7620		9975			8635	37100	37100		CMW-SD-2023	CMW-SW-2023-01F
Chromium	µg/L	18	1	6	None	0.15					0.5	6	1.6		WRC-SD-2015	WRC-SW-2015-01F
Cobalt	µg/L	18	5	28	None	0.0669					0.3	1	1	J	WRC-SD-2015	WRC-SW-2015-01F
Copper	µg/L	18	17	94	Lnrm	0.5			2.27	1.94	2.1	11.2	11.2		WRC-SD-2011	WRC-SW-2011-01F
Iron	µg/L	18	18	100	None	154		142.8			245	525	525		CMW-SD-2024	CMW-SW-2024-01F
Lead	µg/L	18	4	22	None	0.475					0.55	1	0.501		WRC-SW-4001	WRC-SW-4001-01
Magnesium	µg/L	14	14	100	None	1240		1643			1420	6240	6240		CMW-SD-2023	CMW-SW-2023-01F
Manganese	µg/L	18	18	100	None	26.4		406.7			60.55	1570	1570		APB-SD-2029	APB-SW-2029-01F
Mercury	µg/L	18	4	22	None	0.00138					0.05	0.1	0.00173		WRC-SW-4003	WRC-SW-4003-01
Molybdenum	µg/L	4	4	100	None	0.859		0.00854			0.874	0.878	0.878	J	WRC-SW-4004	WRC-SW-4004-01
Nickel	µg/L	18	11	61	None	0.65		0.176			1.10	7.3	7.3		APB-SD-2029	APB-SW-2029-01F
Potassium	µg/L	14	14	100	None	1890		853.3			2440	4900	4900	J	CMW-SD-2023	CMW-SW-2023-01F
Selenium	µg/L	18	2	11	None	0.2					0.9	5.3	5.3		APB-SD-2029	APB-SW-2029-01F
Silver	µg/L	18	4	22	None	0.2					0.275	1.7	1.7	J	APB-SD-2029	APB-SW-2029-01F
Sodium	µg/L	14	14	100	Lnrm	22800			26438	1.10	26550	31800	31800		CMW-SD-2024	CMW-SW-2024-01F
Thallium	µg/L	18	6	33	None	0.00513					1.05	10.6	10.6	J	CMW-SD-2025	CMW-SW-2025-01F
Vanadium	µg/L	18	2	11	None	0.25					0.8	4	0.8	J	APC-SD-2036	APC-SW-2036-01F
													0.8	J	WRC-SD-2015	WRC-SW-2015-01F
Zinc	µg/L	18	18	100	Norm	4.44	63.28	36.89			72.55	121	121		CMW-SD-2024	CMW-SW-2024-01F
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/L	21	1	5	None	0.00087					5	5	0.00087	J	WRC-SW-4003	WRC-SW-4003-01
1,2,4-trichlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2-dichlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,3-dichlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,4-dichlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
2,2'-oxybis(1-chloropropane)	µg/L	16	0	0	None	5					5	5				
2,4,5-trichlorophenol	µg/L	20	0	0	None	12.5					12.5	25				
2,4,6-trichlorophenol	µg/L	16	0	0	None	5					5	5				
2,4-dichlorophenol	µg/L	16	0	0	None	5					5	5				
2,4-dimethylphenol	µg/L	16	0	0	None	5					5	5				
2,4-dinitrophenol	µg/L	20	0	0	None	12.5					12.5	25				
2,4-dinitrotoluene	µg/L	16	0	0	None	5					5	5				
2,6-dinitrotoluene	µg/L	16	0	0	None	5					5	5				
2-chloronaphthalene	µg/L	16	0	0	None	5					5	5				
2-chlorophenol	µg/L	16	0	0	None	5					5	5				
2-methylnaphthalene	µg/L	21	1	5	None	0.00116					5	5	0.00153	J	WRC-SW-4003	WRC-SW-4003-01
2-methylphenol	µg/L	16	0	0	None	5					5	5				
2-nitroaniline	µg/L	16	0	0	None	12.5					12.5	12.5				
2-nitrophenol	µg/L	20	0	0	None	5					5	5				
3,3'-dichlorobenzidine	µg/L	16	0	0	None	5					5	5				
3-nitroaniline	µg/L	16	0	0	None	12.5					12.5	12.5				
4,6-dinitro-2-methylphenol	µg/L	16	0	0	None	12.5					12.5	12.5				
4-bromophenyl-phenylether	µg/L	16	0	0	None	5					5	5				

Table C-15. Allendale Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
4-chloro-3-methylphenol	µg/L	16	0	0	None	5					5	5				
4-chloroaniline	µg/L	16	0	0	None	5					5	5				
4-chlorophenyl-phenylether	µg/L	16	0	0	None	5					5	5				
4-methylphenol	µg/L	20	0	0	None	5					5	5				
4-nitroaniline	µg/L	16	0	0	None	12.5					12.5	12.5				
4-nitrophenol	µg/L	20	0	0	None	12.5					12.5	25				
Acenaphthene	µg/L	21	1	5	None	0.00116					5	5	0.00145	J	WRC-SW-4003	WRC-SW-4003-01
Acenaphthylene	µg/L	21	1	5	None	0.00058					5	5	0.00058	J	WRC-SW-4003	WRC-SW-4003-01
Acetophenone	µg/L	16	0	0	None	5					5	5				
Anthracene	µg/L	21	1	5	None	0.00097					5	5	0.00097	J	WRC-SW-4003	WRC-SW-4003-01
Atrazine	µg/L	16	0	0	None	5					5	5				
Bapeq	µg/L	16	0	0	None	1.5					1.5	1.5				
Benzaldehyde	µg/L	21	1	5	None	0.00116					5	5	0.0145		WRC-SW-4003	WRC-SW-4003-01
Benzo(a)anthracene	µg/L	21	1	5	None	0.00116					5	5	0.00252	J	WRC-SW-4003	WRC-SW-4003-01
Benzo(a)pyrene	µg/L	21	1	5	None	0.00116					5	5	0.00248	J	WRC-SW-4003	WRC-SW-4003-01
Benzo(b)fluoranthene	µg/L	21	1	5	None	0.00116					5	5	0.00349	J	WRC-SW-4003	WRC-SW-4003-01
Benzo(g,h,i)perylene	µg/L	21	1	5	None	0.00116					5	5	0.00333	J	WRC-SW-4003	WRC-SW-4003-01
Benzo(k)fluoranthene	µg/L	21	1	5	None	0.00116					5	5	0.00362	J	WRC-SW-4003	WRC-SW-4003-01
Bis(2-chloroethoxy)methane	µg/L	16	0	0	None	5					5	5				
Bis(2-chloroethyl)ether	µg/L	16	0	0	None	5					5	5				
Bis(2-ethylhexyl)phthalate	µg/L	20	1	5	None	1					5	5	1	J	WRC-SW-4001	WRC-SW-4001-01
Butylbenzylphthalate	µg/L	20	0	0	None	5					5	5				
Caprolactam	µg/L	16	0	0	None	5					5	5				
Carbazole	µg/L	20	0	0	None	5					5	5				
Chrysene	µg/L	21	1	5	None	0.00116					5	5	0.00514		WRC-SW-4003	WRC-SW-4003-01
Dibenzo(a,h)anthracene	µg/L	21	1	5	None	0.00046					5	5	0.00046	J	WRC-SW-4003	WRC-SW-4003-01
Dibenzofuran	µg/L	21	1	5	None	0.001					5	5	0.001	J	WRC-SW-4003	WRC-SW-4003-01
Diethylphthalate	µg/L	16	0	0	None	5					5	5				
Dimethylphthalate	µg/L	16	0	0	None	5					5	5				
Di-n-butylphthalate	µg/L	20	0	0	None	5					5	5				
Di-n-octylphthalate	µg/L	20	0	0	None	5					5	5				
Fluoranthene	µg/L	21	1	5	None	0.00116					5	5	0.0136		WRC-SW-4003	WRC-SW-4003-01
Fluorene	µg/L	21	0	0	None	0.00116					5	5				
Hexachlorobenzene	µg/L	16	0	0	None	5					5	5				
Hexachlorobutadiene	µg/L	20	0	0	None	0.5					5	5				
Hexachlorocyclopentadiene	µg/L	16	0	0	None	5					5	5				
Hexachloroethane	µg/L	16	0	0	None	5					5	5				
High Molecular Weight Pahs	µg/L	16	0	0	None	5					5	5				
Indeno(1,2,3-cd)pyrene	µg/L	21	1	5	None	0.00116					5	5	0.00225	J	WRC-SW-4003	WRC-SW-4003-01
Isophorone	µg/L	16	0	0	None	5					5	5				
Low Molecular Weight Pahs	µg/L	16	0	0	None	5					5	5				
Naphthalene	µg/L	25	1	4	None	0.00116					5	5	0.00766	B	WRC-SW-4003	WRC-SW-4003-01
Nitrobenzene	µg/L	16	0	0	None	5					5	5				
N-nitroso-di-n-propylamine	µg/L	16	0	0	None	5					5	5				
N-nitroso-diphenylamine	µg/L	16	0	0	None	5					5	5				
Pentachlorophenol	µg/L	20	0	0	None	12.5					12.5	25				
Phenanthrene	µg/L	21	1	5	None	0.00116					5	5	0.00561		WRC-SW-4003	WRC-SW-4003-01
Phenol	µg/L	20	0	0	None	5					5	5				
Pyrene	µg/L	21	1	5	None	0.00116					5	5	0.00961		WRC-SW-4003	WRC-SW-4003-01
Total PAH	µg/L	21	1	5	None	0.0219					5	5	0.0661	J	WRC-SW-4003	WRC-SW-4003-01

Table C-15. Allendale Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1,1-trichloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1,2,2-tetrachloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1,2-trichloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1-dichloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1-dichloroethene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,1-dichloropropene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2,3-trichlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2,3-trichloropropane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2,4-trimethylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2-dibromo-3-chloropropane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2-dibromoethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2-dichloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,2-dichloropropane	µg/L	4	0	0	None	0.5					0.5	0.5				
1,3,5-trimethylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
1,3-dichloropropane	µg/L	4	0	0	None	0.5					0.5	0.5				
2,2-dichloropropane	µg/L	4	0	0	None	0.5					0.5	0.5				
2-chlorotoluene	µg/L	4	0	0	None	0.5					0.5	0.5				
4-chlorotoluene	µg/L	4	0	0	None	0.5					0.5	0.5				
Benzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Bromobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Bromochloromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Bromodichloromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Bromoform	µg/L	4	0	0	None	0.5					0.5	0.5				
Bromomethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Carbon Tetrachloride	µg/L	4	0	0	None	0.5					0.5	0.5				
Chlorobenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Chloroethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Chloroform	µg/L	4	0	0	None	0.5					0.5	0.5				
Chloromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Cis-1,2-dichloroethene	µg/L	4	0	0	None	0.5					0.5	0.5				
Cis-1,3-dichloropropene	µg/L	4	0	0	None	0.5					0.5	0.5				
Dibromochloromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Dibromomethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Dichlorodifluoromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Ethylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Isopropylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
m&p-Xylene	µg/L	4	0	0	None	0.5					0.5	0.5				
Methylene Chloride	µg/L	4	1	25	None	0.3					0.5	0.5	0.3	J	WRC-SW-4004	WRC-SW-4004-01
N-butylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
N-propylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
O-xylene	µg/L	4	0	0	None	0.5					0.5	0.5				
P-isopropyltoluene	µg/L	4	0	0	None	0.5					0.5	0.5				
Sec-butylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Styrene	µg/L	4	0	0	None	0.5					0.5	0.5				
Tert-butylbenzene	µg/L	4	0	0	None	0.5					0.5	0.5				
Tetrachloroethene	µg/L	4	2	50	None	0.5					0.5	0.7	0.7	J	WRC-SW-4003	WRC-SW-4003-01
Toluene	µg/L	4	0	0	None	0.5					0.5	0.5				
Total Volatile Organics	µg/L	4	2	50	None	0.5					0.6	0.8	0.8	J	WRC-SW-4004	WRC-SW-4004-01
Total Xylenes	µg/L	4	0	0	None	0.5					0.5	0.5				
Trans-1,2-dichloroethene	µg/L	4	0	0	None	0.5					0.5	0.5				
Trans-1,3-dichloropropene	µg/L	4	0	0	None	0.5					0.5	0.5				

Table C-15. Allendale Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Trichloroethene	µg/L	4	0	0	None	0.5					0.5	0.5				
Trichlorofluoromethane	µg/L	4	0	0	None	0.5					0.5	0.5				
Vinyl Chloride	µg/L	4	0	0	None	0.5					0.5	0.5				
PCB as Aroclors																
Aroclor, Total	µg/L	21	0	0	None	0.0923					1	1				
Aroclor-1016	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1221	µg/L	21	0	0	None	0.0115					1	1				
Aroclor-1232	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1242	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1248	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1254	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1260	µg/L	21	0	0	None	0.0115					0.5	0.5				
Aroclor-1268	µg/L	5	0	0	None	0.0115					0.0121	0.0231				
Pesticides/Herbicides																
4,4'-DDD	µg/L	21	0	0	None	0.000925					0.05	0.05				
4,4'-DDE	µg/L	21	0	0	None	0.000925					0.05	0.05				
4,4'-DDT	µg/L	21	0	0	None	0.000925					0.05	0.05				
Aldrin	µg/L	21	4	19	None	0.000925					0.025	0.059	0.059		APC-SD-2035	APC-SW-2035-01
alpha-BHC	µg/L	21	1	5	None	0.000925					0.025	0.043	0.043	J	APC-SD-2036	APC-SW-2036-01
alpha-Chlordane	µg/L	21	3	14	None	0.00056					0.025	0.025	0.00069	J	WRC-SW-4001	WRC-SW-4001-01
beta-BHC	µg/L	21	0	0	None	0.000925					0.025	0.025				
delta-BHC	µg/L	21	4	19	None	0.000925					0.025	0.025	0.0096	J	WRC-SD-2013	WRC-SW-2013-01
Dieldrin	µg/L	21	0	0	None	0.000925					0.05	0.05				
Endosulfan I	µg/L	21	0	0	None	0.000925					0.025	0.025				
Endosulfan II	µg/L	21	0	0	None	0.000925					0.05	0.05				
Endosulfan Sulfate	µg/L	21	2	10	None	0.000925					0.05	0.05	0.0026	J	APB-SD-2034	APB-SW-2034-01
Endrin	µg/L	21	0	0	None	0.000925					0.05	0.05				
Endrin Aldehyde	µg/L	21	4	19	None	0.000925					0.05	0.05	0.0032	J	APC-SD-2035	APC-SW-2035-01
Endrin Ketone	µg/L	21	0	0	None	0.000925					0.05	0.05				
gamma-BHC	µg/L	21	0	0	None	0.000925					0.025	0.025				
gamma-Chlordane	µg/L	21	3	14	None	0.00055					0.025	0.025	0.00075	J	WRC-SW-4002	WRC-SW-4002-01
Heptachlor	µg/L	21	0	0	None	0.000925					0.025	0.025				
Heptachlor Epoxide	µg/L	21	0	0	None	0.000925					0.025	0.025				
Methoxychlor	µg/L	21	0	0	None	0.000925					0.25	0.25				
Technical Chlordane	µg/L	5	0	0	None	0.115					0.121	0.231				
Toxaphene	µg/L	21	0	0	None	0.0231					2.5	2.5				
Ancillary																
Total Organic Carbon	mg/L	6	6	100	Lnrm	5.15			5.23	1.01	5.24	5.33	5.33		WRC-SW-4002	WRC-SW-4002-01
Biochemical Oxygen Demand	mg/L	4	4	100	None	2		8.11			2.6	18.6	18.6		WRC-SW-4002	WRC-SW-4002-01
Conductivity	mg/L	1	1	100	None	206					206	206	206		Allendale Dam	DAM002-SW
Dissolved Organic Carbon	mg/L	4	4	100	None	4.78		0.198			5.1	5.23	5.23		WRC-SW-4003	WRC-SW-4003-01
Hardness	mg/L	4	4	100	None	28.5		0.141			28.55	28.8	28.8		WRC-SW-4002	WRC-SW-4002-01
Nitrate	mg/L	6	6	100	Norm	0.733	0.759	0.014			0.763	0.773	0.773		WRC-SW-4002	WRC-SW-4002-01
Nitrite-N	mg/L	4	4	100	None	0.106		0.0141			0.116	0.139	0.139		WRC-SW-4001	WRC-SW-4001-01
Nitrogen, Ammonia	mg/L	4	4	100	None	0.194		0.0518			0.234	0.306	0.306	J	WRC-SW-4001	WRC-SW-4001-01
Nitrogen, Dissolved	mg/L	4	4	100	None	1.26		0.0614			1.31	1.39	1.39		WRC-SW-4001	WRC-SW-4001-01
Nitrogen, Total	mg/L	6	6	100	Lnrm	1.3		0.0592	1.37	1.04	1.37	1.44	1.44		WRC-SW-4001	WRC-SW-4001-01
													1.44		WRC-SW-4001	WRC-SW-4001-01
pH	SU	1	1	100	None	6.8					6.8	6.8	6.8		Allendale Dam	DAM002-SW
Phosphate	mg/L	6	6	100	Lnrm	0.0438		0.006383	0.051	1.13	0.049	0.062	0.0617		WRC-SW-4004	WRC-SW-4004-01
Phosphorus, Dissolved	mg/L	4	4	100	None	0.0617		0.000695			0.063	0.063	0.0631	J	WRC-SW-4002	WRC-SW-4002-01
													0.0631	J	WRC-SW-4003	WRC-SW-4003-01
Phosphorus, Total	mg/L	6	6	100	Norm	0.0617	0.073	0.012			0.071	0.086	0.0861		WRC-SW-4001	WRC-SW-4001-01
Temperature	C	1	1	100	None	11					11	11	11		Allendale Dam	DAM002-SW
Total Suspended Solids	mg/L	4	4	100	None	2.4		6			2.4	14.4	14.4		WRC-SW-4002	WRC-SW-4002-01

Table C-16. Lyman Mill Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Dioxin/Furans/HCX																
1,2,3,4,6,7,8-HpCDD	pg/L	17	8	47	None	1.7					5.45	149	149		WRL-SD-2042	WRL-SW-2042-01
1,2,3,4,6,7,8-HpCDF	pg/L	17	5	29	None	0.35					5.65	58.3	58.3		WRL-SD-2042	WRL-SW-2042-01
1,2,3,4,7,8,9-HpCDF	pg/L	17	1	6	None	0.5					6.1	41.85	6.1	EMPC	LPX-SD-2048	LPX-SW-2048-01
1,2,3,4,7,8-HxCDD	pg/L	17	1	6	None	0.4					4.45	16.75	1.6	J	LPX-SD-2048	LPX-SW-2048-01
1,2,3,4,7,8-HxCDF	pg/L	17	2	12	None	0.345					2.4	12.35	2.4	EMPC	WRL-SD-2041	WRL-SW-2041-01
1,2,3,6,7,8-HxCDD	pg/L	17	1	6	None	0.35					4.2	11.7	6.1	J	WRL-SD-2042	WRL-SW-2042-01
1,2,3,6,7,8-HxCDF	pg/L	17	1	6	None	0.25					3	4.05	1.9	EMPC	LPX-SD-2048	LPX-SW-2048-01
1,2,3,7,8,9-HxCDD	pg/L	17	4	24	None	0.4					3.9	22.4	6.1	J	WRL-SD-2042	WRL-SW-2042-01
1,2,3,7,8,9-HxCDF	pg/L	17	0	0	None	0.1					3.55	48.45				
1,2,3,7,8-PeCDD	pg/L	17	0	0	None	0.25					2.95	9.6				
1,2,3,7,8-PeCDF	pg/L	17	0	0	None	0.15					2.05	11.4				
1,2,4,5,7,8-hexachloro(9h)xanthene	pg/L	17	3	18	None	18.76					22.1	80.93	80.93	J	WRL-SD-2042	WRL-SW-2042-01
2,3,4,6,7,8-HxCDF	pg/L	17	1	6	None	0.25					3.2	21.85	5.9	J	LPX-SD-2048	LPX-SW-2048-01
2,3,4,7,8-PeCDF	pg/L	17	0	0	None	0.15					2.15	19.95				
2,3,7,8-TCDD	pg/L	17	9	53	None	1.75					3.65	853	853		WRL-SD-2042	WRL-SW-2042-01
2,3,7,8-TCDF	pg/L	17	1	6	None	0.15					2.25	7.7	7.7	J	WRL-SD-2042	WRL-SW-2042-01
OCDD	pg/L	17	9	53	None	8.55					18.6	1110	1110		WRL-SD-2042	WRL-SW-2042-01
OCDF	pg/L	17	6	35	None	1					13.75	83.3	83.3	J	WRL-SD-2042	WRL-SW-2042-01
PCDD/Fs	pg/L	17	14	82	Lnrm	2.9			34.71	11.61	29.7	2610	2610		WRL-SD-2042	WRL-SW-2042-01
TEQ	pg/L	17	17	100	None	4.7		206.7			10.8	861	861		WRL-SD-2042	WRL-SW-2042-01
Total HpCDD	pg/L	17	10	59	None	1.7		0.849			5.9	281	281	J	WRL-SD-2042	WRL-SW-2042-01
Total HpCDF	pg/L	17	6	35	None	0.7					3.7	124	124	J	WRL-SD-2042	WRL-SW-2042-01
Total HxCDD	pg/L	17	4	24	None	0.4					3	36.8	36.8	J	WRL-SD-2042	WRL-SW-2042-01
Total HxCDF	pg/L	17	4	24	None	0.345					2.25	51.9	51.9	J	WRL-SD-2042	WRL-SW-2042-01
Total PeCDD	pg/L	17	1	6	None	0.25					2.2	18.6	18.6	EMPC	LPX-SD-2045	LPX-SW-DU-110899A
Total PeCDF	pg/L	17	3	18	None	0.45					1.95	14.6	14.6	J	WRL-SD-2042	WRL-SW-2042-01
Total TCDD	pg/L	17	9	53	None	2					4.1	871	871	J	WRL-SD-2042	WRL-SW-2042-01
Total TCDF	pg/L	17	3	18	None	0.35					2.15	40.4	40.4	J	WRL-SD-2042	WRL-SW-2042-01
Metals (total)																
Aluminum	µg/L	21	12	57	Lnrm	12.65			70.47	1.61	75.6	917	917		WRL-SD-2042	WRL-SW-2042-01
Antimony	µg/L	21	3	14	None	0.176					2.5	2.5	0.22	J	WRL-SW-4004	WRL-SW-4004-01
Arsenic	µg/L	21	6	29	None	0.497					3	9.2	9.2	J	WRL-SD-2041	WRL-SW-2041-01
Barium	µg/L	21	21	100	None	15.2		5.28			19.1	37	37		WRL-SD-2044	WRL-SW-2044-01
Beryllium	µg/L	21	4	19	None	0.0481					0.5	0.95	0.2		WRL-SD-2042	WRL-SW-2042-01
Cadmium	µg/L	21	3	14	None	0.0288					0.5	0.5	0.0293	J	WRL-SW-4005	WRL-DU-071701-A
Calcium	µg/L	18	18	100	None	7620		2048			8805	17000	17000		WRL-SD-2044	WRL-SW-2044-01
Chromium	µg/L	21	5	24	None	0.15					0.5	6.3	6.3		WRL-SD-2042	WRL-SW-2042-01
Cobalt	µg/L	21	5	24	None	0.145					0.5	1	1	J	WRL-SD-2042	WRL-SW-2042-01
Copper	µg/L	21	21	100	Lnrm	1.3			4.56	2.32	4.3	29.4	29.4		WRL-SD-2042	WRL-SW-2042-01
Iron	µg/L	21	21	100	Lnrm	165			488.7	2.10	414	3710	3710		WRL-SD-2044	WRL-SW-2044-01
Lead	µg/L	21	6	29	None	0.55					1	21.8	21.8		WRL-SD-2042	WRL-SW-2042-01
Magnesium	µg/L	18	18	100	None	1250		255.3			1410	2400	2400		WRL-SD-2044	WRL-SW-2044-01
Manganese	µg/L	21	21	100	None	57.4		311.3			94.4	1490	1490		WRL-SD-2044	WRL-SW-2044-01
Mercury	µg/L	21	3	14	None	0.00294					0.1	0.1	0.00437		WRL-SW-4005	WRL-DU-071701-A
Molybdenum	µg/L	3	3	100	None	0.829		0.0618			0.929	0.942	0.942	J	WRL-SW-4005	WRL-SW-4005-01
Nickel	µg/L	21	14	67	Lnrm	0.65			1.80	2.11	1.58	5.4	5.4		LPX-SD-2051	LPX-DU-110499B
Potassium	µg/L	18	18	100	Lnrm	1710			2092	1.17	1950	2760	2760		WRL-SD-2042	WRL-SW-2042-01
Selenium	µg/L	21	0	0	None	0.2					2.5	2.5				
Silver	µg/L	21	4	19	None	0.2					0.5	1.6	1.6	J	WRL-SD-2039	WRL-SW-2039-01
													1.6	J	WRL-SD-2040	WRL-DU-102599B
Sodium	µg/L	18	18	100	None	19700		2748			22500	31800	31800		WRL-SD-2044	WRL-SW-2044-01
Thallium	µg/L	21	4	19	None	0.00601					3.5	7.7	7.7	J	LPX-SD-2047	LPX-SW-2047-01
Vanadium	µg/L	21	3	14	None	0.00506					1	4	2.7		WRL-SD-2042	WRL-SW-2042-01
Zinc	µg/L	21	20	95	Lnrm	6.45			20.53	1.77	21.4	75.7	75.7		WRL-SD-2043	WRL-SW-2043-01

Table C-16. Lyman Mill Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Metals (dissolved)																
Aluminum	µg/L	19	9	47	None	7					20.75	100	100		LPX-SD-2050	LPX-SW-2050-01F
Antimony	µg/L	19	3	16	None	0.18					2.5	2.5	0.22		WRL-SW-4004	WRL-SW-4004-01
Arsenic	µg/L	19	6	32	None	0.416					3	10.5	10.5		WRL-SD-2041	WRL-SW-2041-01F
Barium	µg/L	19	10	53	None	7.7					17.95	286	286		WRL-SD-2040	WRL-SW-2040-01F
Beryllium	µg/L	19	3	16	None	0.0286					0.5	1.15	0.0367	J	WRL-SW-4005	WRL-SW-4005-01
Cadmium	µg/L	19	3	16	None	0.0143					0.5	0.5	0.0148	J	WRL-SW-4005	WRL-SW-4005-01
Calcium	µg/L	16	16	100	None	7660		2313			8275	17300	17300		WRL-SD-2044	WRL-SW-2044-01F
Chromium	µg/L	19	1	5	None	0.15					0.5	22.1	22.1	J	WRL-SD-2040	WRL-SW-2040-01F
Cobalt	µg/L	19	3	16	None	0.0944					0.5	0.5	0.0976		WRL-SW-4005	WRL-SW-4005-01
Copper	µg/L	19	19	100	Norm	1.4	4.67	2.78			4.8	10	10		LPX-SD-2050	LPX-SW-2050-01F
Iron	µg/L	19	19	100	None	126		628.5			244	2960	2960		WRL-SD-2044	WRL-SW-2044-01F
Lead	µg/L	19	4	21	None	0.55					1	4.7	4.7		WRL-SD-2043	WRL-SW-2043-01F
Magnesium	µg/L	16	16	100	None	1240		272.5			1370	2420	2420		WRL-SD-2044	WRL-SW-2044-01F
Manganese	µg/L	19	19	100	None	44.2		346.8			67.9	1550	1550		WRL-SD-2044	WRL-SW-2044-01F
Mercury	µg/L	19	3	16	None	0.00127					0.1	0.1	0.00144		WRL-SW-4005	WRL-SW-4005-01
Molybdenum	µg/L	3	3	100	None	0.856		0.0224			0.861	0.897	0.897	J	WRL-SW-4004	WRL-SW-4004-01
Nickel	µg/L	19	9	47	None	0.65					1	5.1	5.1		WRL-SD-2040	WRL-SW-2040-01F
Potassium	µg/L	16	16	100	Lnrm	1800			2090	1.13	2045	2760	2760		WRL-SD-2044	WRL-SW-2044-01F
Selenium	µg/L	19	0	0	None	0.2					2.5	2.5				
Silver	µg/L	19	4	21	None	0.2					0.5	1.6	1.6	J	WRL-SD-2040	WRL-DU-102599BF
Sodium	µg/L	16	16	100	Lnrm	20800			24293	1.13	23800	31900	31900		WRL-SD-2044	WRL-SW-2044-01F
Thallium	µg/L	19	7	37	None	0.02					3.5	9	9		LPX-SD-2046	LPX-SW-2046-01F
Vanadium	µg/L	19	0	0	None	0.25					1	4				
Zinc	µg/L	19	18	95	None	6.45		34.17			27.1	105	105	J	WRL-SD-2040	WRL-SW-2040-01F
Semi-volatile Organic Compounds																
1,1'-biphenyl	µg/L	20	0	0	None	0.00118					5	5				
1,2,4-trichlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2-dichlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,3-dichlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,4-dichlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
2,2'-oxybis(1-chloropropane)	µg/L	17	0	0	None	5					5	5				
2,4,5-trichlorophenol	µg/L	20	0	0	None	12.5					12.5	26.5				
2,4,6-trichlorophenol	µg/L	17	0	0	None	5					5	5				
2,4-dichlorophenol	µg/L	17	0	0	None	5					5	5				
2,4-dimethylphenol	µg/L	17	0	0	None	5					5	5				
2,4-dinitrophenol	µg/L	17	0	0	None	12.5					12.5	12.5				
2,4-dinitrotoluene	µg/L	17	0	0	None	5					5	5				
2,6-dinitrotoluene	µg/L	17	0	0	None	5					5	5				
2-chloronaphthalene	µg/L	17	0	0	None	5					5	5				
2-chlorophenol	µg/L	17	0	0	None	5					5	5				
2-methylnaphthalene	µg/L	20	0	0	None	0.00118					5	5				
2-methylphenol	µg/L	17	0	0	None	5					5	5				
2-nitroaniline	µg/L	17	0	0	None	12.5					12.5	12.5				
2-nitrophenol	µg/L	20	0	0	None	5					5	5.5				
3,3'-dichlorobenzidine	µg/L	17	0	0	None	5					5	5				
3-nitroaniline	µg/L	17	0	0	None	12.5					12.5	12.5				
4,6-dinitro-2-methylphenol	µg/L	17	0	0	None	12.5					12.5	12.5				
4-bromophenyl-phenylether	µg/L	17	0	0	None	5					5	5				
4-chloro-3-methylphenol	µg/L	17	0	0	None	5					5	5				
4-chloroaniline	µg/L	17	0	0	None	5					5	5				
4-chlorophenyl-phenylether	µg/L	17	0	0	None	5					5	5				

Table C-16. Lyman Mill Surface Water Statistical Summary
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PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
4-methylphenol	µg/L	20	0	0	None	5					5	5.5				
4-nitroaniline	µg/L	17	0	0	None	12.5					12.5	12.5				
4-nitrophenol	µg/L	20	0	0	None	12.5					12.5	26.5				
Acenaphthene	µg/L	20	0	0	None	0.00118					5	5				
Acenaphthylene	µg/L	20	3	15	None	0.00132					5	5	0.00156	J	WRL-SW-4005	WRL-DU-071701-A
Acetophenone	*µg/L*	*17*	*0*	*0*	*None*	*5*					*5*	*5*				
Anthracene	µg/L	20	0	0	None	0.00118					5	5				
Atrazine	µg/L	17	0	0	None	5					5	5				
Bapeq	µg/L	17	0	0	None	1.5					1.5	1.5				
Benzaldehyde	µg/L	20	0	0	None	0.00118					5	5				
Benzo(a)anthracene	µg/L	20	0	0	None	0.00118					5	5				
Benzo(a)pyrene	µg/L	20	0	0	None	0.00118					5	5				
Benzo(b)fluoranthene	µg/L	20	0	0	None	0.00118					5	5				
Benzo(g,h,i)perylene	µg/L	20	0	0	None	0.00118					5	5				
Benzo(k)fluoranthene	µg/L	20	0	0	None	0.00118					5	5				
Bis(2-chloroethoxy)methane	µg/L	17	0	0	None	5					5	5				
Bis(2-chloroethyl)ether	µg/L	17	0	0	None	5					5	5				
Bis(2-ethylhexyl)phthalate	µg/L	20	1	5	None	5					5	160	160	*	WRL-SD-2043	WRL-SW-2043-01
Butylbenzylphthalate	µg/L	20	0	0	None	5					5	5.5				
Caprolactam	µg/L	16	0	0	None	5					5	5				
Carbazole	µg/L	20	0	0	None	5					5	5.5				
Chrysene	µg/L	20	0	0	None	0.00118					5	5				
Dibenzo(a,h)anthracene	µg/L	20	0	0	None	0.00118					5	5				
Dibenzofuran	µg/L	20	0	0	None	0.00118					5	5				
Diethylphthalate	µg/L	17	0	0	None	5					5	5				
Dimethylphthalate	µg/L	17	0	0	None	5					5	5				
Di-n-butylphthalate	µg/L	20	0	0	None	5					5	5.5				
Di-n-octylphthalate	µg/L	20	0	0	None	5					5	5.5				
Fluoranthene	*µg/L*	*20*	*0*	*0*	*None*	*0.00118*					*5*	*5*				
Fluorene	µg/L	20	0	0	None	0.00118					5	5				
Hexachlorobenzene	µg/L	17	0	0	None	5					5	5				
Hexachlorobutadiene	µg/L	20	0	0	None	0.5					5	5				
Hexachlorocyclopentadiene	µg/L	17	0	0	None	5					5	5				
Hexachloroethane	µg/L	17	0	0	None	5					5	5				
High Molecular Weight Pahs	µg/L	17	0	0	None	5					5	5				
Indeno(1,2,3-cd)pyrene	µg/L	20	0	0	None	0.00118					5	5				
Isophorone	µg/L	17	0	0	None	5					5	5				
Low Molecular Weight Pahs	µg/L	17	0	0	None	5					5	5				
Naphthalene	µg/L	23	0	0	None	0.00118					5	5				
Nitrobenzene	µg/L	17	0	0	None	5					5	5				
N-nitroso-di-n-propylamine	µg/L	17	0	0	None	5					5	5				
N-nitroso-diphenylamine	µg/L	17	0	0	None	5					5	5				
Pentachlorophenol	µg/L	20	0	0	None	12.5					12.5	26.5				
Phenanthrene	µg/L	20	0	0	None	0.00118					5	5				
Phenol	µg/L	20	0	0	None	5					5	5.5				
Pyrene	µg/L	20	0	0	None	0.00118					5	5				
Total PAH	µg/L	20	0	0	None	0.0224					5	5				

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Volatile Organic Compounds																
1,1,1,2-tetrachloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1,1-trichloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1,2,2-tetrachloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1,2-trichloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1-dichloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1-dichloroethene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,1-dichloropropene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2,3-trichlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2,3-trichloropropane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2,4-trimethylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2-dibromo-3-chloropropane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2-dibromoethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2-dichloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,2-dichloropropane	µg/L	3	0	0	None	0.5					0.5	0.5				
1,3,5-trimethylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
1,3-dichloropropane	µg/L	3	0	0	None	0.5					0.5	0.5				
2,2-dichloropropane	µg/L	3	0	0	None	0.5					0.5	0.5				
2-chlorotoluene	µg/L	3	0	0	None	0.5					0.5	0.5				
4-chlorotoluene	µg/L	3	0	0	None	0.5					0.5	0.5				
Benzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Bromobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Bromochloromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Bromodichloromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Bromoform	µg/L	3	0	0	None	0.5					0.5	0.5				
Bromomethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Carbon Tetrachloride	µg/L	3	0	0	None	0.5					0.5	0.5				
Chlorobenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Chloroethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Chloroform	µg/L	3	0	0	None	0.5					0.5	0.5				
Chloromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Cis-1,2-dichloroethene	µg/L	3	0	0	None	0.5					0.5	0.5				
Cis-1,3-dichloropropene	µg/L	3	0	0	None	0.5					0.5	0.5				
Dibromochloromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Dibromomethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Dichlorodifluoromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Ethylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Isopropylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
m&p-Xylene	µg/L	3	0	0	None	0.5					0.5	0.5				
Methylene Chloride	µg/L	3	0	0	None	0.5					0.5	0.5				
N-butylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
N-propylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
O-xylene	µg/L	3	0	0	None	0.5					0.5	0.5				
P-isopropyltoluene	µg/L	3	0	0	None	0.5					0.5	0.5				
Sec-butylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Styrene	µg/L	3	0	0	None	0.5					0.5	0.5				
Tert-butylbenzene	µg/L	3	0	0	None	0.5					0.5	0.5				
Tetrachloroethene	µg/L	3	0	0	None	0.5					0.5	0.5				
Toluene	µg/L	3	0	0	None	0.5					0.5	0.5				
Total Volatile Organics	µg/L	3	0	0	None	0.5					0.5	0.5				
Total Xylenes	µg/L	3	0	0	None	0.5					0.5	0.5				
Trans-1,2-dichloroethene	µg/L	3	0	0	None	0.5					0.5	0.5				
Trans-1,3-dichloropropene	µg/L	3	0	0	None	0.5					0.5	0.5				
Trichloroethene	µg/L	3	0	0	None	0.5					0.5	0.5				
Trichlorofluoromethane	µg/L	3	0	0	None	0.5					0.5	0.5				
Vinyl Chloride	µg/L	3	0	0	None	0.5					0.5	0.5				

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PCB as Aroclors																
Aroclor, Total	µg/L	20	0	0	None	0.0945					1	1				
Aroclor-1016	µg/L	20	0	0	None	0.0118					0.5	0.5				
Aroclor-1221	µg/L	20	0	0	None	0.0118					1	1				
Aroclor-1232	µg/L	12	0	0	None	0.0118					0.5	0.5				
Aroclor-1242	µg/L	20	0	0	None	0.0118					0.5	0.5				
Aroclor-1248	µg/L	20	0	0	None	0.0118					0.5	0.5				
Aroclor-1254	µg/L	20	0	0	None	0.0118					0.5	0.5				
Aroclor-1260	µg/L	20	0	0	None	0.0118					0.5	0.5				
Aroclor-1268	µg/L	3	0	0	None	0.0118					0.0122	0.0127				
Pesticides/Herbicides																
4,4'-DDD	µg/L	20	0	0	None	0.000945					0.05	0.05				
4,4'-DDE	µg/L	20	1	5	None	0.000945					0.05	0.05	0.0043	J	WRL-SD-2042	WRL-SW-2042-01
4,4'-DDT	µg/L	20	1	5	None	0.000945					0.05	0.05	0.01	J	LPX-SD-2050	LPX-SW-2050-01
Aldrin	µg/L	20	3	15	None	0.000945					0.025	0.069	0.069		LPX-SD-2049	LPX-SW-2049-01
alpha-BHC	µg/L	20	0	0	None	0.000945					0.025	0.025				
alpha-Chlordane	µg/L	20	1	5	None	0.000945					0.025	0.025	0.019	J	WRL-SD-2042	WRL-SW-2042-01
beta-BHC	µg/L	20	3	15	None	0.00097					0.025	0.025	0.00149	J	WRL-SW-4005	WRL-SW-4005-01
delta-BHC	µg/L	20	0	0	None	0.000945					0.025	0.025				
Dieldrin	µg/L	20	0	0	None	0.000945					0.05	0.05				
Endosulfan I	µg/L	20	0	0	None	0.000945					0.025	0.025				
Endosulfan II	µg/L	20	0	0	None	0.000945					0.05	0.05				
Endosulfan Sulfate	µg/L	20	1	5	None	0.000945					0.05	0.05	0.0032	J	WRL-SD-2042	WRL-SW-2042-01
Endrin	µg/L	20	0	0	None	0.000945					0.05	0.05				
Endrin Aldehyde	µg/L	12	2	17	None	0.000945					0.05	0.05	0.005	J	WRL-SD-2042	WRL-SW-2042-01
Endrin Ketone	µg/L	20	0	0	None	0.000945					0.05	0.05				
gamma-BHC	µg/L	20	3	15	None	0.00062					0.025	0.025	0.00083	J	WRL-SW-4005	WRL-SW-4005-01
gamma-Chlordane	µg/L	20	1	5	None	0.000945					0.025	0.025	0.021	J	WRL-SD-2042	WRL-SW-2042-01
Heptachlor	µg/L	20	0	0	None	0.000945					0.025	0.025				
Heptachlor Epoxide	µg/L	20	0	0	None	0.000945					0.025	0.025				
Methoxychlor	µg/L	20	0	0	None	0.000945					0.25	0.25				
Technical Chlordane	µg/L	3	0	0	None	0.118					0.122	0.127				
Toxaphene	µg/L	20	0	0	None	0.0236					2.5	2.5				
Ancillary																
Total Organic Carbon	mg/L	3	3	100	None	5.37		0.0451			5.41	5.46	5.46		WRL-SW-4004	WRL-SW-4004-01
Biochemical Oxygen Demand	mg/L	2	2	100	None	2		0.07071			2.05	2.1	2.1		WRL-SW-4005	WRL-SW-4005-01
Conductivity	MS/CM	1	1	100	None	242					242	242	242		Lymansville Dam	DAM003-SW
Dissolved Organic Carbon	mg/L	3	3	100	None	5.12		0.196			5.39	5.5	5.5		WRL-SW-4004	WRL-SW-4004-01
Hardness	mg/L	3	3	100	None	29.2					29.2	29.2	29.2		WRL-SW-4005	WRL-DU-071701-A
													29.2		WRL-SW-4004	WRL-SW-4004-01
													29.2		WRL-SW-4005	WRL-SW-4005-01
Nitrate	mg/L	3	3	100	None	0.757		0.00954			0.765	0.776	0.776		WRL-SW-4005	WRL-DU-071701-A
Nitrite-N	mg/L	3	3	100	None	0.082		0.00247			0.086	0.0865	0.0865		WRL-SW-4004	WRL-SW-4004-01
Nitrogen, Ammonia	mg/L	3	3	100	None	0.138		0.002			0.14	0.142	0.142	J	WRL-SW-4004	WRL-SW-4004-01
Nitrogen, Dissolved	mg/L	3	3	100	None	1.22					1.22	1.22	1.22		WRL-SW-4005	WRL-DU-071701-A
													1.22		WRL-SW-4004	WRL-SW-4004-01
													1.22		WRL-SW-4005	WRL-SW-4005-01
Nitrogen, Total	mg/L	3	3	100	None	1.27		0.01528			1.29	1.3	1.3		WRL-SW-4005	WRL-DU-071701-A
pH	SU	1	1	100	None	6.8					6.8	6.8	6.8		Lymansville Dam	DAM003-SW
Phosphate	mg/L	3	3	100	None	0.0529		0.00371			0.0587	0.0598	0.0598		WRL-SW-4005	WRL-SW-4005-01
Phosphorus, Dissolved	mg/L	3	3	100	None	0.0721		0.00051			0.0724	0.0731	0.0731	J	WRL-SW-4005	WRL-SW-4005-01
Phosphorus, Total	mg/L	3	3	100	None	0.0721		0.01583			0.0731	0.1	0.1		WRL-SW-4005	WRL-DU-071701-A
Temperature	C	1	1	100	None	11					11	11	11		Lymansville Dam	DAM003-SW
Total Suspended Solids	mg/L	3	3	100	None	3.2		0.8			4	4.8	4.8		WRL-SW-4005	WRL-DU-071701-A

Table C-17. Manton Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ancillary																
Conductivity	MS/CM	2	2	100	None	246					246	246	246		Manton Dam	DAM004-SW
													246		Manton Dam	DAM04A-SW
pH	SU	2	2	100	None	6.6					6.6	6.6	6.6		Manton Dam	DAM004-SW
													6.6		Manton Dam	DAM04A-SW
Temperature	C	2	2	100	None	11					11	11	11		Manton Dam	DAM004-SW
													11		Manton Dam	DAM04A-SW

Table C-18. Downstream of Manton Surface Water Statistical Summary
CMRP Remedial Investigation Report

PARAMETER	Units	No. Obs	No. Detected	% Detected	Distribution	MIN	A. Mean	A. StDev	G. Mean	G. StDev	Median	MAX	MAX (detected)	MAX (detected) Qualifier	Location of MAX (detected)	Sample ID of MAX (detected)
Ancillary																
Conductivity	MS/CM	3	3	100	None	225		13.229			230	250	250		Dyerville Dam	DAM005-SW
pH	SU	3	3	100	None	8.4		0.2			8.6	8.8	8.8		Dyerville Dam	DAM005-SW
Temperature	C	3	3	100	None	8		0.5774			9	9	9		Dyerville Dam	DAM005-SW
													9		Lonigan Dam	DAM007-SW

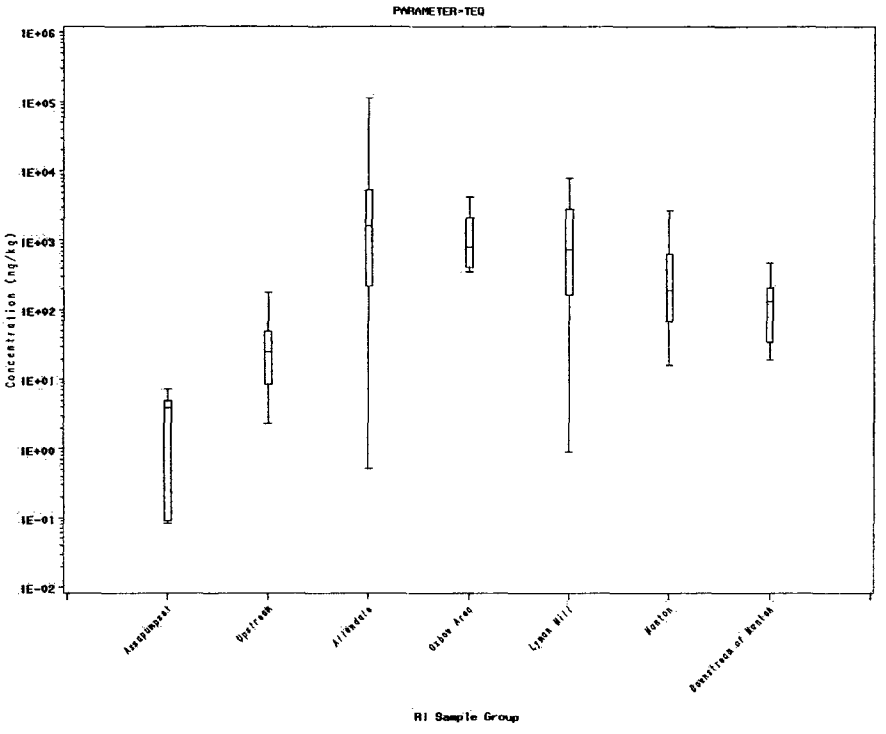


Figure C-1. Boxplot of Dioxin TEQ in Sediment Samples

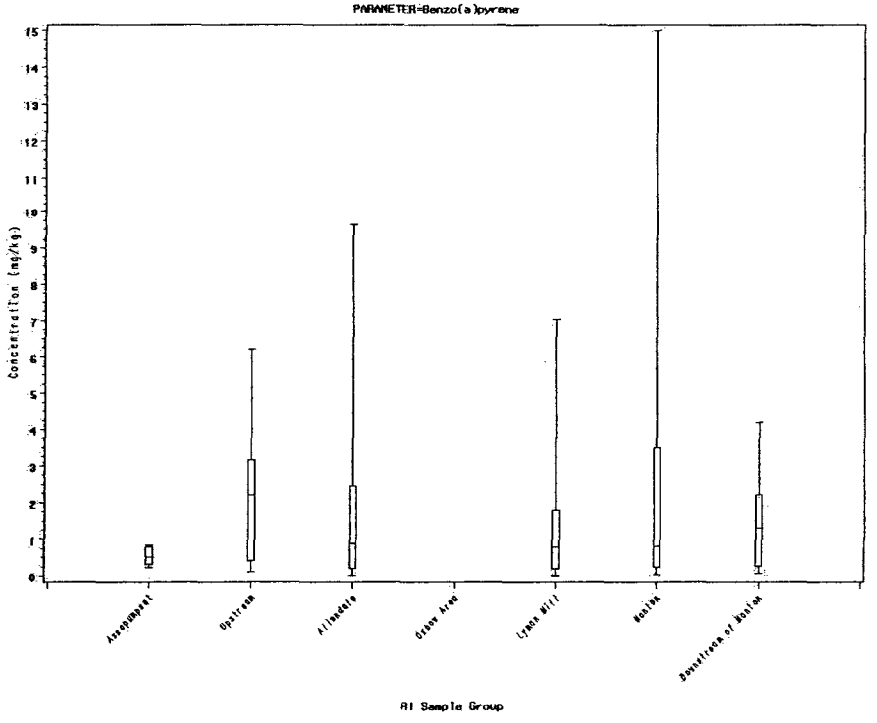


Figure C-2. Boxplot of Benzo(a)pyrene in Sediment Samples

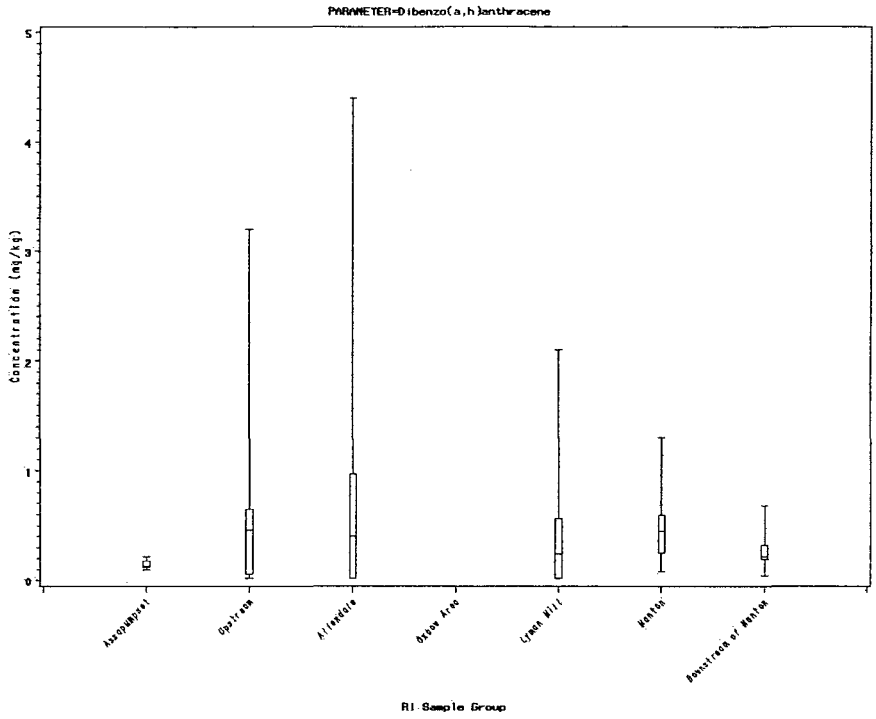


Figure C-3. Boxplot of Dibenz(a,h)anthracene in Sediment Samples

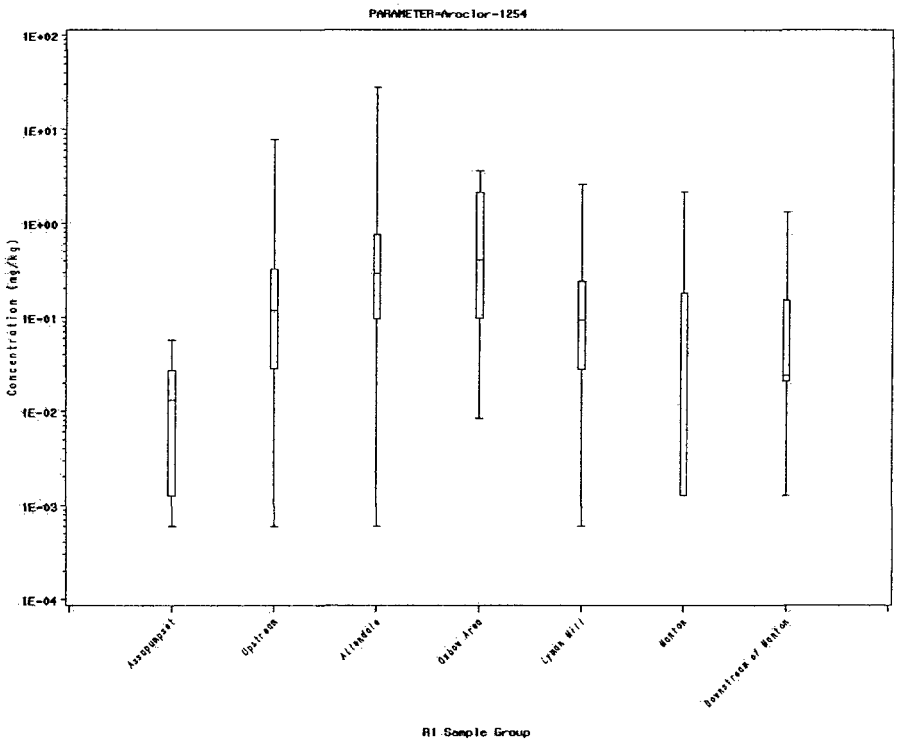


Figure C-4. Boxplot of Aroclor 1254 in Sediment Samples

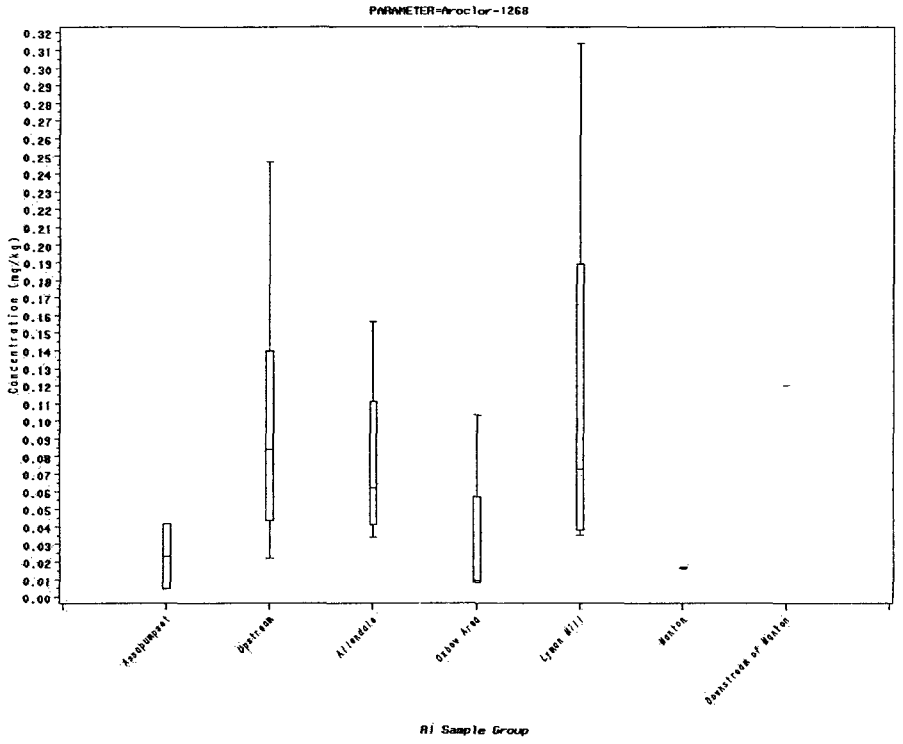


Figure C-5. Boxplot of Aroclor 1268 in Sediment Samples

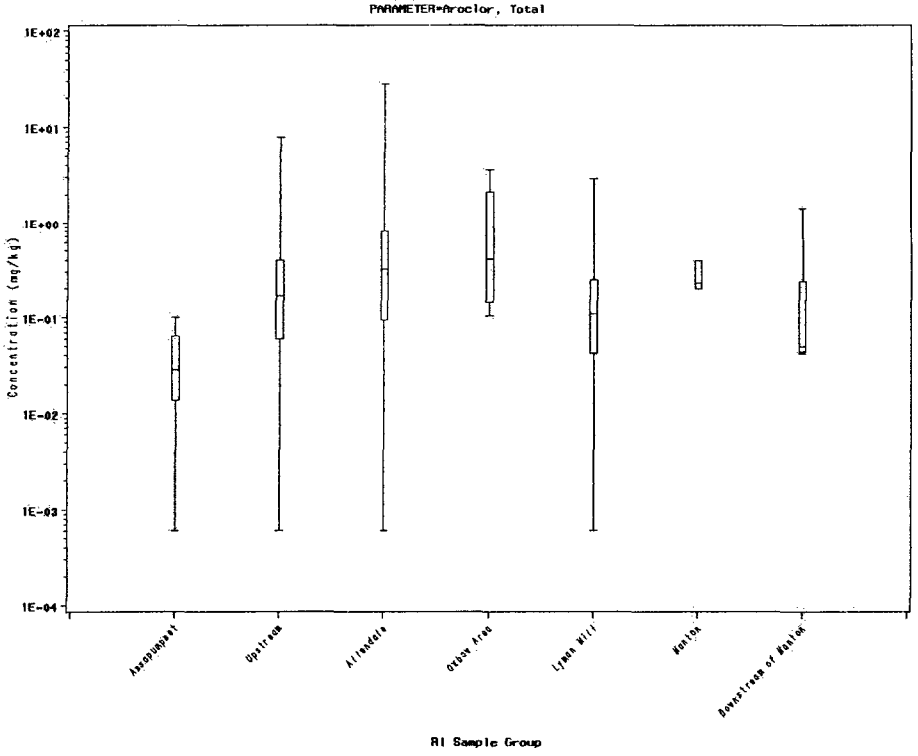


Figure C-6. Boxplot of Total Aroclor in Sediment Samples

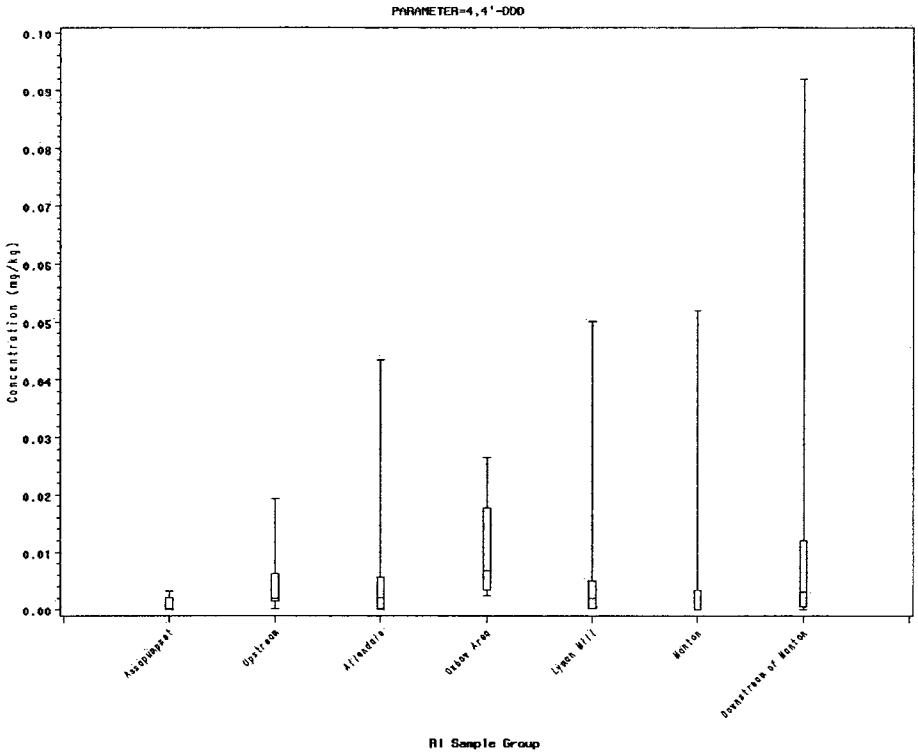


Figure C-7. Boxplot of 4,4'-DDD in Sediment Samples

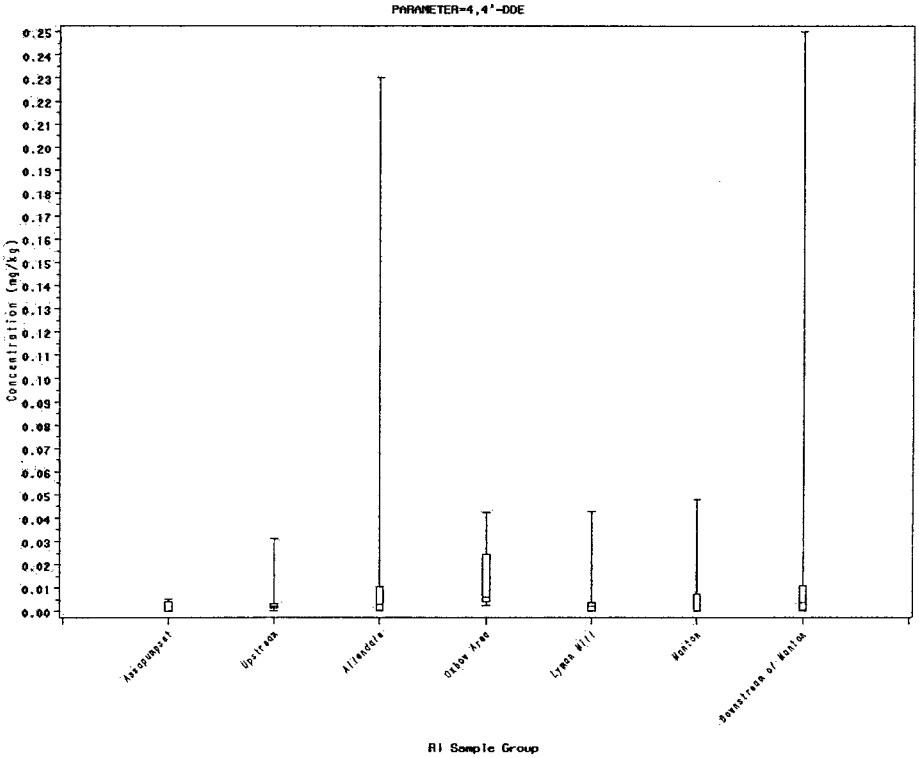


Figure C-8. Boxplot of 4,4'-DDE in Sediment Samples

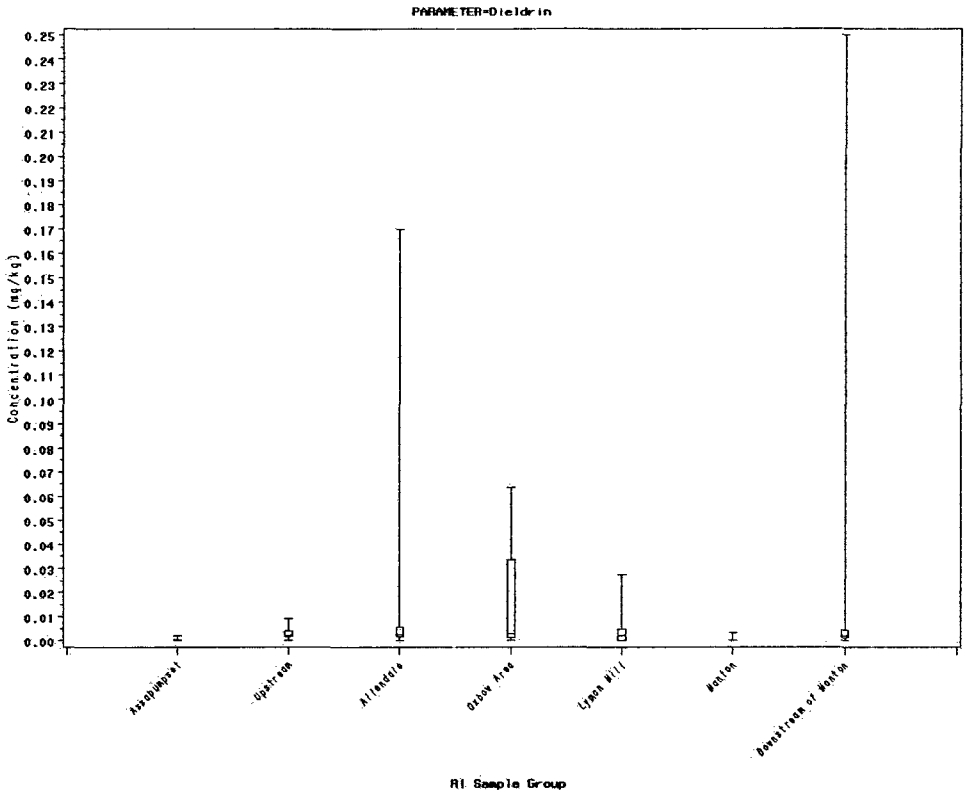


Figure C-9. Boxplot of Dieldrin in Sediment Samples

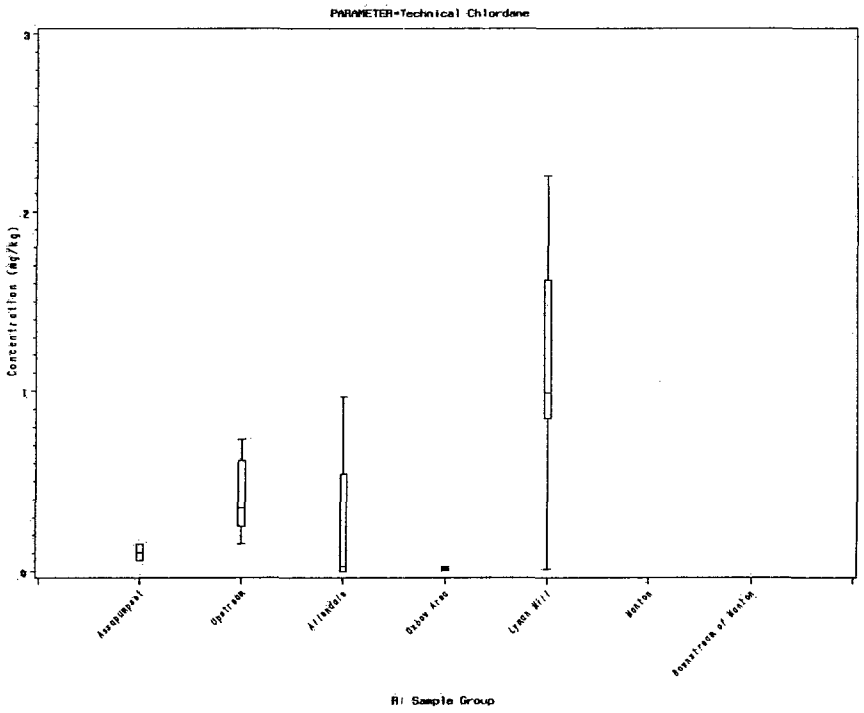


Figure C-10. Boxplot of Technical Chlordane in Sediment Samples

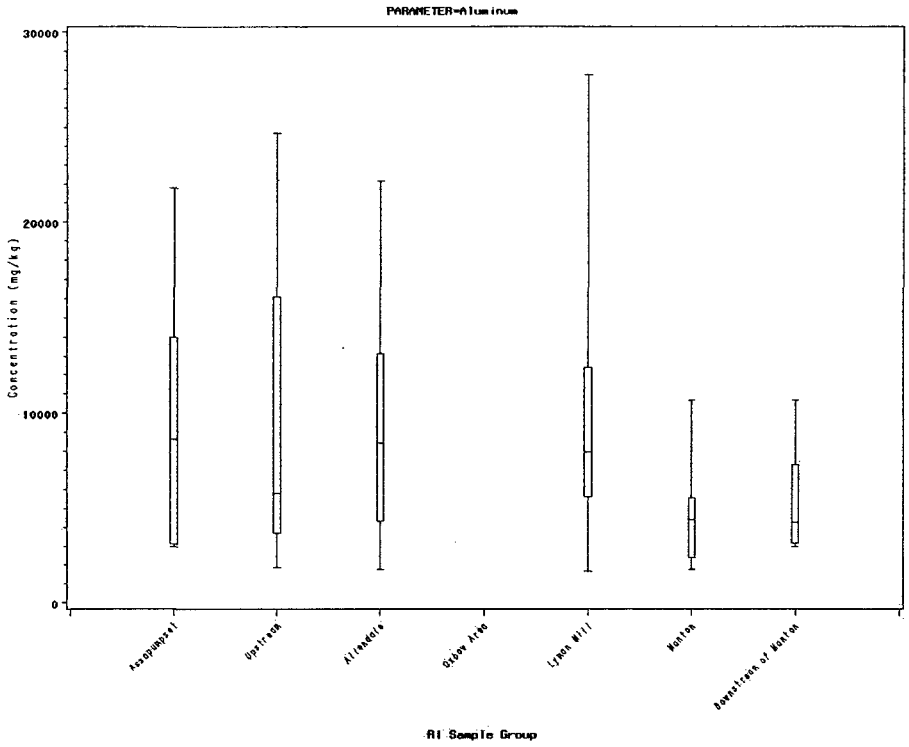


Figure C-11. Boxplot of Aluminum in Sediment Samples

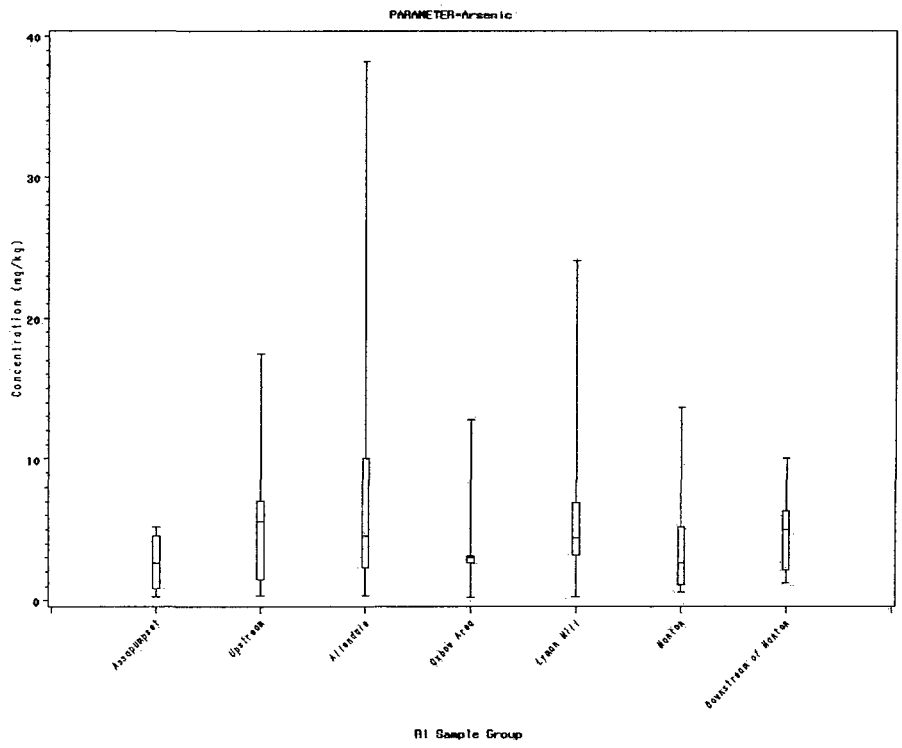


Figure C-12. Boxplot of Arsenic in Sediment Samples

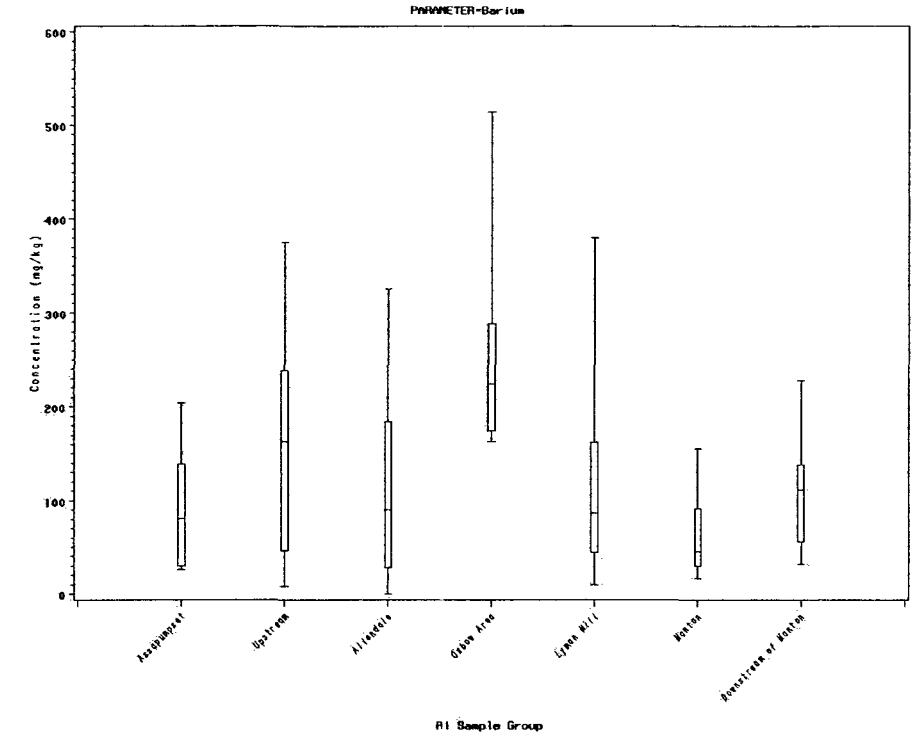


Figure C-13. Boxplot of Barium in Sediment Samples

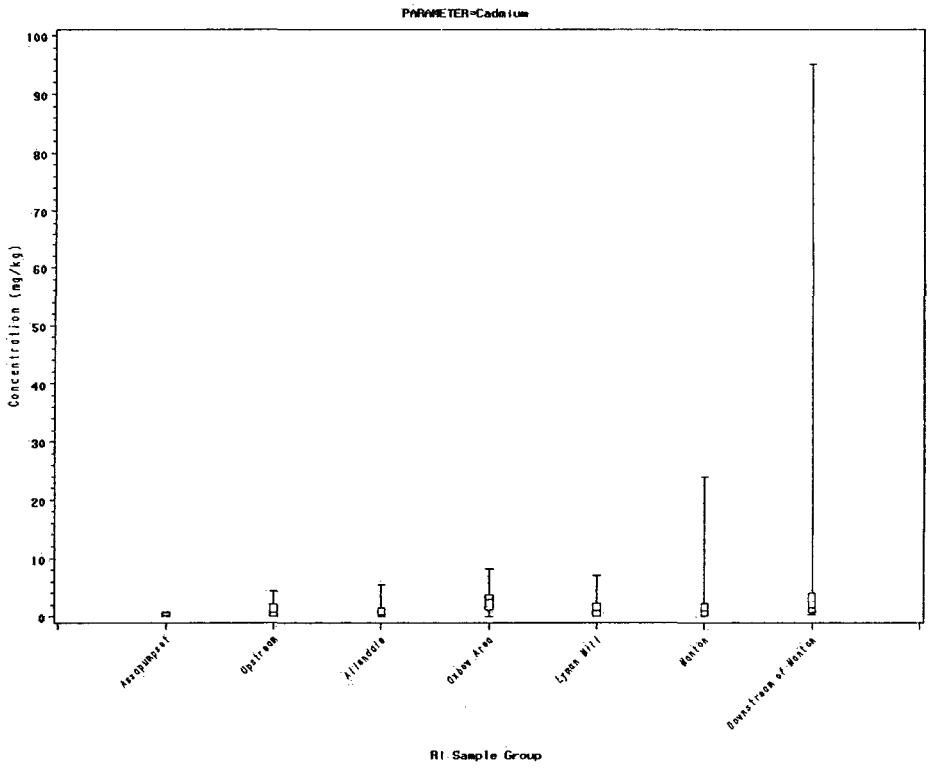


Figure C-14. Boxplot of Cadmium in Sediment Samples

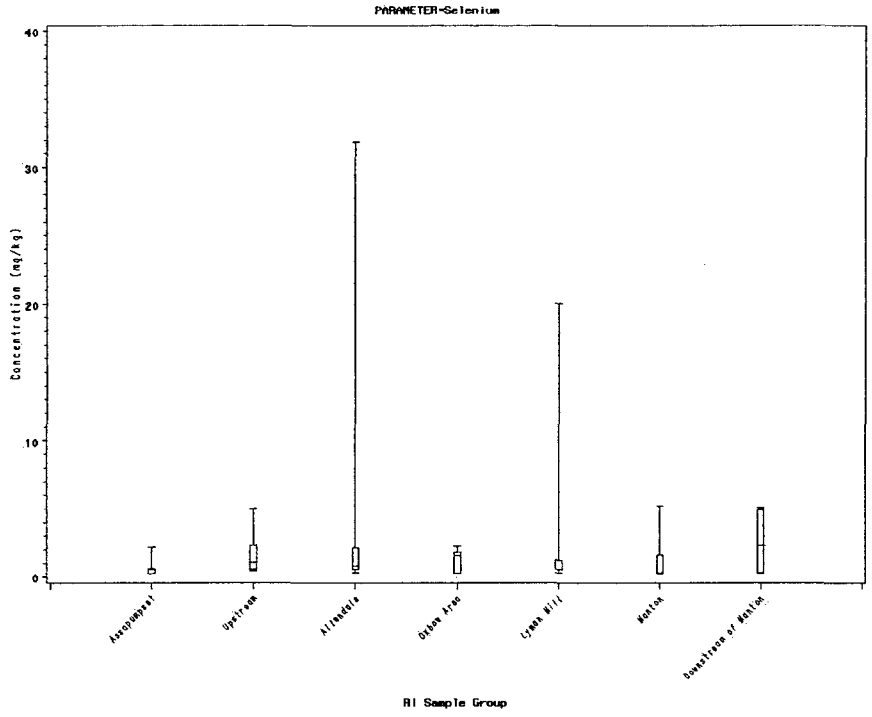


Figure C-15. Boxplot of Selenium in Sediment Samples

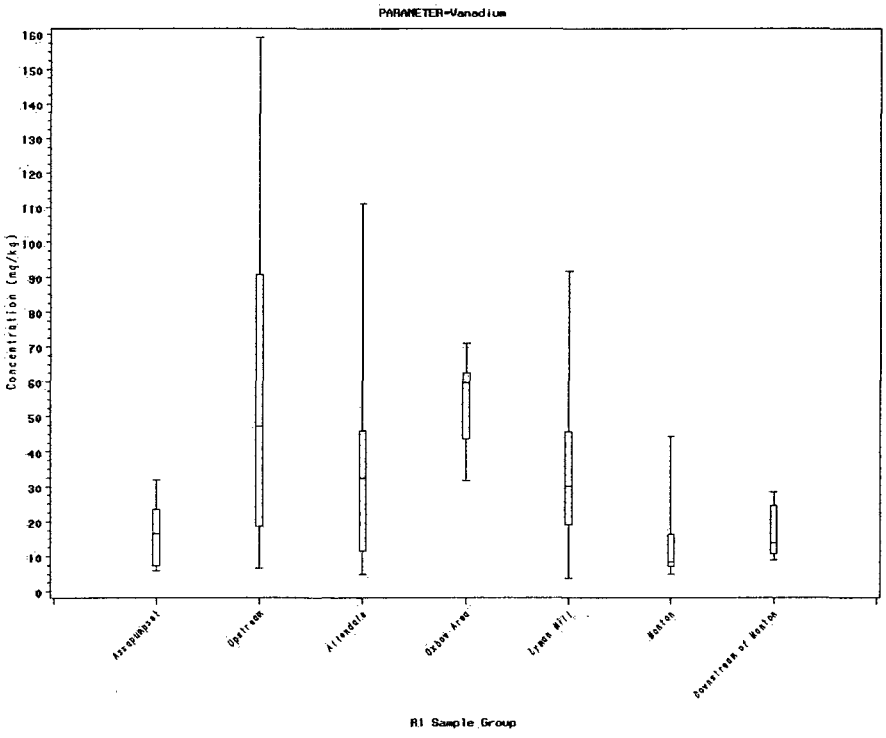


Figure C-16. Boxplot of Vanadium in Sediment Samples

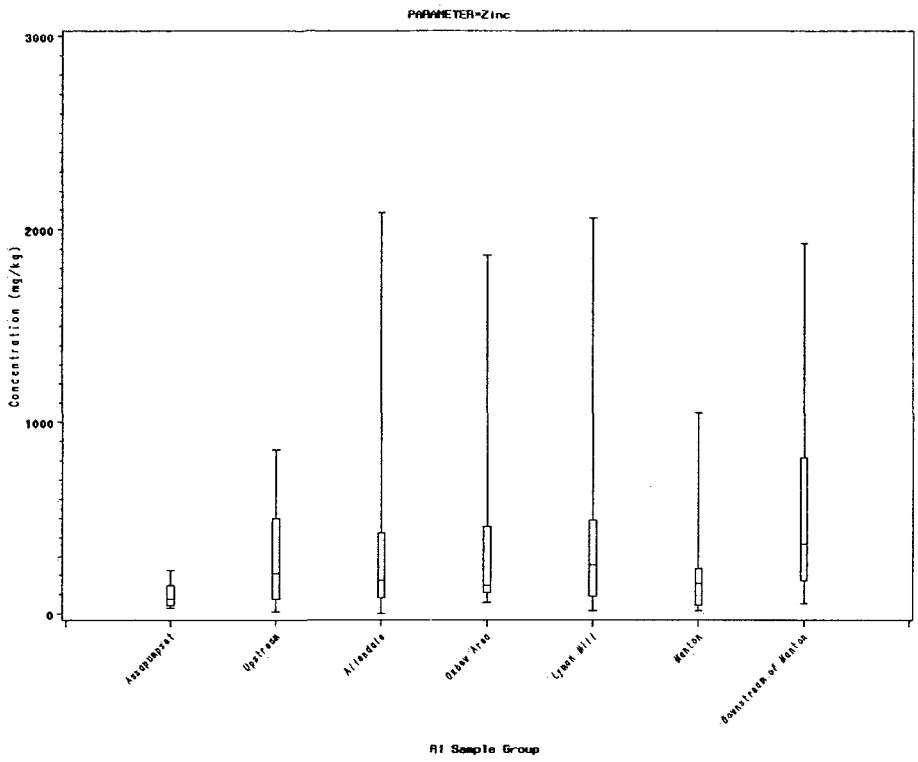


Figure C-17. Boxplot of Zinc in Sediment Samples

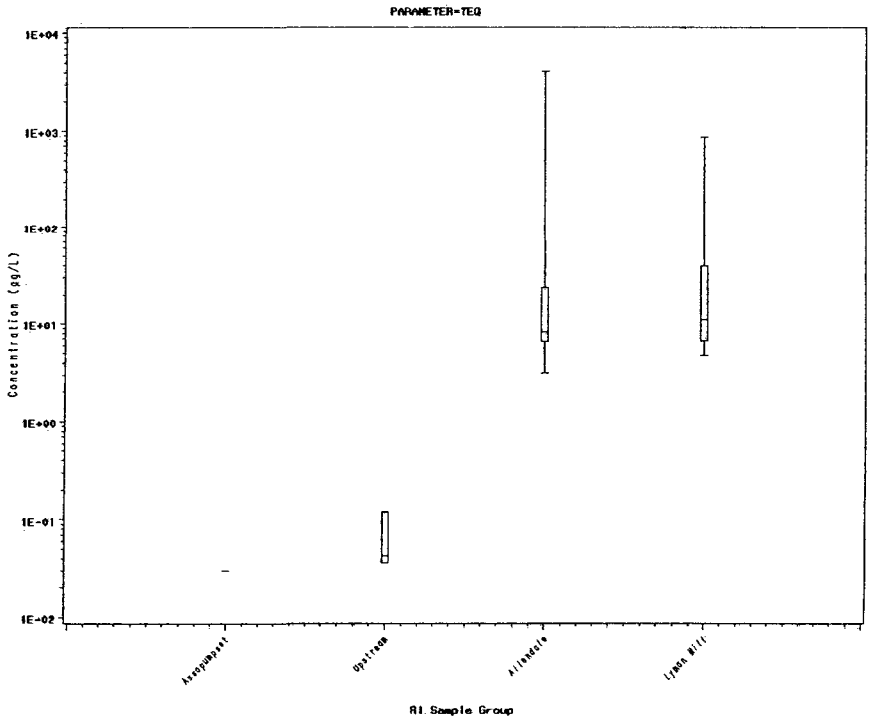


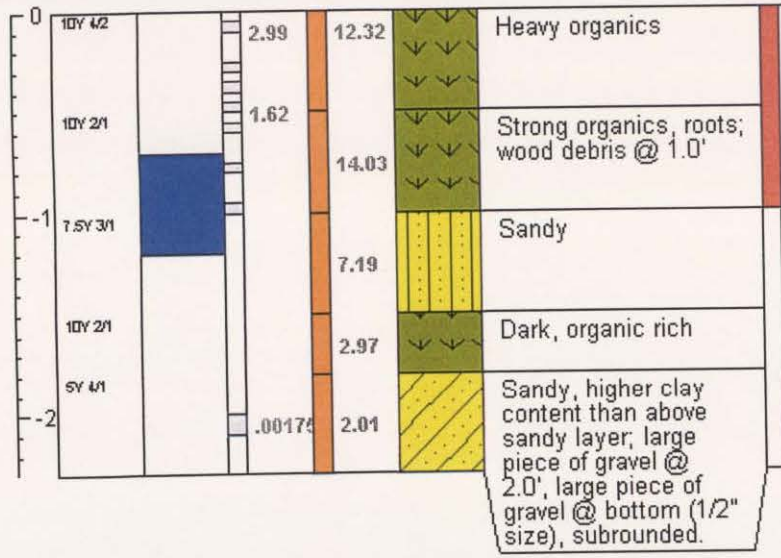
Figure C-18. Boxplot of Dioxin TEQ in Surface Water Samples

APPENDIX D

MAY 2003 SEDIMENT CORE LOGS

PROJECT NAME: Centredale Manor Restoration Project
LOCATION: Woonasquatucket River, North Providence, RI
BORING NUMBER: CMS-SD-4204 136-C
LOCATION (lat/long): 280543.14891 332307.30910

DATE: 5/6/03
TOTAL DEPTH: 2.3'



Depth (ft)	Color	210 Pb / 137 Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		2.99	12.32		Heavy organics		MH/OH Organic silt, dark yellowish brown	20.64	70.37	8.24	0.75	0.00	0.00	167	106	61	1.57	237	8.0	68.6	23.3	31.3
	10Y 2/1		1.62			Strong organics, roots; wood debris @ 1.0'																	
-1	7.5Y 3/1			14.03		Sandy																	
	10Y 2/1			7.19		Dark, organic rich																	
	5Y 4/1			2.97		Sandy, higher clay content than above sandy layer; large piece of gravel @ 2.0', large piece of gravel @ bottom (1/2" size), subrounded.																	
-2			.00175	2.01																			

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

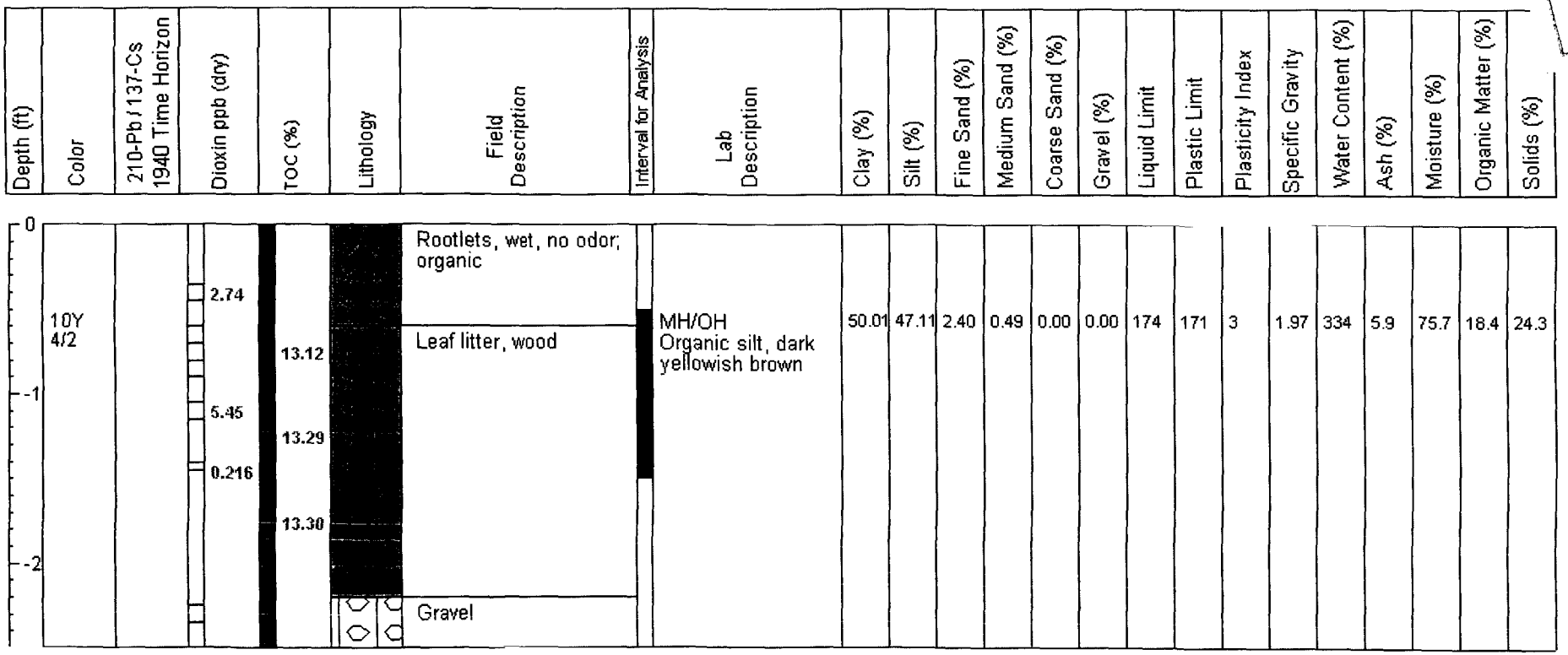
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/6/0

TOTAL DEPTH: 2.5'

BORING NUMBER: CMS-SD-4206 161-A

LOCATION (lat/long): 280475.87265 332782.43328



Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/6/03

TOTAL DEPTH: 2.6'

BORING NUMBER: CMS-SD-4207 131-C

LOCATION (lat/long): 280423.37268 332555.93756

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2			3.78		Organics, black, strong hydrocarbon odor when cutting core, roots		SM Silty sand, dark yellowish brown	9.50	33.39	22.78	22.72	7.54	4.07									
-1						Pea-sized gravel in sand matrix, root																	
-2						Large gravel																	
						Gravel																	

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

BORING NUMBER: CMS-SD-4208 131-A

LOCATION (lat/long): 280414.49560 332176.23823

DATE: 5/7/03

TOTAL DEPTH: 2.5'

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 2/1			1.37		Organics @ top, odor, dark color, broken glass, some coarse gravel, pebbles (subrounded - rounded)			0.18	33.03	3.91	9.46	6.50	79.00										
-1	7.5Y 6/3					Coarse sand, subrounded-rounded, quartz pebbles																	
-2																							

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

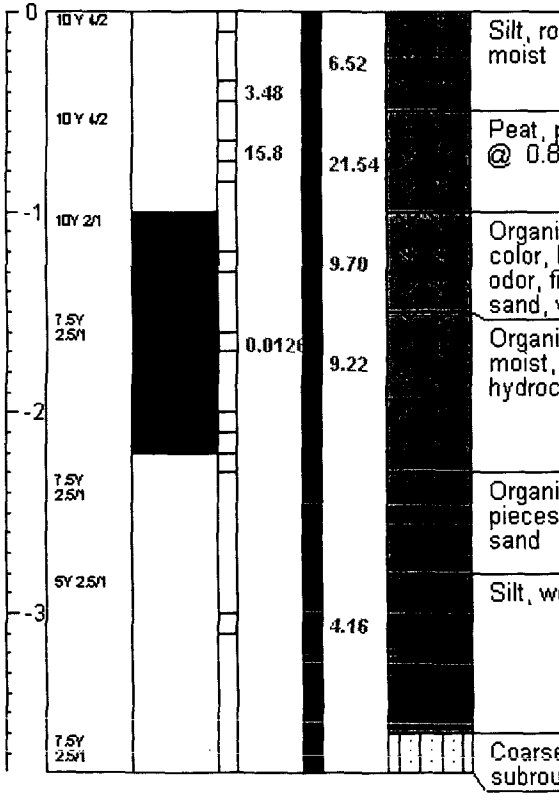
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 3.8'

BORING NUMBER: CMS-SD-4209 131-B

LOCATION (lat/long): 280423.59283 332248.27325



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		3.48	6.52		Silt, rootlets, organic, moist		MH/OH Organic silt w/sand, dark yellowish brown	15.01	58.40	25.80	0.79	0.00	0.00	59	56	3	2.35	124	6.6	54.4	39.0	45.6
	10Y 4/2		15.8	21.54		Peat, plastic drink lid @ 0.88'		SM Silty sand, dark yellowish brown	11.90	35.77	50.07	2.26	0.00	0.00	64	61	3	2.09	98	5.6	42.8	51.6	57.2
-1	10Y 2/1			9.70		Organic silt, dark color, hydrocarbon odor, fine-grained sand, wood @ 1.3'																	
	7.5Y 2.5/1		0.0126	9.22		Organic silt, rootlets, moist, sheen, hydrocarbon odor																	
-2	7.5Y 2.5/1					Organic silt, wood pieces, fine-grained sand																	
	5Y 2.5/1			4.16		Silt, wood pieces, odor																	
-3	7.5Y 2.5/1					Coarse sand, subrounded quartz																	

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 3.4'

BORING NUMBER: CMS-SD-4210 128-C

LOCATION (lat/long): 280332.09968 333071.61506

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		1.67	9.54		Odor, black in color		MH/OH Organic silt w/sand, dark yellowish brown	12.68	64.49	17.76	5.07	0.00	0.00	89	73	16	1.57	139	4.6	38.8	56.6	61.2
-1			3.72	8.22																			
				8.57																			
	7.5Y 3/1			3.65		Clay layer, light tan									45	43	2		76				
	7.5Y 3/1					Clay, silt (v. fine grain), heavy organics																	
-2			0.0264	7.19																			
	7.5Y 2.5/1					3.5" wood debris, organic layer, darkens with depth																	
-3																							

Original includes color coding.

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 3.4'

BORING NUMBER: CMS-SD-4211 128-A

LOCATION (lat/long): 280282.82690 332797.98231

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2			10.85		Organics (grass, rootlets), silt		MH/OH Organic silt, dark yellowish brown	37.84	59.07	1.97	1.12	0.00	0.00	109	103	6	1.97	251	6.3	65.7	28.0	34.3
-1	5Y 3/1			6.76		Organics, silt																	
				2.53																			
	10Y 2.5/1			1.27		Silt, oil sheen																	
-2	10Y 3/1			0.49		Silt, fine-grained sand, mica flakes																	
	10Y 4/2					Pebbles, rounded gravel clasts (1-3"), coarse, subrounded quartz grains		SP/SM Poorly graded sand w/silt and gravel, dark yellowish brown	1.74	4.40	26.92	34.79	15.93	16.27									
-3																							

Original includes color coding

PROJECT NAME: ***Centredale Manor Restoration Project***

LOCATION: **Woonasquatucket River, North Providence, RI**

DATE: 5/7/03

TOTAL DEPTH: 2.5'

BORING NUMBER: CMS-SD-4212 125-A

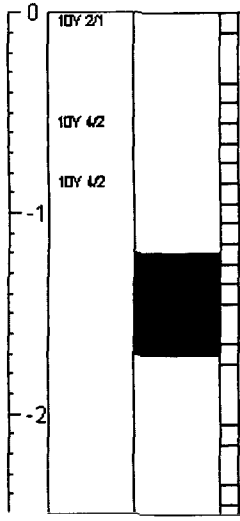
LOCATION (lat/long): 280146.48376 333016.08381

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		8.95	12.35		Heavy organics, wood debris @ bottom, leaf debris @ top 1.0"		MH/OH Organic silt, dark yellowish brown	25.98	71.83	2.16	0.03	0.00	0.00	147	120	27	2.36	336	6.3	69.3	24.4	30.7
-1			16	8.95																			
-2			0.151																				

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project
LOCATION: Woonasquatucket River, North Providence, RI
BORING NUMBER: CMS-SD-4213 124-A
LOCATION (lat/long): 280063.08608 333046.72171

DATE: 5/7/03
TOTAL DEPTH: 2.5'



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 2/1		6.52	9.33		Organic, rootlets on top		MH/OH Organic silt, dark yellowish brown	25.42	70.43	5.08	0.08	0.00	0.00	81	79	2	2.04	236	6.67	68.9	24.5	31.1
	10Y 4/2		52.8	14.08		Leaf litter (flood event?)																	
-1	10Y 4/2		0.119	9.57		Organic, wood debris @ 1.7'		MH/OH Organic silt, dark yellowish brown	25.62	63.7	10.39	0.29	0.00	0.00	103	91	12			5.8	66.1	28.1	33.9
-2																							

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

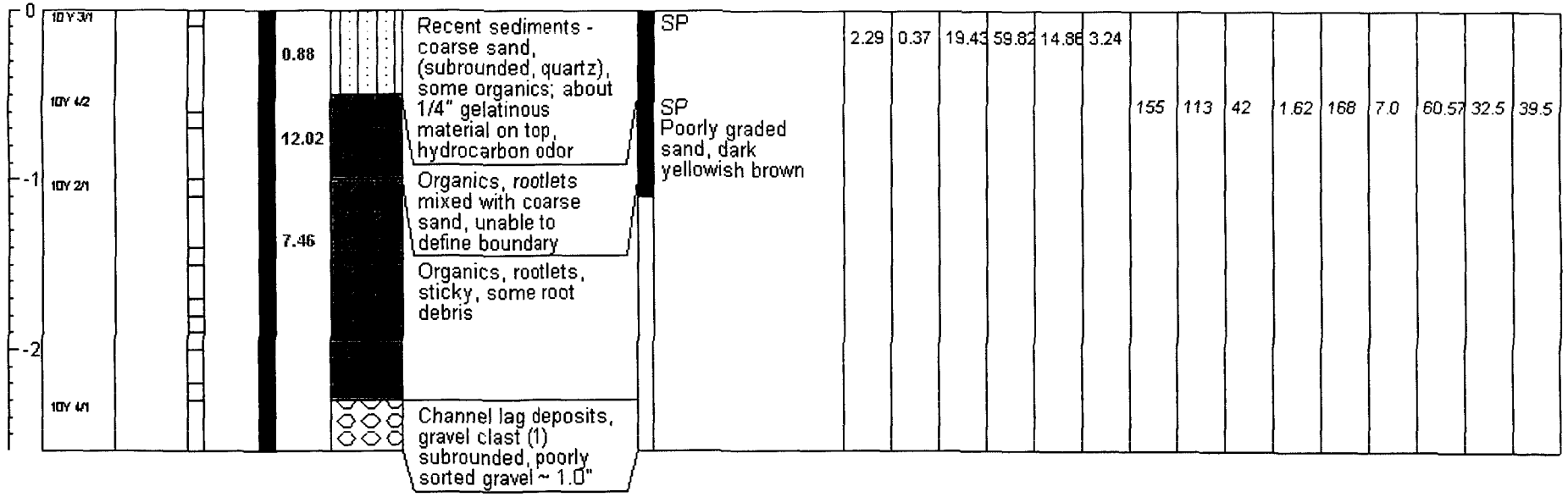
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 2.6'

BORING NUMBER: CMS-SD-4214 123-A

LOCATION (lat/long): 280007.41814 332950.41781



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 3/1			0.88		Recent sediments - coarse sand, (subrounded, quartz), some organics; about 1/4" gelatinous material on top, hydrocarbon odor		SP	2.29	0.37	19.43	59.82	14.86	3.24									
-1	10Y 4/2			12.02		Organics, rootlets mixed with coarse sand, unable to define boundary		SP Poorly graded sand, dark yellowish brown							155	113	42	1.62	168	7.0	60.57	32.5	39.5
	10Y 2/1			7.46		Organics, rootlets, sticky, some root debris																	
-2	10Y 4/1					Channel lag deposits, gravel clast (1) subrounded, poorly sorted gravel ~ 1.0"																	

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

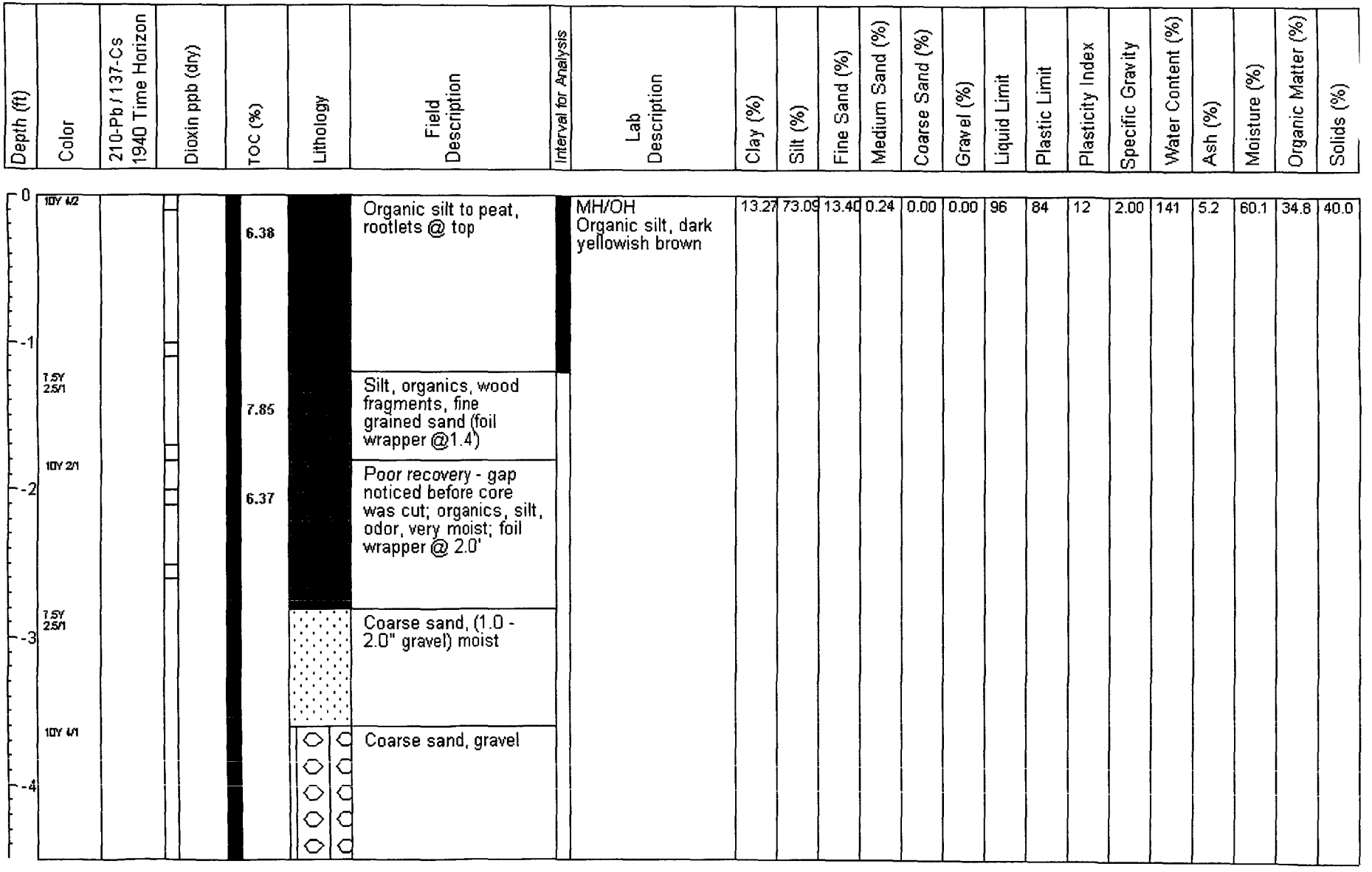
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 4.5'

BORING NUMBER: CMS-SD-4215 128-D

LOCATION (lat/long): 280251.40151 332284.65623



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2			6.38		Organic silt to peat, rootlets @ top		MH/OH Organic silt, dark yellowish brown	13.27	73.09	13.40	0.24	0.00	0.00	96	84	12	2.00	141	5.2	60.1	34.8	40.0
-1	7.5Y 2.5/1			7.85		Silt, organics, wood fragments, fine grained sand (foil wrapper @1.4)																		
-2	10Y 2/1			6.37		Poor recovery - gap noticed before core was cut; organics, silt, odor, very moist; foil wrapper @ 2.0'																		
-3	7.5Y 2.5/1					Coarse sand, (1.0 - 2.0" gravel) moist																		
-4	10Y 4/1					Coarse sand, gravel																		

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 3.2'

BORING NUMBER: CMS-SD-4216 138-A

LOCATION (lat/long): 280629.99966 332075.26407

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2			6.17		Heavy organics, roots at top; Some woody debris at top		MH/OH Sandy organic silt, dark yellowish brown	14.04	53.99	30.71	1.06	0.20	0.00	98	76	22	2.37	114	6.0	52.1	41.9	47.9
-1																							
-2	10Y 5/2			0.79		Clay layer																	
	10Y 4/1			0.24		Sand, coarse, one large clast																	
-3																							

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

BORING NUMBER: CMS-SD-4217 136-B

LOCATION (lat/long): 280540.28703 332197.59199

DATE: 5/7/03

TOTAL DEPTH: 3.4'

Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2			8.33		Leaves, roots, organics		SM Silty sand, dark yellowish brown	8.58	30.77	52.79	7.86	0.00	0.00	82	78	4	2.35	143	6.6	53.0	40.4	47.0
	10Y 4/2			2.01		Coarse grained		SP Poorly graded sand, dark yellowish brown	2.00	2.87	33.93	55.12	5.11	0.97	163	90	73						
-1	10Y 3/1			4.92		Organics, silt?																	
	10Y 3/1			12.31		Clay																	
-2	10Y 3/1			3.09		Fine-grained sand @ base, 10% mica																	
-3																							

PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

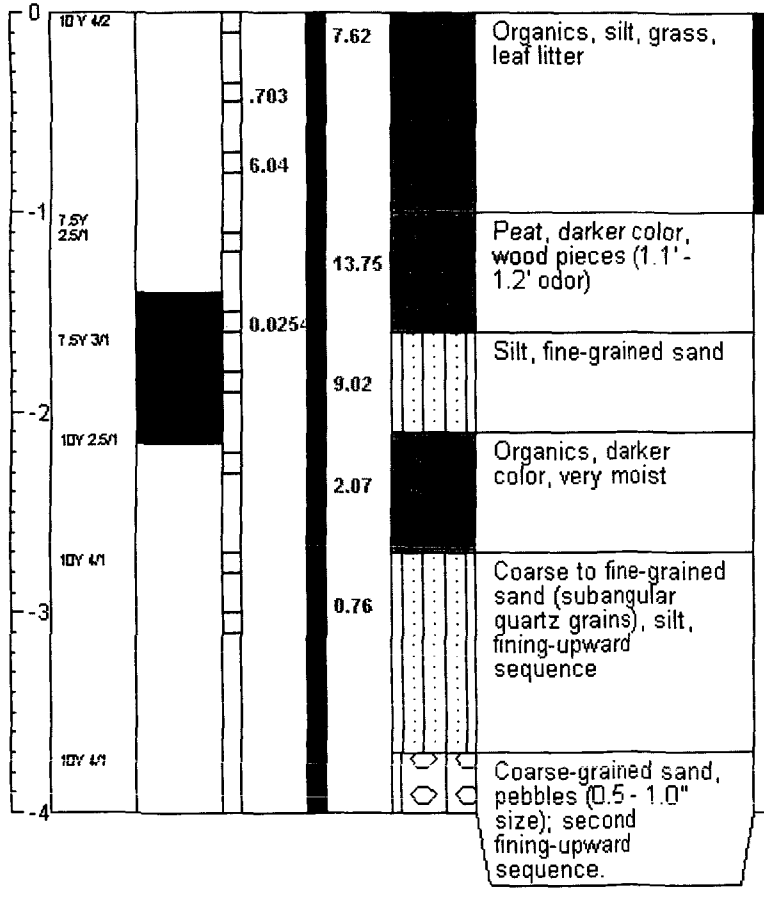
DATE: 5/7/03

TOTAL DEPTH: 4'

BORING NUMBER: CMS-SD-4218 152-A

LOCATION (lat/long): 279946.33100 332813.54699

Original includes color coding



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Soil
0	10Y 4/2		.703	7.62		Organics, silt, grass, leaf litter		MH/OH Organic silt, dark yellowish brown	25.37	72.57	2.00	0.07	0.00	0.00	167	101	66	2.33	188	5.9	60.7	33.4	39.3
-1	7.5Y 2.5/1		6.04																				
				13.75		Peat, darker color, wood pieces (1.1' - 1.2' odor)																		
	7.5Y 3/1		0.025																				
-2				9.02		Silt, fine-grained sand																	
	10Y 2.5/1																						
				2.07		Organics, darker color, very moist																	
	10Y 4/1																						
-3				0.76		Coarse to fine-grained sand (subangular quartz grains), silt, fining-upward sequence																	
	10Y 4/1																						
-4						Coarse-grained sand, pebbles (0.5 - 1.0" size); second fining-upward sequence.																	

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

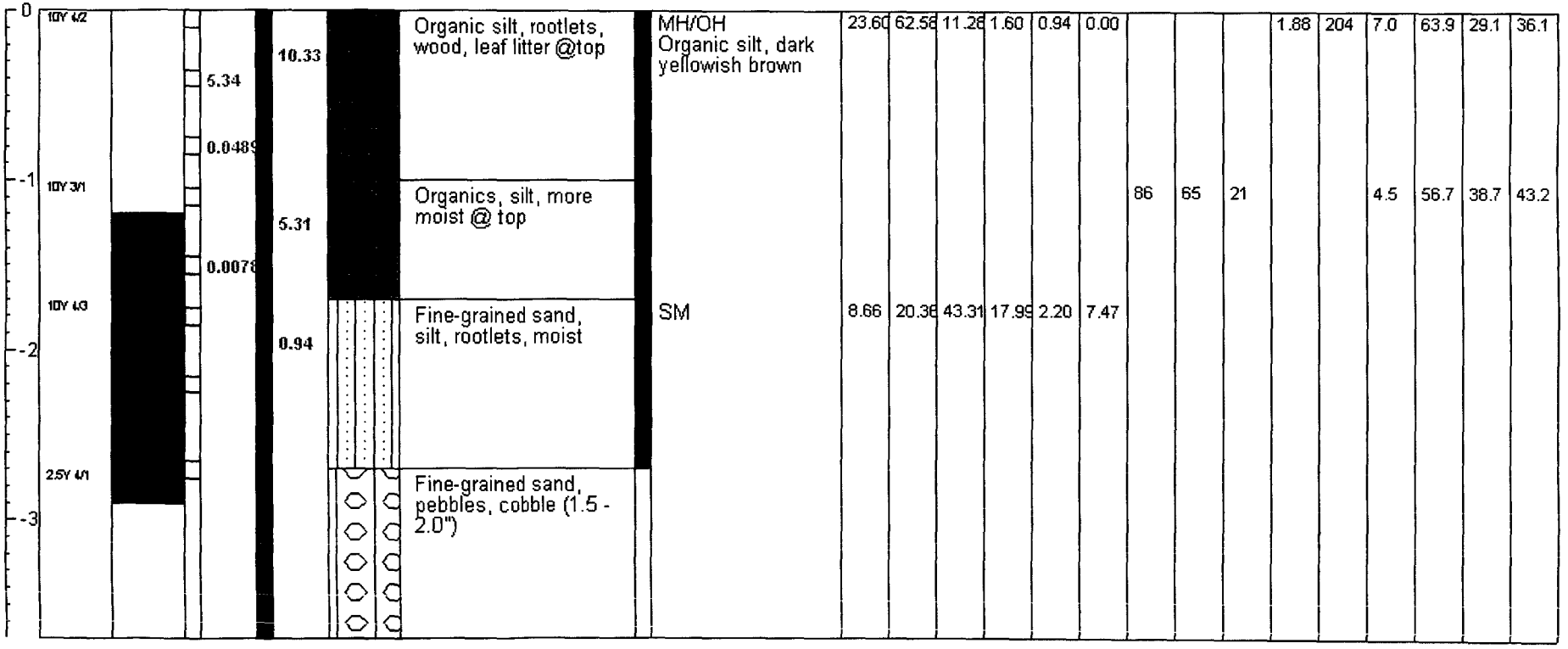
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 3.7'

BORING NUMBER: CMS-SD-4219 127-A

LOCATION (lat/long): 280158.17826 332735.66908



Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

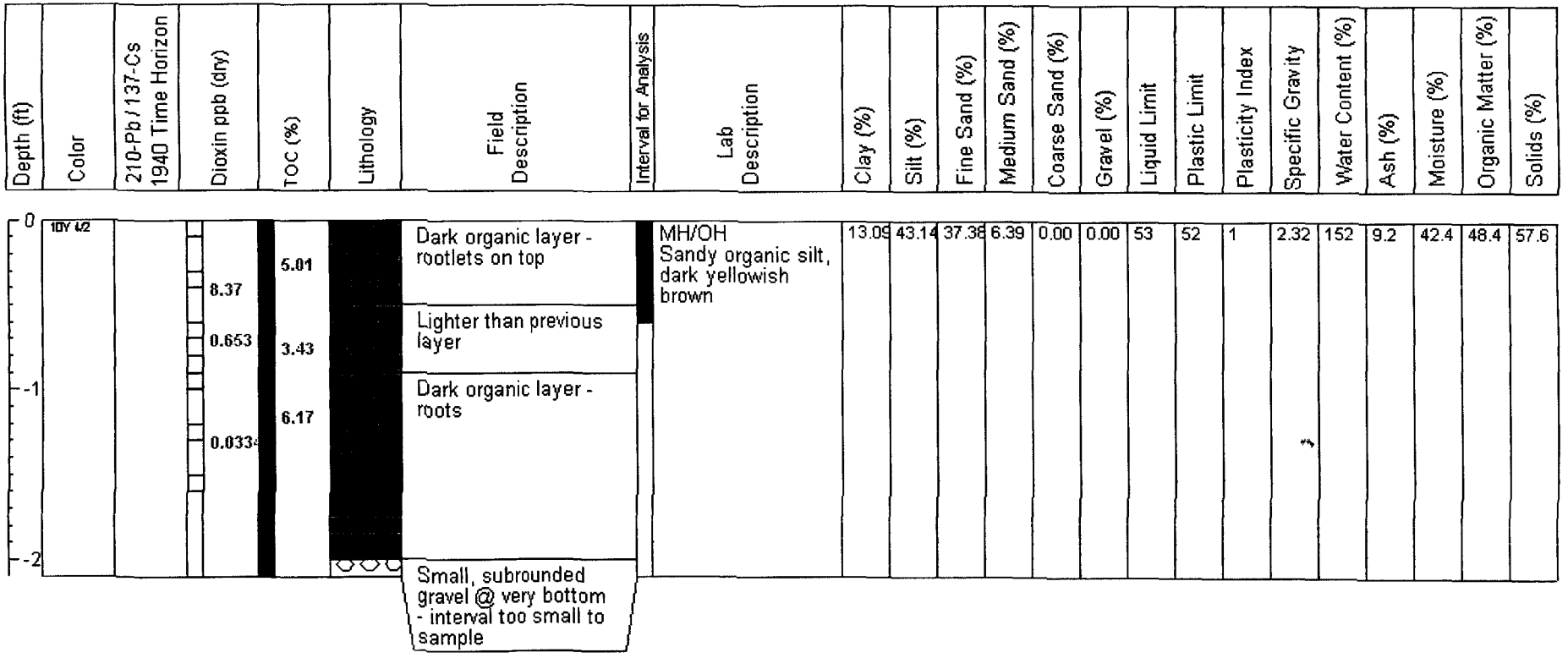
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/7/03

TOTAL DEPTH: 2.1'

BORING NUMBER: CMS-SD-4220 122-A

LOCATION (lat/long): 279914.57543 333119.93841



Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

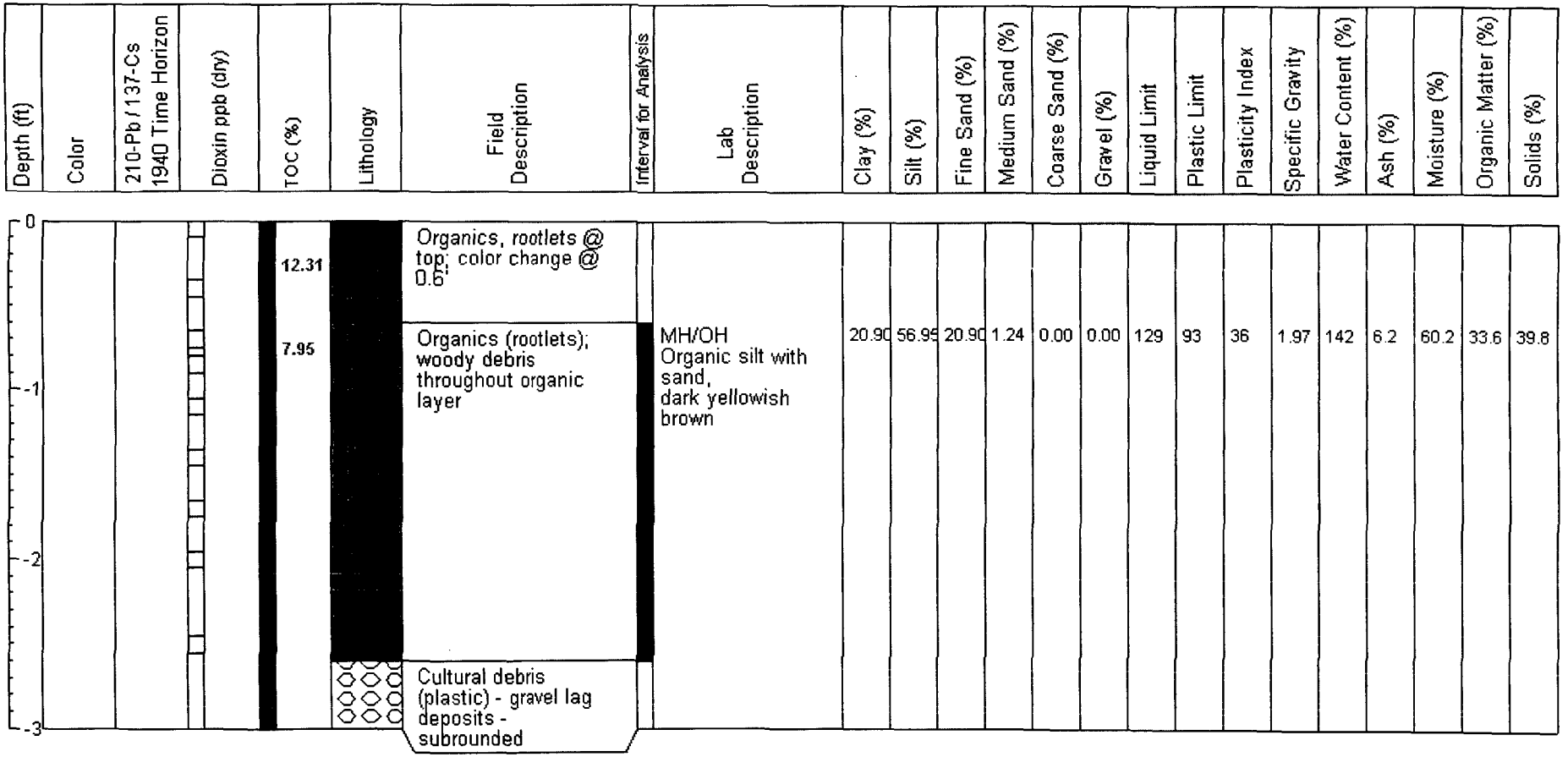
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/8/03

TOTAL DEPTH: 3.0'

BORING NUMBER: CMS-SD-4221 167-A

LOCATION (lat/long): 280702.45951 332109.87333



PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

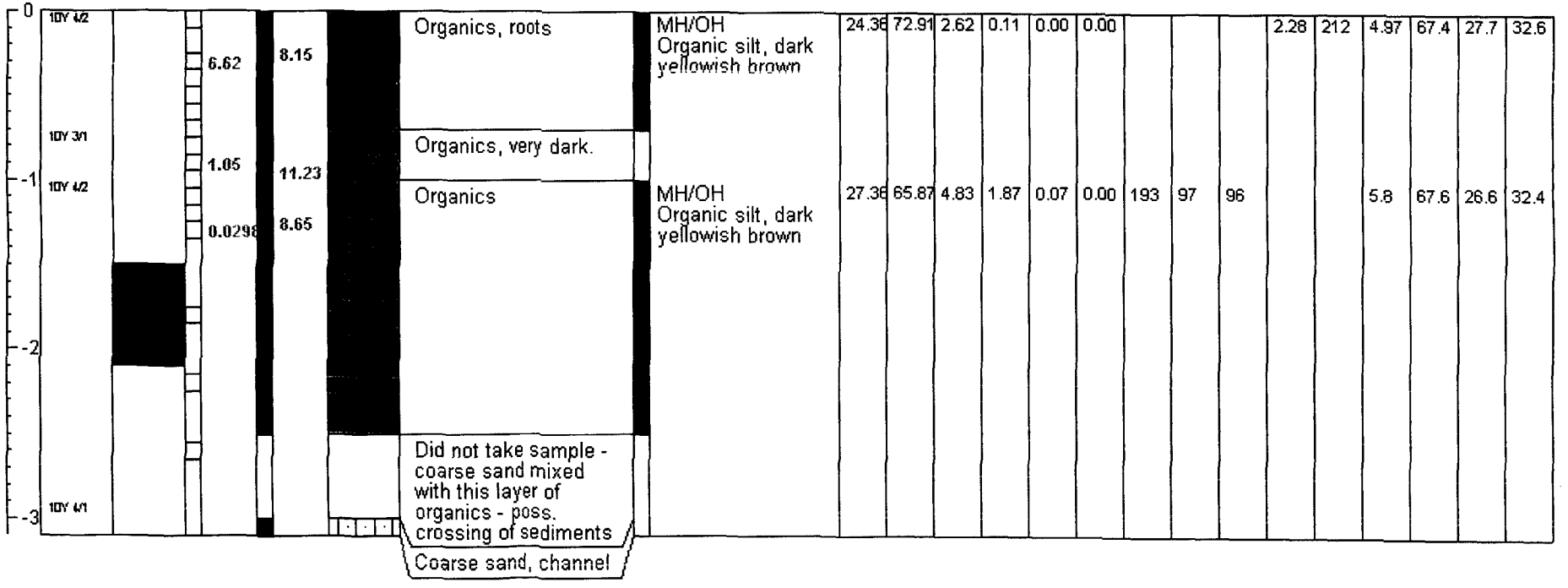
BORING NUMBER: CMS-SD-4222 120-A

LOCATION (lat/long): 279785.66972 332936.02953

Original includes color coding.

DATE: 5/8/03

TOTAL DEPTH: 3.1'



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		6.62	8.15		Organics, roots		MH/OH Organic silt, dark yellowish brown	24.36	72.91	2.62	0.11	0.00	0.00				2.28	212	4.97	67.4	27.7	32.6
-1	10Y 3/1		1.05	11.23		Organics, very dark.																	
	10Y 4/2		0.0298	8.65		Organics		MH/OH Organic silt, dark yellowish brown	27.36	65.87	4.83	1.87	0.07	0.00	193	97	96			5.8	67.6	26.6	32.4
-2																							
-3	10Y 4/1					Did not take sample - coarse sand mixed with this layer of organics - poss. crossing of sediments																	
						Coarse sand, channel																	

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

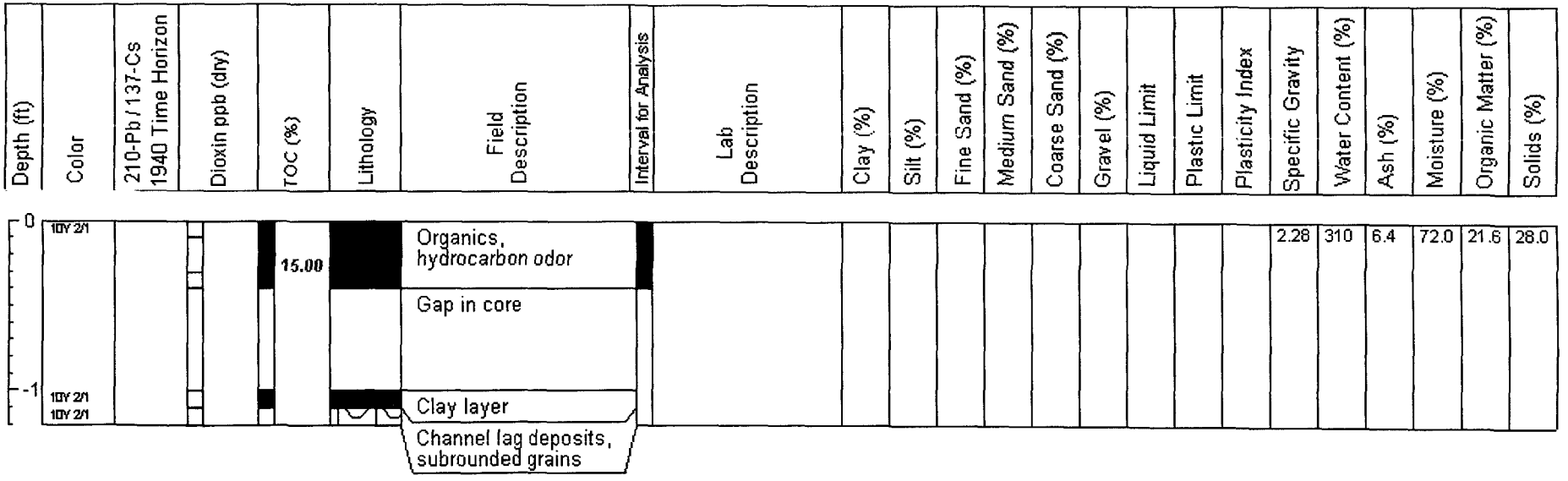
DATE: 5/8/03

LOCATION: Woonasquatucket River, North Providence, RI

TOTAL DEPTH: 1.2'

BORING NUMBER: CMS-SD-4223 120-B

LOCATION (lat/long): 279796.96218 333191.20672



PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

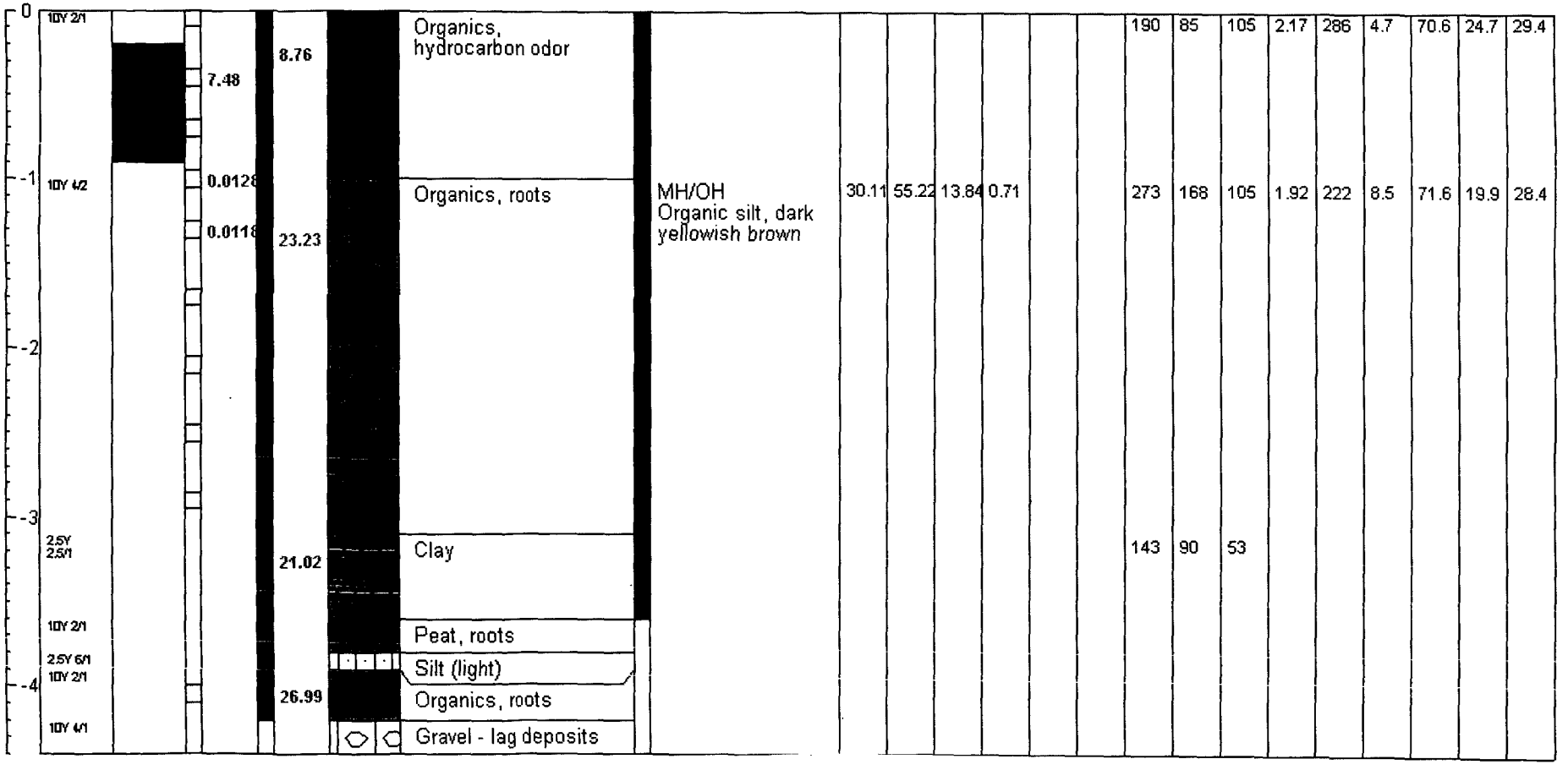
BORING NUMBER: LPX-SD-4201 188-A

LOCATION (lat/long): *275592.77104 333892.73874*

Original includes color coding.

DATE: 5/8/03

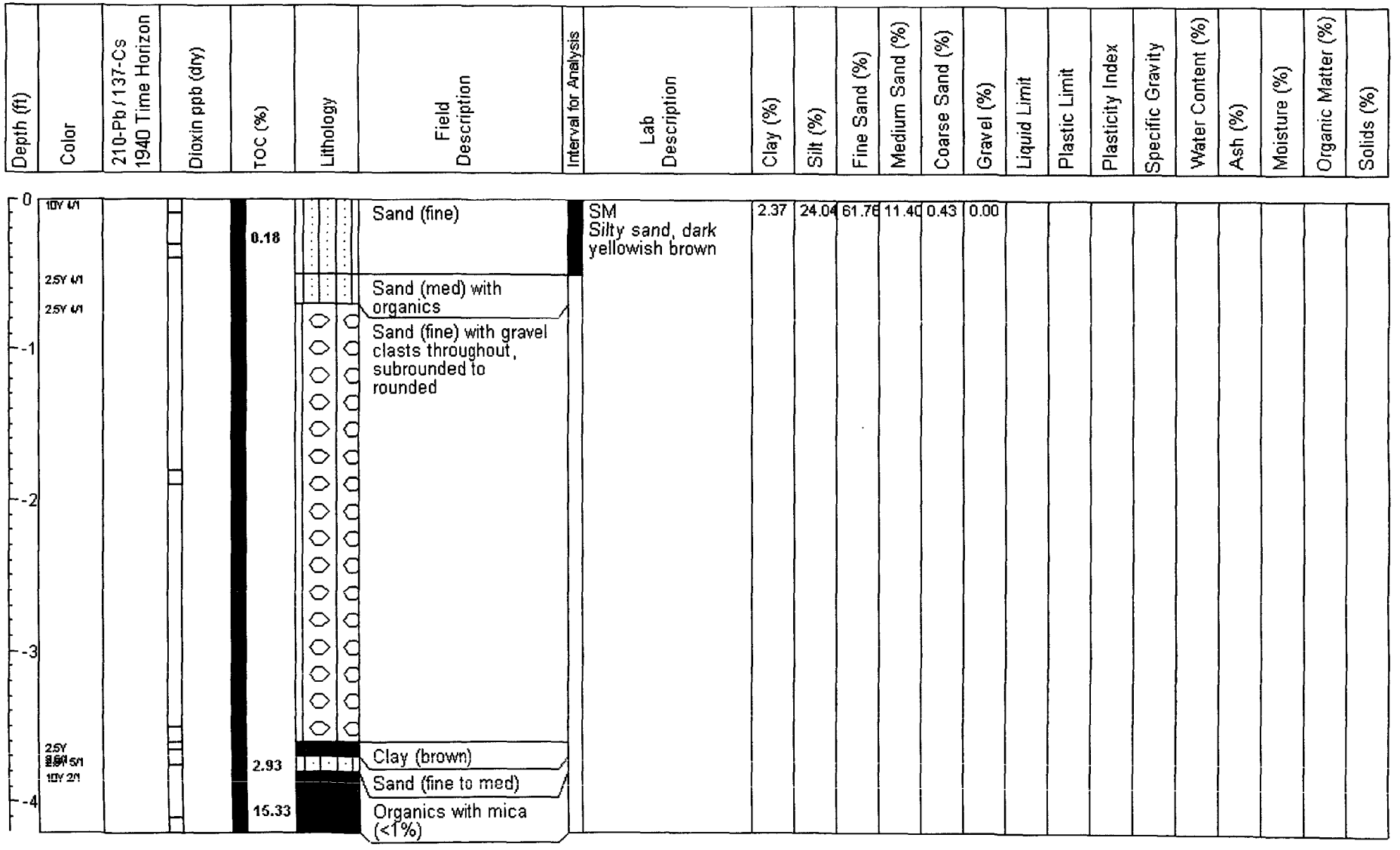
TOTAL DEPTH: 4.4'



PROJECT NAME: Centredale Manor Restoration Project
LOCATION: Woonasquatucket River, North Providence, RI
BORING NUMBER: LPX-SD-4202 188-B
LOCATION (lat/long): 275623.92637 334048.48584

Original includes color coding.

DATE: 5/8/03
TOTAL DEPTH: 4.2'



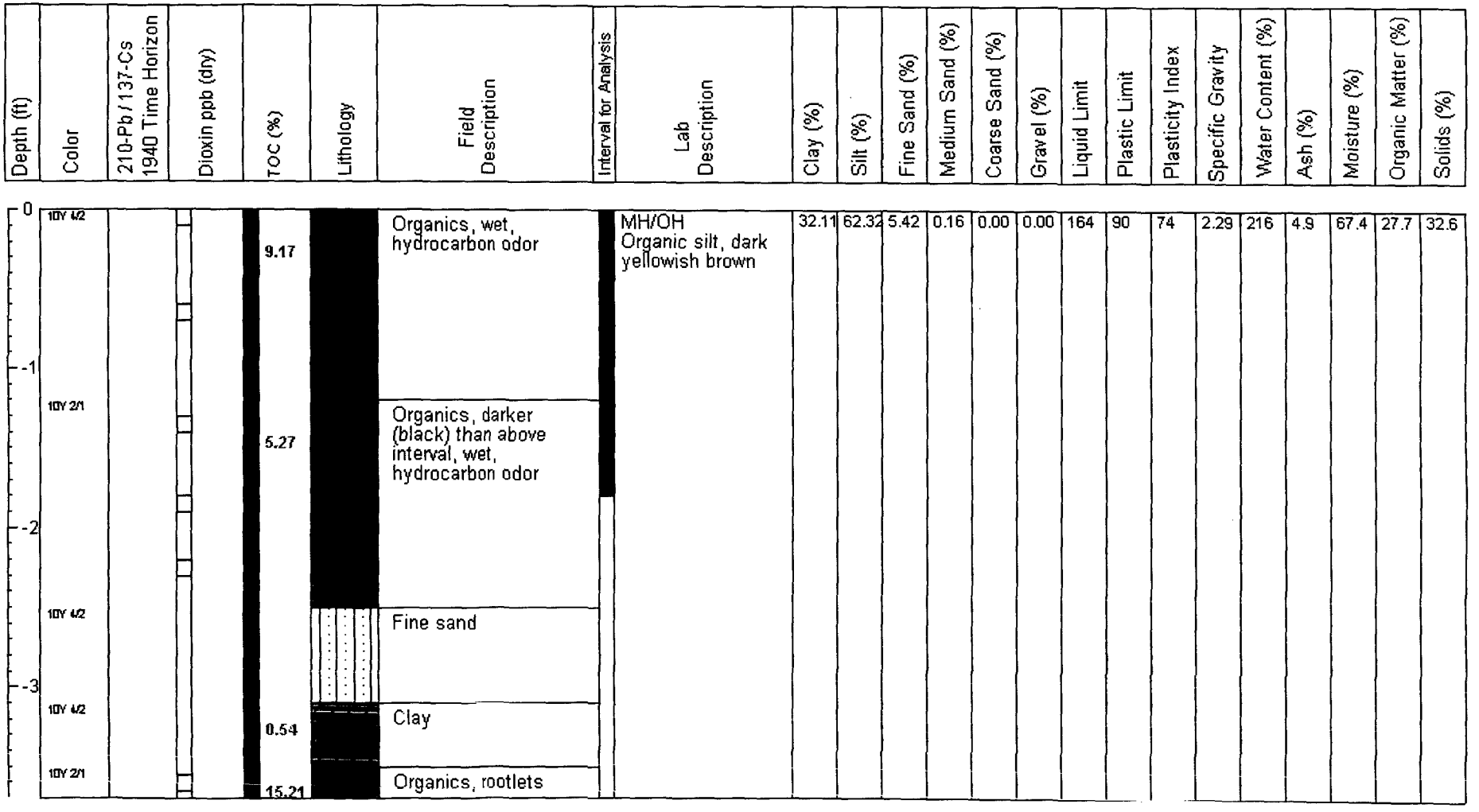
Original includes color coding

Manor Restoration Project
River, North Providence, RI

DATE: 5/8/03
TOTAL DEPTH: 3.7'

88-C

LOCATION (lat/long): 275613.70314 334321.18351



PROJECT NAME: Centredale Manor Restoration Project

LOCATION: Woonasquatucket River, North Providence, RI

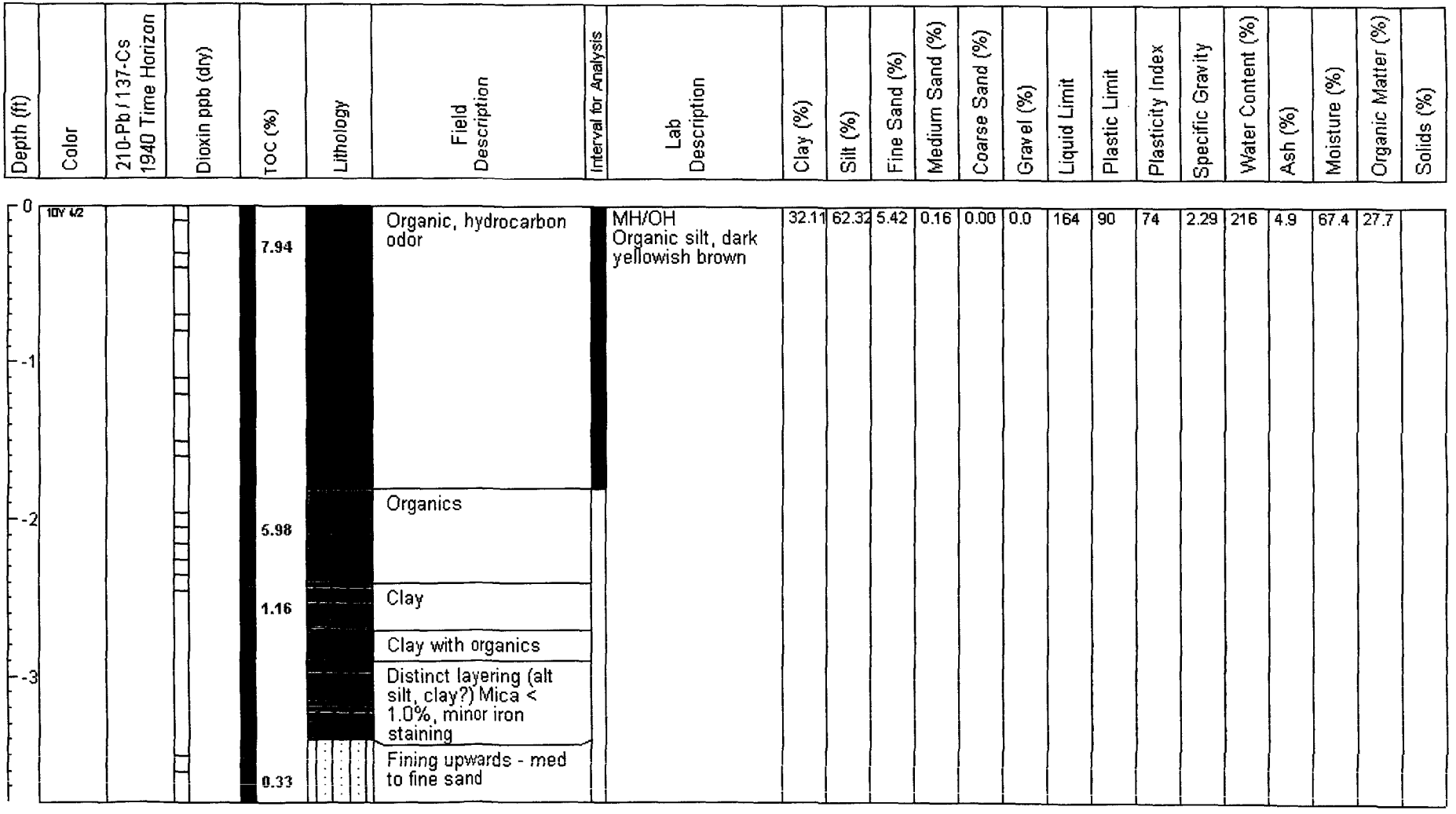
BORING NUMBER: LPX-SD-4204 179-A

LOCATION (lat/long): 275794.91979 334183.99577

Original includes color coding.

DATE: 5/8/03

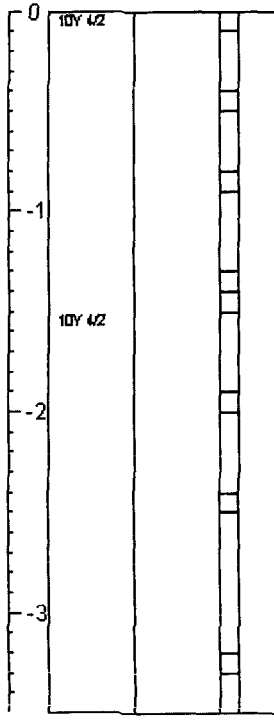
TOTAL DEPTH: 3.8'



PROJECT NAME: Centredale Manor Restoration Project
LOCATION: Woonasquatucket River, North Providence, RI
BORING NUMBER: LPX-SD-4205 199-A
LOCATION (lat/long): 276413.41998 333939.41415

Original includes color coding

DATE: 5/8/03
TOTAL DEPTH: 3.5'



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0 to -1	10Y 4/2			12.17		Organic, hydrocarbon odor		MH/OH Organic silt, dark yellowish brown	36.36	62.10	1.53	0.00	0.00	0.00	113	90	23	1.91	387	5.0	77.0	18.0	23.0
-1 to -2	10Y 4/2			7.02		Organic, hydrocarbon odor, more silt		MH/OH Organic silt, dark yellowish brown	29.76	67.83	2.29	0.12	0.00	0.00	157	96	61	2.26	200	4.9	65.6	29.5	34.4
-2 to -3				10.39		Organics, hydrocarbon odor, rootlets																	

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

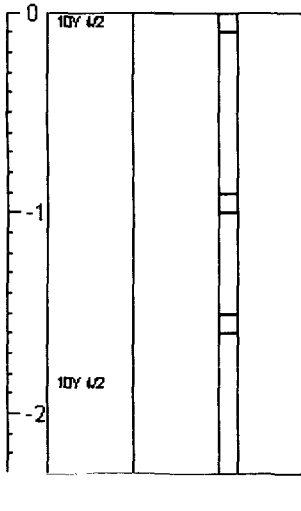
DATE: 5/8/03

LOCATION: Woonasquatucket River, North Providence, RI

TOTAL DEPTH: 2.3'

BORING NUMBER: LPX-SD-4206 206-A

LOCATION (lat/long): 276809.38726 333726.08198



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 6/2			9.18		Organic, hydrocarbon odor, clay @ 1' - not very consolidated		MH/OH Organic silt, dark yellowish brown	27.28	67.30	4.74	0.45	0.23	0.00	178	85	93	1.87	258	5.3	68.3	26.4	31.7
-1				10.02		Organic wood debris right above gravel, hydrocarbon odor													282	5.8	70.8	23.4	29.2
-2	10Y 6/2					Gravel, channel lag, subrounded, poorly graded		GP Poorly graded gravel w/sand, dark yellowish	1.23	3.51	6.66	9.96	1.46	77.18									

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

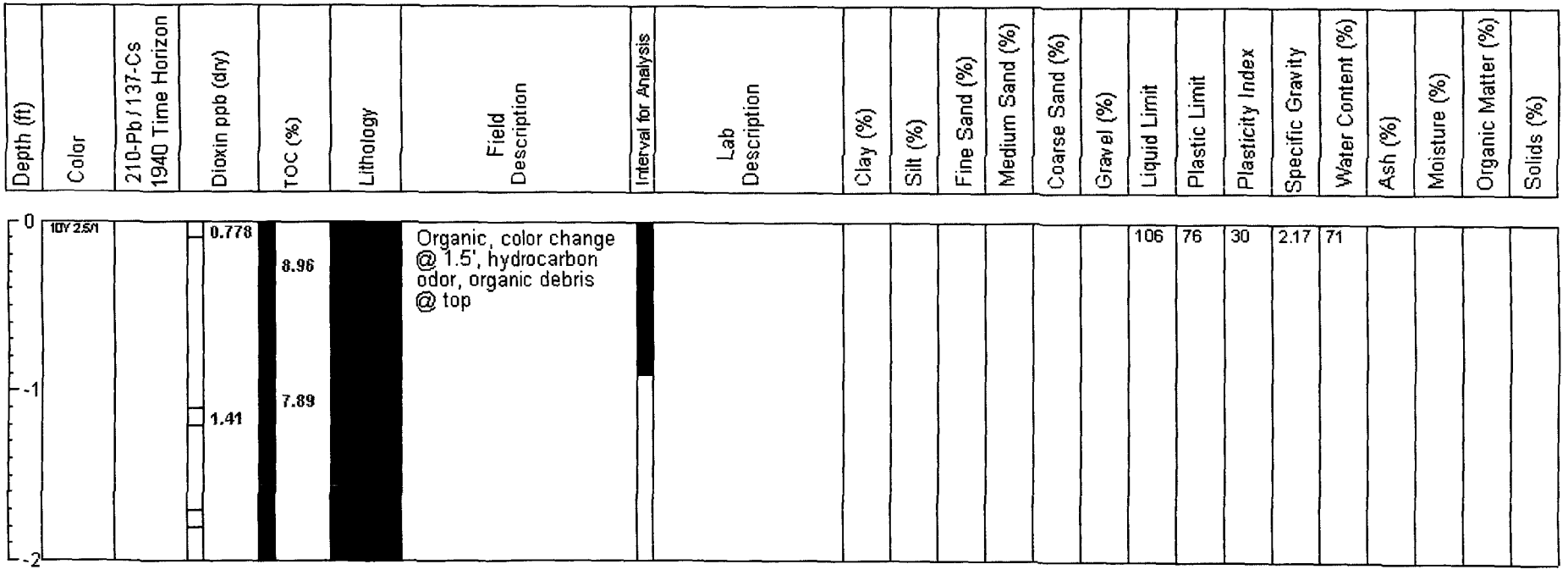
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/8/03

TOTAL DEPTH: 2.3'

BORING NUMBER: LPX-SD-4207 217-A

LOCATION (lat/long): 277166.45713 334024.20703



Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project

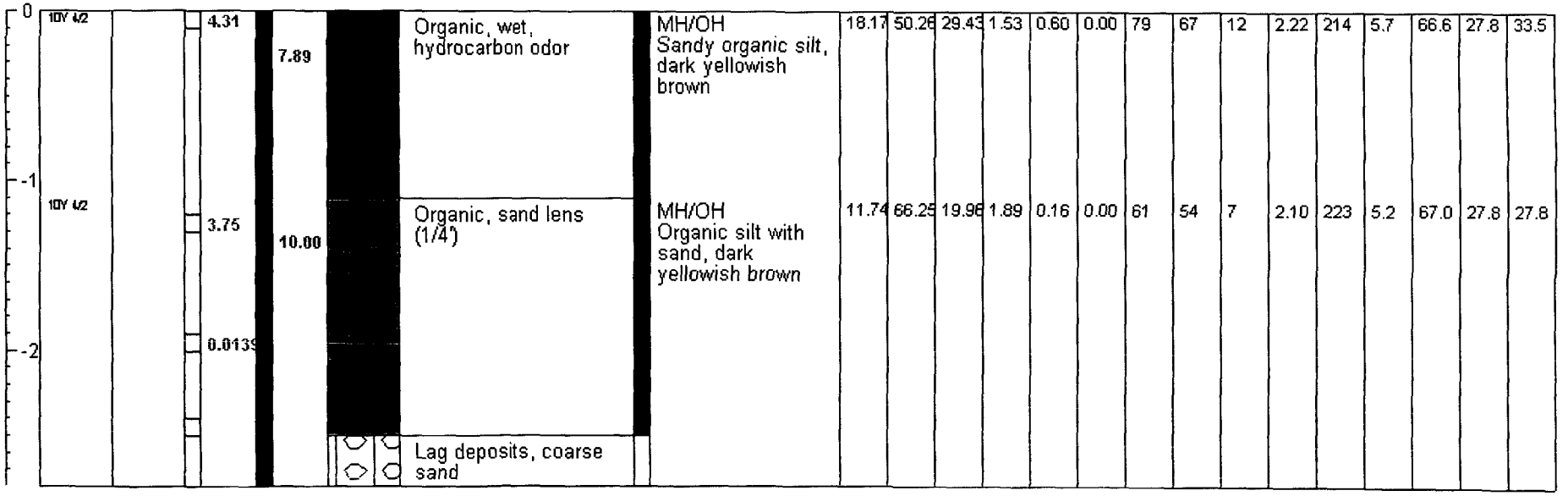
LOCATION: Woonasquatucket River, North Providence, RI

BORING NUMBER: LPX-SD-4208 223-A

LOCATION (lat/long): 277580.65722 333388.51628

DATE: 5/8/03

TOTAL DEPTH: 2.8'



Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		4.31	7.89		Organic, wet, hydrocarbon odor		MH/OH Sandy organic silt, dark yellowish brown	18.17	50.26	29.43	1.53	0.60	0.00	79	67	12	2.22	214	5.7	66.6	27.8	33.5
-1	10Y 4/2		3.75	10.00		Organic, sand lens (1/4')		MH/OH Organic silt with sand, dark yellowish brown	11.74	66.25	19.98	1.89	0.16	0.00	61	54	7	2.10	223	5.2	67.0	27.8	27.8
-2			0.013			Lag deposits, coarse sand																	

Original includes color coding

PROJECT NAME: Centredale Manor Restoration Project

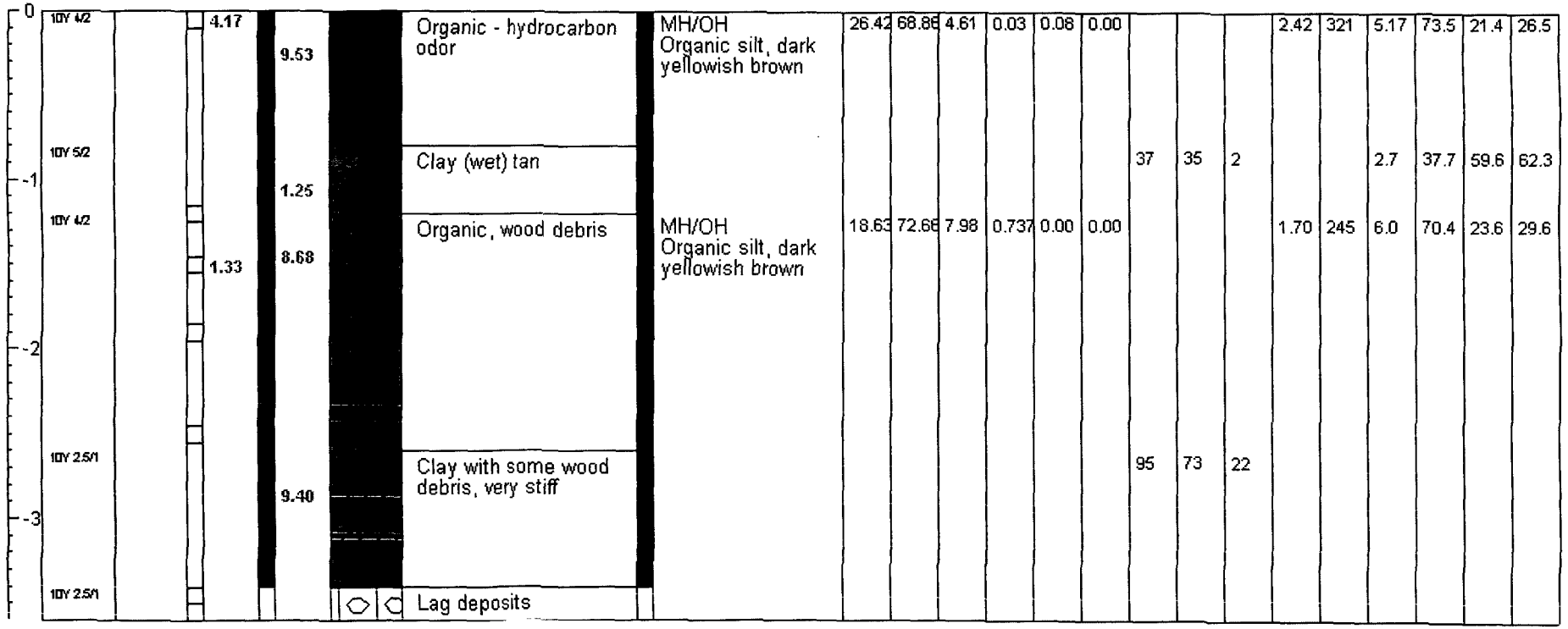
LOCATION: Woonasquatucket River, North Providence, RI

DATE: 5/9/03

TOTAL DEPTH: 3.6'

BORING NUMBER: LPX-SD-4209 219-A

LOCATION (lat/long): 277346.60111 333709.78901

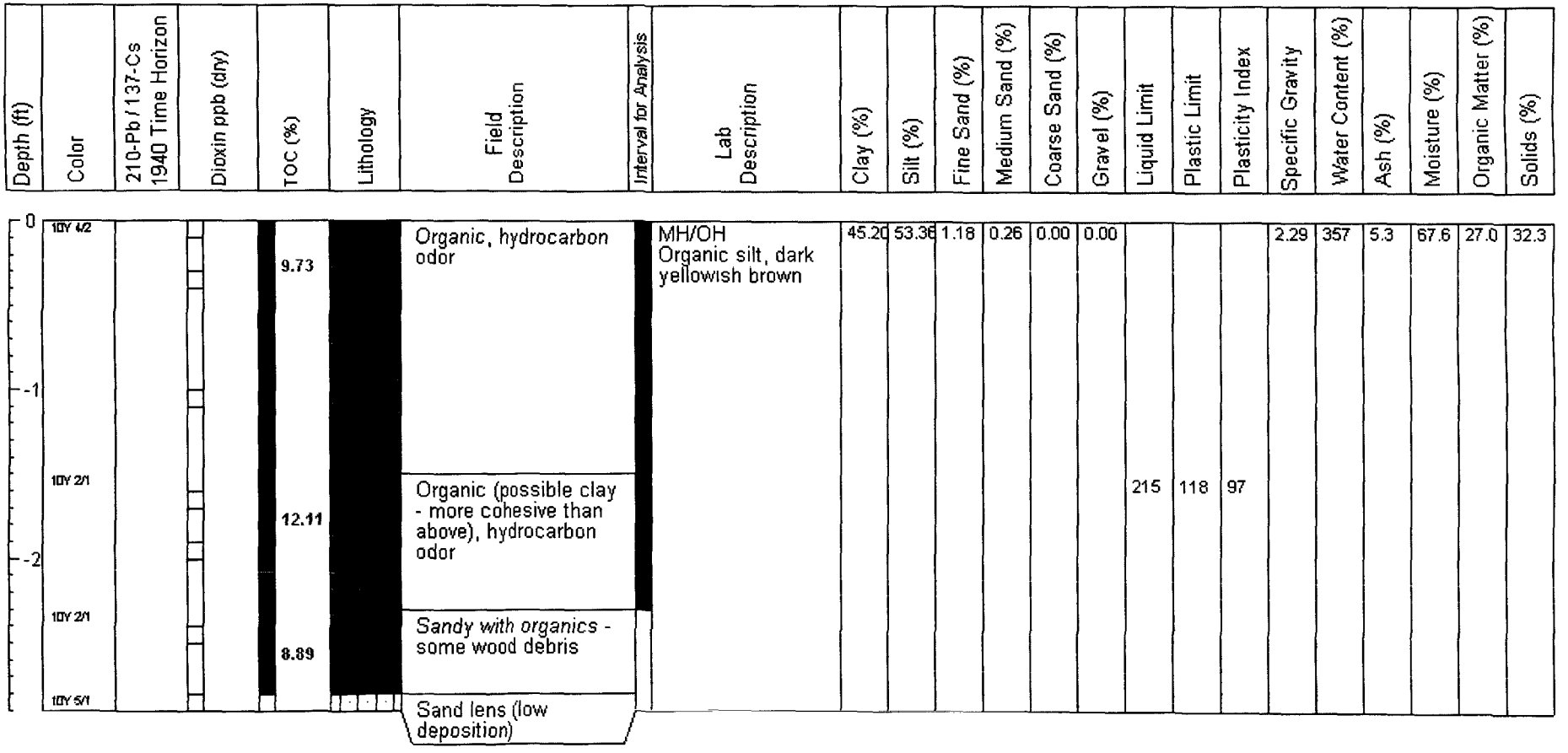


Depth (ft)	Color	210-Pb / 137-Cs 1940 Time Horizon	Dioxin ppb (dry)	TOC (%)	Lithology	Field Description	Interval for Analysis	Lab Description	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	Water Content (%)	Ash (%)	Moisture (%)	Organic Matter (%)	Solids (%)
0	10Y 4/2		4.17	9.53		Organic - hydrocarbon odor		MH/OH Organic silt, dark yellowish brown	26.42	68.86	4.61	0.03	0.08	0.00				2.42	321	5.17	73.5	21.4	26.5
-1	10Y 5/2			1.25		Clay (wet) tan									37	35	2			2.7	37.7	59.6	62.3
	10Y 4/2		1.33	8.68		Organic, wood debris		MH/OH Organic silt, dark yellowish brown	18.63	72.66	7.98	0.737	0.00	0.00				1.70	245	6.0	70.4	23.6	29.6
-2																							
-3	10Y 2.5/1			9.40		Clay with some wood debris, very stiff									95	73	22						
	10Y 2.5/1					Lag deposits																	

Original includes color coding.

PROJECT NAME: Centredale Manor Restoration Project
LOCATION: Woonasquatucket River, North Providence, RI
BORING NUMBER: LPX-SD-4210 193-A
LOCATION (lat/long): 275946.76034 334302.89481

DATE: 5/9/03
TOTAL DEPTH: 2.9'



Appendix E

APPENDIX E

ENVIRONMENTAL FORENSICS REVIEW

NEWFIELDS

June 20, 2005

Ms. Deirdre Dahlen
Battelle Memorial Institute
397 Washington Street
Duxbury, MA 02332
Tel: (781) 952-5253

Environmental Forensics Review of Persistent Chlorinated Organics
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

Dear Ms. Dahlen:

This letter provides an environmental forensics summary of the measured concentrations of persistent chlorinated organics in samples collected from the Centredale Manor Restoration Project Superfund Site in North Providence, Rhode Island (Centredale). Historically, the property currently occupied by Centredale Manor and its immediate surroundings supported the production of pesticides, chemicals, and reconditioned waste drums. Past environmental investigations identified likely residues of these activities in hydrologically downgradient ponds and streams.

Objective

The primary objective of this analysis was a statistical review of these data for the identification of compositional relationships among analytes detected in the study area. Specifically, we explored the likelihood that analytes detected above background screening levels were consistent with the assemblages of contaminants present in the source area around the current location of the Centredale Manor property. Alternatively, we evaluated the likelihood that the chlorinated compounds were better associated with background or independent human activity adjacent to Allendale or Lyman Mill Ponds.

Sample Locations

The study area and site history are described under separate cover (Battelle, 2005). The project team divided the study area into nine subsections for this review (Figure 1). These locations provided a frame of reference for determining the migration potential of

material from the Source Area (Centredale Manor) through the Nearfield (Allendale Pond), Middle Field (Lyman Pond), and Far Field (Manton Pond) areas. Recognizing that many of the persistent chlorinated pesticides were widely used in residential, commercial and industrial applications, Upstream Background locations were sampled to determine the site specific ambient levels for these compounds (e.g., background concentrations). The background locations were selected by the project team to demonstrate the composition of local sediments in the absence of historical operations at the Centredale Manor property. The Reference Areas were sampled as a conservative measure to evaluate the less likely pathways of contaminant migration.

Methods

Polychlorinated dibenzo-p-dioxins (PCDDs or dioxins) and polychlorinated dibenzofurans (furans or PCDFs) are two families of chemical compounds that are produced simultaneously. Patterns of PCDDs and PCDFs (PCDD/DF fingerprints) are often indicative of the process that generated them. Consequently, the PCDD/DF fingerprints can be compared between candidate source and release areas to determine the origin of these compounds in the environment. This pattern matching approach typically improves in proportion to the number of PCDD/DF congeners measured as part of a forensic investigation.

There are 75 PCDD and 135 PCDF congeners. Of these, toxicologists identified 7 PCDDs and 10 PCDFs toxic congeners (U.S. EPA, 1995). The most toxic PCDD/DF congener is 2,3,7,8-TCDD (U.S. EPA, 1995). The relative toxicity of these congeners can be estimated by multiplying each toxic congener by its toxicity equivalent factor (TEF). The products of this calculation are added together to determine the toxicity equivalent (TEQ) of 2,3,7,8-TCDD (U.S. EPA, 1987). This study employed two primary measures of dioxins and furans (i.e., TEQ and toxic PCDD/DF isomers) based on the project objectives as discussed below.

The historical manufacture of hexachlorophene was reported within the Source Area. It was produced by reacting of raw materials such as 2,4,5-trichlorophenol and 2,4,5-trichloroaninsole and used as an additive for antibacterial soap and cosmetics (Archer and Crone, 2000). In addition to the co-generation of dioxins and furans, the manufacture of hexachlorophene produced 1,2,4,5,7,8-Hexachloro(9h)xanthene (HCX) in widely varying amounts depending on the reaction conditions of the manufacturing process (Archer and Crone, 2000). The high variability of the manufacturing process prevented the use of source ratios, such as HCX:2,3,7,8-TCDD, for the reliable identification of hexachlorophene byproducts. Consequently, previous investigators recommended the use of detected levels of HCX to identify residues of the hexachlorophene manufacturing process (Archer and Crone, 2000).

Since Fall 1998, EPA collected 1,400 sediment and soil samples for dioxins and furans in multiple sampling efforts. The TEQ was determined for all of these samples. Data were available for only the most toxic dioxin congener (2,3,7,8-TCDD) in approximately 1360 samples and individual toxic congeners plus HCX in approximately 550 samples. In addition, EPA collected more than 400 sediment and soil samples for the measurement of chlorinated pesticides and more than 700 sediment and soil samples for the measurement of polychlorinated biphenyls (PCBs) as Aroclors. Only 181 samples were tested for all of these chlorinated compounds. Wherever possible, all of the data were used for this interpretation; however, subsets of samples with more numerous measured compounds provided the great value for the source identification objective as evidenced in the results section below.

The analytical methods are described in greater detail in the work plans for each sampling effort (see summary in Battelle, 2005). The Centredale database indicated that most dioxin analyses were conducted following EPA Methods 8290 or 1613B (modified) (U.S. EPA, 1986). In general, PCDD and PCDF compounds (Table 1) were measured using a gas chromatograph equipped with a high resolution mass spectrometer (GC/HRMS). Some samples collected in February, 1999 were analyzed for 2,3,7,8-TCDD by a GC equipped with a low resolution mass spectrometer (GC/LRMS) according to EPA Method 8290. Table 2 lists the chlorinated pesticides and polychlorinated biphenyls (PCBs) that were measured using a gas chromatograph equipped with an electron capture detector (GC/ECD) following EPA Methods 8081A and 8082, respectively (U.S. EPA, 1986). Selected samples were also measured for total organic carbon (TOC) in accordance with EPA Method 9060 (U.S. EPA, 1986).

Detailed chemical analysis of chlorinated organic compounds provides a substantial amount of numerical data. In order to present this data in a meaningful manner, we use a variety of visual, graphical and statistical techniques to explain the compositional relationships. Largely, we rely upon three methods of data presentation in this report. These include:

- Data tables that depict frequencies of detection and concentration summaries.
- Scatter Plots that depict the concentrations of important and related hydrocarbons in samples in a format amenable to establishing qualitative or quantitative correlations.
- Parametric Pearson and Nonparametric Kendall Correlations[1]

[1] The relationships between total PCDD/DFs, PCBs, pesticides, and organic carbon were examined using two types of correlation coefficients: Pearson correlations (parametric) and Kendall correlations (nonparametric). The Pearson correlation coefficient measures the degree to which two variables have a linear relationship if the variables have normal distributions. Normality could occur in untransformed or logarithmically transformed data. The Kendall correlation, on the other hand, measures the degree to which high concentrations of one variable are associated with high concentrations of the second variable. Kendall correlation coefficients are calculated by subtracting the number of discordant pairs of

- Score and loading generated by a chemometric technique known as principal components analysis[2] (PCA).

Whenever possible, color coding and symbols will be used to illustrate the most relevant compositional features.

Results and Discussion

The identification of likely sources for dioxins, furans, pesticides and PCBs is complex and benefits from a tiered approach. This section begins with a large scale view of closely associated contaminants. Thereafter, the macro trends are evaluated on a sample specific basis. The summary section closes with a site conceptual model that helps unify the data interpretation.

General Patterns

The distributions of target analytes in the Upstream Background area were used as reference values to help identify contamination in the study area. We evaluated the central tendency of each location relative to the Upstream background primarily in terms of the median (Table 3). In addition, the Proportional Hazard test[3] helped identify sampling locations in which the analyte concentration in sediment was statistically greater than the background samples from the Upstream portion of the study area. Soil data were not compared to background due to differences in exposure pathway scenarios. Specific exceedances are discussed by analyte group.

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observations in a sample from the number of concordant pairs of observations and dividing by the total number of pairs of observations.

[2] Principal Component Analysis (PCA; Pirouette, Version 3.02, Infometrix, Seattle, WA) is a factor analysis method that generates new independent variables (i.e. factors) that are linear combinations of the original input variables (e.g., chemical concentrations). This method reduces the dimensionality of the data to a few important "principal components" (axes) that best describe variations in the data. The first axis (1st PC) demonstrates the most prominent trend and successive axes (2nd PC, 3rd PC, etc.) demonstrate additional trends in decreasing order of importance. Prior to PCA, non-detected analytes are set to zero to isolate compositional trends among detected analytes. (Other substitution (e.g., 1/2 detection limit) scenarios yield comparable results with less compositional resolution - see project file). While data normality is not required for this technique, the chemical concentrations are log-transformed and Z-scaled to reduce the effect of widely varying concentrations between samples and between individual analytes. The primary objective of the PCA conducted for this study was to aid in the classification of field samples based on their chemical similarities or differences, without any pre-classification as to their nature/source(s). In this report, the results of a PCA are presented using 2-dimensional factor score and loading plots.

[3] The Proportional Hazard test (i.e., modified Kaplan Meier) is a non-parametric test to determine if the sediment concentrations were statistically different than the upstream background at the 95% confidence limit. See Appendix A for details on the use of all statistics.

- Dioxins
  The analytes 2,3,7,8-TCDD and HCX were greater than background in Allendale Pond sediments, Lyman Mill Pond sediments, Manton Pond sediments, and Downstream sediments (Table 3). By inspection of the sample specific data, the concentration of 2,3,7,8-TCDD was higher in Allendale Pond and Lyman Mill Pond sediments than Source soils. We speculated that this pattern resulted from either 1) the gradual erosion of contaminants from the source area to the proximal sediments, or 2) the direct discharge of dioxin-containing byproducts into the proximal water body during the manufacture of hexachlorophene. It was not possible to definitively determine the dominant transport process with the available data. However, we believed that the higher concentration of PCDD/DFs in Allendale Pond, not the Source Area, helped identify the initial point of discharge. In addition, the long migration path from Allendale Pond to the Downstream sediments was consistent with a manufacturing discharge in which the contaminants were not adsorbed to heavy soil particles capable of retarding movement.

  The sediment concentrations of 2,3,7,8-TCDD generally decreased hydrologically down gradient through Lyman Mill Pond, Manton Pond and Downstream sediments. Interestingly, this washout pattern was not as clearly observed for the hexachlorophene marker HCX. Rather, HCX exhibited relatively high concentrations in Manton Pond in relation to Lyman Mill Pond. However, varying relative amounts of 2,3,7,8-TCDD and HCX were consistent with hexachlorophene byproducts observed in previous investigations (Archer and Crone, 2000). Accordingly, moderate to high levels of 2,3,7,8-TCDD coincided with detected concentrations of HCX. The co-detection of these two compounds linked the source of this material to the hexachlorophene manufacturing process.

  The dioxins other than 2,3,7,8-TCDD were not significantly higher than Upstream background sediments. Indeed, they were below the background levels in the Downstream and Assapumpset sediments (Table 3).

- Furans
  The origin of furans was less clear. The furans were not greater than the Upstream background sediment concentrations in the Source soils, Allendale Pond Soils, and Lyman Mill Pond Soils. Like 2,3,7,8-TCDD, however, the highest furan concentrations occurred in Allendale Pond sediments. Unexpectedly, two HxCDF isomers were significantly greater in Manton Pond when compared to the Background sediments. In fact, the central tendency of these isomers in Manton Pond were also greater than Allendale Pond. The reason for the elevated levels of these analytes was not evident in these data. It

is possible that elevated levels of PCDFs relative to PCDDs was a feature of off-site furan sources distinct from background. On the whole, however, the initial data indicated a high degree of variability in the furan pattern. This variability may indicate 1) variable manufacturing processes for hexachlorophene or 2) multiple PCDF sources.

- PCBs
  Aroclor concentrations above background were not as spatially widespread as 2,3,7,8-TCDD (Table 3). Unlike dioxins and furans, the PCBs were largely restricted to the Source Area soils. The maximum concentrations of total Aroclors in Source Area Soils were substantially higher than the Allendale Pond Sediments (Battelle, 2005). The high frequency of Aroclor 1254 detections in the Source Area mirrored the detection frequency in Allendale Pond. Although measured in high concentrations in selected Source Area soils, other Aroclors like 1232, 1242, and 1248 appeared to be spatially limited based on the frequency of detects. These Aroclors also exhibited higher concentrations of totla PCBs in Source Area soils relative to Allendale Pond sediments. The presence of Aroclor 1248 above background in Lyman Mill Pond sediments were unexpected given the low levels measured in Allendale Pond relative to Aroclor 1254. The isolated detections of Aroclor 1242 in the Downstream sediments were most likely caused by local releases. Evidence for the common use of Aroclor 1242 in the region was found in the soils proximal to Lyman Mill Pond.

- Pesticides
  The central tendency of pesticides was variable (Table 3). One of the most commonly detected pesticides in soils and sediments were members of the DDT breakdown series (e.g., 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE). We attributed the concentrations in Allendale Pond to the Source Area. However, soils proximate to Lyman Mill Pond could have impacted sediments in Lyman Mill Pond, Manton Pond, and Downstream locations. Other commonly detected pesticides included the chlordane series (alpha-chlordane, gamma-chlordane, and technical chlordane). Like the DDT series, high levels of chlordanes and heptachlor contamination in Allendale Pond sediments was attributed to the Source Area while down gradient contamination was linked to landside activities in the soils proximate to Lyman Mill Pond. The shared distribution of chlordanes and heptachlor was consistent with the common practice of blending them before application.

  Many pesticides were detected less frequently than DDT and chlordane in the sediments samples (Table 3). Dieldrin was detected in approximately half of the Source Area soils at high levels compared to other sampling locations. The concentrations declined gradually through Allendale Pond and Lyman Mill Pond and eventually reached non detected levels in Manton Pond. Local use of dieldrin was credited for low levels of dieldrin detected in soils proximate to

Allendale Pond and Lyman Mill Pond. This activity likely contributed to the background screening levels of dieldrin.

The breakdown series of endrin (endrin, endrin aldehyde, and endrin ketone) and endosulfan (endosulfan I, endosulfan II, and endosulfan sulfate) were more concentrated and less degraded (e.g., lower levels of endrin aldehyde, endrin ketone, and endosulfan sulfate) in the Source Area. By inspection of the sample specific data, the concentrations of endrins and endosulfans declined in the sediments with distance from the Source Area. The declining concentration of these compounds corresponded to the increasing abundance of the breakdown products relative to the parent material. However, sediment impacts from activities proximal to Allendale Pond and Lyman Mill Pond were also likely sources endrin and endosulfan compounds. Higher levels of endosulfan sulfate and endrin ketone were detected in two Downstream sediment samples. These compounds are attributed to the breakdown of endosulfan and endrin, respectively, and possibly linked to soils from the Source Area or soils proximate to Allendale Pond and Lyman Mill Pond.

The remaining pesticides exhibited concentrations well within the range of background. These pesticides included aldrin, BHCs, endosulfan I, heptachlor epoxide, methoxychlor and toxaphene.

- Clean Area
  Assapumpset Pond sediments were consistently below the background screening levels for all measured analytes. No impacts were observed in this reference area. Indeed, these sediments contained lower levels of target compounds than the Upstream background sampling locations.

Correlations

We evaluated mathematical relationships among the classes of target analytes to determine if the contaminants generally shared an origin or behaved similarly in the environment.

- PCBs v Dioxins and Furans
  The measured values for TEQ and total PCBs (TPCBs) were poorly correlated (Parametric Pearson Correlation was 0.27435 at $p < 0.0001$ and Nonparametric Kendall Correlation was 0.17569 at $p < 0.0001$) (Figure 2a). High levels of TEQ did not necessarily correspond to high levels of TPCBs. As noted previously, the highest levels of 2,3,7,8-TCDD resided in Allendale Pond sediments while the highest levels of PCBs existed in the Source Area. The independent distributions of these compound classes possibly indicated different release histories. For example, the dioxin and furan wastes associated with the production of hexachlorophene may have been directly discharged to Allendale

Pond while PCB residuals from drum refurbishing activities may have been initially discharged within the Source Area.

- PCBs v TOC
  Similarly, TOC and TPCBs were poorly correlated (Parametric Pearson Correlation was 0.31530 at $p = 0.0007$ and Nonparametric Kendall Correlation was 0.14036 at $p = 0.0277$) (Figures 2a and 2b). Again, high levels of TOC did not necessarily correspond to high levels of TPCBs. We attributed the independent relationship between TOC and TPCBs to active local sources of organic carbon; e.g., degraded vegetation. Recent organic matter would not have the time or exposure history to become enriched in anthropogenic contaminants like PCBs.

- PCBs v Pesticides
  The measured values of TPCBs and total pesticides (TPEST) exhibited a fair correlation (Parametric Pearson Correlation was 0.71204 at $p < 0.0001$ and Nonparametric Kendall Correlation was 0.54683 at $p < 0.0001$) (Figure 2b). Higher levels of PCBs and pesticides often occurred together, especially in samples from the Source Area and Allendale Pond. Conversely, lower levels of pesticides and PCBs were observed in sediments from Lyman Mill Pond, Manton Pond, and Downstream locations. Factors that might adversely affect the correlation may include the high degradability of pesticides relative to PCBs. As noted previously, endosulfan and endrin breakdown products appeared in Downstream sediments. By contrast, the breakdown of Aroclors was not within the technical scope of this project. In addition, the local use of pesticides and release of PCBs would very likely occur independently. Consequently, these activities would not impact the sediments simultaneously. Indeed, we might expect the local application of pesticides to resemble chronic sediment impacts before the 1970's while the local PCB impacts might resemble acute releases from damaged electrical equipment into the 1980's.

Principal Components Analysis

A principal components analysis (PCA) provided a qualitative method for objectively observing compositional patterns on a sample specific basis. Loading factors for each analyte class (dioxins and furans, Aroclors, and pesticides) described the maximum compositional differences present in the field samples (Figures 3e, 4e, and 5e). The loading factors were used to generate score plots that graphically presented the compositional relationships among the samples. In general, proximal samples were chemically similar and distal samples were different. We plotted specific groups of samples in black to demonstrate how the mixtures of measured analytes varied by location, concentration, and depth. Finally, we approximated the compositional variability within the background signature by circling the Upstream sediment sample

with a dashed loop. By projecting the background footprint (dashed loop) onto the multiple copies of the scores plot, we illustrated the chemical similarity and differences between samples from each study area location, concentration, and depth. The implications of these associations are described below.

- Spatial Patterns of Dioxins and Furans
  The primary compositional differences among dioxins and furans were caused by changes in the abundances of PCDDs/PCDF isomers relative to HCX and less frequently detected isomers, like 1,2,3,7,8,9-HexCDF. These differences accounted for 70% and 7% of the variability in the dioxin and furan isomer data as represented by Factors 1 and 2, respectively (Figure 3e).

  We approximated the variance within the background signature by circling the samples collected from Upstream locations (Figure 3d). We projected this background footprint (dashed loop) onto other scores plots to highlight samples of similar composition by location (Figure 3), concentration (Figures 6a, 6b, and 6c), and depth (Figures 7a, 7b, and 7c). At the outset, we observed that many background samples plotted near the top of the background footprint indicating high abundances of HCX relative to other PCDDs and PCDFs (Figure 3d). This was unexpected given the intended use of HCX as a marker for the manufacture of hexachlorophene in the Source Area. If transport of HCX from the Source Area to the Upstream locations was unlikely, one might conclude that soaps and cosmetics containing hexachlorophene and HCX byproduct may have been widely used or discharged in this water shed. Indeed, a wastewater treatment plant capable of releasing HCX from soaps and cosmetics into the study area was located upstream in North Smithfield, RI. In summary, HCX might not be an exclusive indicator of PCDDs and PCDFs originating from the Source Area within the concentration range of background.

  Many samples collected from the Source Area resembled background compositionally (see looped samples in black in Figure 3a). However, a great many differed from background (see samples in black above and to the right of the dashed loop in Figure 3a). These samples generally contained higher levels of HCX and PCDDs consistent with the manufacture of hexachlorophene. By extension, samples from Allendale Pond plotting within the background footprint resembled background and samples above and to the right resembled the Source Area (Figure 3b). Other samples plotting to the lower right of the background footprint were slightly enriched in furans. The highest density of samples from Lyman Mill Pond plotted above and to the right of the background signature indicating likely impacts from the Source Area (Figure 3c).

  The soil samples proximal to Allendale and Lyman Mill Pond were highly concentrated within the background footprint (Figure 3f). However, the compositional diversity in these areas was greater than in the background

samples (see samples that plotted across the dashed line) and possibly explained the origin of furan enriched samples in the Allendale and Lyman Mill Ponds (see samples plotting to the lower right of the dashed line in Figures 3b and 3c). While many samples from Manton Pond and Downstream resembled background, several samples resembled the Source Area signature (see samples plotting above the dashed loop in Figures 3i and 3h). All of the Assapumpset samples fell within the background footprint and exhibited no perceptible influence from the Source Area (Figure 3g).

In summary, we identified three principal dioxin and furan signatures: a) samples containing background PCDDs and PCDFs fell within the dashed loop, b) Source Area patterns plotted within and above the dashed loop, c) local mixtures of dioxins and furans generally plotted within and to the lower right of the dashed loop. The overlap between the signatures of background, Source Area, and local soils was not discernable within the dashed loop. It was not possible to further refine the classification criteria using only the toxicologically significant dioxin and furan isomers.

- Concentration Patterns of Dioxins and Furans
  The greatest number of samples with concentrations of Total PCDDs and PCDFs (TPCDD/DFs) less than 500 ng/kg fell within the background signature (see high density sample cluster within the dashed loop of Figure 6a). However, some samples in this concentration range exhibited some influence consistent with the Source Area (see samples plotting above the dashed loop in Figure 6a). Greater compositional diversity appeared in the TPCDD/DF concentration range of 500 to 12500 ng/kg (Figure 6b). Samples plotting above the dashed loop exhibited an influence from the Source Area while samples plotting to the lower right exhibited an influence from soils proximal to Allendale and Lyman Mill Ponds (see samples plotting above and to the lower right of the dashed loop in Figure 6b, respectively). Predictably, the compositional features of samples with the highest levels of TPCDD/DFs were most consistent with the Source Area and soils proximal to Allendale and Lyman Mill Ponds (Figure 6c). The lack of overlap between the samples with the highest TPCDD/DF concentration and background indicated a clear compositional distinction between background and local dioxin and furan sources (notice the near absence of samples in black within the dashed loop of Figure 6c).

- Vertical Distribution of Dioxins and Furans
  The dioxin and furan pattern was most diverse in the top 2 feet (Figure 7a). The surface pattern penetrated into the 2-6 foot interval and suggested some form of disturbance of the applicable Source Area soils and a few Allendale Pond sediments (Figure 7b). The deeper samples (greater than 6 feet) were overwhelmingly from the Source Area and consistent with background (samples generally contained within the dashed loop in Figure 7c). Some Source Area

samples below 6 feet appeared to have a mixture of background and surficial PCDD/DF contamination (see samples that plotted along the top of the dashed loop in Figure 7c). These data indicated that soil and sediments from the deeper sediments contained dioxins consistent with background that mixed with hexachlorophene related contamination in more surficial samples. The likely mechanisms of mixing in the surficial soils may have been drum burial or filling activities. The possible mechanisms of mixing in the sediments were storm events and bioturbation.

- Spatial Patterns of PCB Aroclors
  PCB Aroclors were fairly similar over the study area. The samples commonly contained mixtures of AR1254 with lesser amounts of other Aroclors. Rare mixtures with high levels of AR1016 and AR1260 caused samples to plot high on the Factor 1 axis; high levels of AR1232 and AR1248 caused samples to plot high on the Factor 2 axis; and high levels of AR1221 caused samples to plot in the upper right hand quadrant (Figure 4e). Factors 1 and 2 accounted for 21% and 15% of the variability, respectively.

  Aroclor mixtures dominated by AR1254 comprised the primary background signature (Figure 4d). Again, we approximated the compositional features of background with a dashed loop and projected it on the copies of the scores plot. This reference point helped illustrate the widely variable Aroclor composition found in the Source Area (Figure 4a). As stated previously, samples plotting above the background footprint generally contained higher levels of AR1232 and AR1248 while samples plotting to the right contained higher levels of AR1016 and AR1260. Fortunately, these varying signatures were confined to the Source Area. Samples from Allendale and Lyman Mill Ponds were consistent with background (Figures 4b and 4c, respectively). Like the Upstream sediments (Figure 4d) and proximal soils (Figure 4f), a few samples from Allendale and Lyman Mill Ponds plotted towards the lower right perimeter of the background pattern (Figures 4b and 4c, respectively). We attributed this minor variability to background. The Aroclor composition of Manton Pond, Downstream, and Assapumpset Pond sediments compared very well with background (Figures 4i, 4h, and 4g, respectively).

- Concentration Patterns of PCB Aroclors
  The overwhelming majority of samples with less than 500 ug/kg TPCBs fell within the compositional range of the background samples (Figure 6d). Two samples from the Source Area (CMS-SS-4105 and -4110) plotted just above the dashed loop due to enriched levels of AR1268. Both of these samples were collected from the former tail race on the east side of the Source Area. A third sample (WRC-SD-2010) plotted in the upper right corner due to the presence of many Aroclors, including AR1221. At TPCB concentrations above 500 ug/kg, additional samples plotted outside the background signature footprint (Figures 6e

and 6f). These were rare mixtures isolated to the Source Area. Although most of the samples were compositionally consistent with background, the concentration of TPCB clearly indicates that they likely originated from the Source Area. Consequently, the identification of background PCBs truly relied on compositional features plus TPCB concentration.

- Vertical Distribution of PCB Aroclors
  The majority of samples in any given depth predominantly contained AR1254. However, alternate mixtures of Aroclors with significant concentrations of AR1232 were observed in the Source Area between 0 and 6 feet (see samples above the dashed loop in Figures 7d and 7e). Mixtures of AR1016 and AR1260 were observed in the Source Area from the surface to depths below 6 feet (see samples to the lower right of the dashed loop in Figures 7d, 7e, and 7f). It was not clear whether these deep PCB signatures resulted from downward contaminant migration, waste drum burial, or filling activities. Other Aroclor mixtures were limited to surficial releases within the top 2 feet of the site.

- Spatial Patterns of Pesticides
  Pesticides were frequently observed as mixtures commonly containing one or more members of the following analyte groups: chlordanes (aC, gC, and TC), endosulfan (ES1, ES2, and ES), and DDT (DDT, DDD, and DDE). Varying levels of DDE, DIEL, END, HEPT, BHC and others differentiated samples with less common pesticide mixtures (Figure 5e). However, in this PCA run, Loading Factors 1 and 2 accounted for only 16% and 10% of the variability, respectively. We concluded that the patterns of pesticides were actually more similar than different with a handful of notable exceptions discussed below.

  Background samples collected from Upstream locations contained a mix of chlordane, endosulfan, and DDT series analytes (Figure 5d). Source Area soils again demonstrated a greater diversity of pesticide mixtures, many with higher levels of DDE, DIEL, END, HEPT, BHC relative to the common chlordane-endosulfan-DDT analytes (see samples spilling over the right and lower sides of the dashed loop Figure 5a). For example, CMS-451-F plotted in the lower middle quadrant due to enriched BHC while CMS-419-B plotted in the lower right quadrant due to enriched DDE and EA. We observed a likely mixture of background and Source Area pesticides in the Allendale Pond samples where most samples matched background, but several samples plotted within a short distance above and to the to the right of the dashed line (Figure 5b). Samples from the Lyman Mill Pond that plotted to the upper right of the dashed loop (Figure 5c) most closely resembled the soil patterns proximal to Allendale and Lyman Mill Ponds (Figure 5f). The pesticide composition of Manton Pond, Downstream, and Assapumpset Pond sediments compared very well with background (Figures 5i, 5h, and 5g, respectively).

- Concentration Patterns of Pesticides
  The concentration pattern of pesticides followed the classic background to Source Area mixing model. Low concentrations of TPEST (< 50 ug/kg) plotted completely within the footprint of the regional background signatures initially defined by the samples collected from Upstream locations (Figure 6g). Samples with high concentrations (> 1250 ug/kg) of varying pesticides plotted outside the range of the background samples (see samples outside the dashed loop in Figure 6i). Samples of intermediate concentration (50-1250 ug/kg) plotted along a mixing gradient overlapping the right hand boundary of the dashed loop (Figure 6h). This pattern suggested that pesticides likely migrated on eroded soil particulates from upland soils into proximal Allendale and Lyman Mill Pond sediments.

- Vertical Distribution of Pesticides
  The surficial samples (0-2 feet) exhibited the greatest degree of compositional diversity (Figure 7g). However, pesticide residues from the Source Area locations near CMS-451-F and CMS-417-F contained moderate to high concentrations TPEST at depths ranging from 2 to 6 feet (Figure 7h). Pesticide signatures below 6 feet generally resembled background (Figure 7i) with the exception of CM-SO-SB02 from the Source Area. In summary, Source Area impacts were generally observed in the top two feet of Allendale Pond sediments, deeper sediments resembled background, a few Source Area locations contained moderate to high levels of pesticides below 2 feet and only one sampling location had moderate levels of pesticides below 6 feet.

Summary

The distributions of PCDD/DFs, PCB Aroclors, and chlorinated pesticides were complex. Based on concentrations alone, the influence of the Source Area appeared more extensive than it was when considering the assemblages of target analytes in signature groups. Some examples of the relationship between analyte concentration and compositional trends are presented below.

- High concentration and compositional diversity were characteristics that helped locate the primary source of fugitive materials in this study area. Compositional diversity was important as a marker of the historical manufacture of hexachlorophene, because the manufacturing process that co-generated PCDD/DFs was reported to be variable. Diversity was also characteristic of the drum refurbishing operation that presumably received chemical shipping and storage containers from numerous sources.
- For dioxins and furans, the highest concentrations and diversity was observed in Allendale Pond. Alternatively, diverse mixtures of high concentration PCBs and pesticides were largely confined to the Source Area.
- The hexachlorophene marker HCX was found throughout the study area with highest concentrations in Allendale Pond, Lyman Mill Pond, Downstream, and Source Area locations. The concentration of HCX fluctuated independently relative to dioxins, like 2,3,7,8-TCDD. This phenomenon was observed in previous studies and attributed to varying manufacturing processes for hexachlorophene. However, we identified low levels of HCX in many Upstream background locations. Consequently, we used HCX as a Source Area marker above background samples collected from Upstream locations. Accordingly, residues of the historical manufacturing of hexachlorophene extended down gradient from the site to approximately half of the Downstream sampling locations.
- We tracked the PCDD/DF fingerprint of the Source Area through Allendale Pond, Lyman Mill Pond, Manton Pond, and Downstream sediments using PCA largely based on the relatively high levels of PCDDs. This signature was most evident in the top 2-foot interval. These results complemented well the tracking of Source Area signatures with HCX.
- Low level PCDD/DF impacts were also observed in Allendale and Lyman Mill Ponds from landside activities that deposited dioxins and furans into the proximal soils.
- Relative to background, PCB mixtures dominated by AR1254 with minor amounts of other Aroclors likely migrated on soil particles into Allendale Pond. Below Allendale Pond, almost all of the PCB mixtures were indistinguishable from background.
- Source Area samples dominated by AR1016, AR1232, and AR1260 did not migrate directly off site. The spatially limited distribution of these signatures was attributed in part to the depth (frequently below 2 feet) at which they were

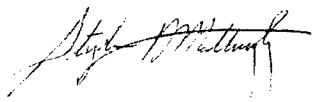
located. Relative to background, the slightly elevated concentration of AR1248 in several samples from Lyman Mill and AR1242 in a Downstream sediment was compositionally consistent with background.

- The pesticide background signature contained a mixture of chlordane, endosulfan, and DDT related compounds. The Source Area samples shared this basic formulation with numerous variations in the relative abundances of dieldrin, endrin, BHC and others. This chemical diversity was consistent with a drum refurbishing operation that received used drums from various sources.
- Many samples from Allendale Pond resembled Source Area pesticides mixed with background. While it was possible that Source Area pesticides reached Lyman Mill Pond, upland soils proximal to Lyman Mill Ponds more closely matched these sediments. Below Lyman Mill Pond, the sediment pesticide patterns were consistent with background.
- Assapumpset Pond sediments exhibited no chemical influence from historical activities at the Source Area based on concentration and compositional data.

A conceptual site model that helped explain the findings of this environmental forensic analysis included several parts. First, dioxins and furans were generated as hexachlorophene byproducts that were discharged directly into Allendale Pond. Second, the historical drum refurbishing operation likely washed pesticide and Aroclor residues into the Source Area soils. Third, surface soil erosion and sediment migration secondarily transported a fraction of the initial discharge into hydrologically down gradient locations. Fourth, surface soil erosion and upgradient discharges of background contamination established regional and local assemblages of selected target analytes that admixed and diluted the impacts from the Source Area. While 2,3,7,8-TCDD and HCX were likely conveyed from the Source Area to Downstream locations, the remaining Aroclor and pesticides were compositionally indistinguishable from background below Lyman Mill Pond.

Please do not hesitate to call me at (781) 681-5040 if you have any questions.

Sincerely,



Stephen Emsbo-Mattingly
Senior Scientist

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Table 1. Dioxin and Furan Target Analytes

Target Analytes	Abbreviation
Toxic Dioxin Congeners	
2,3,7,8-Tetrachloro dibenzo-p-dioxin	2,3,7,8-TCDD
1,2,3,7,8-Pentachloro dibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8,9-Hexachloro dibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,6,7,8-Hexachloro dibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,4,7,8-Hexachloro dibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,4,6,7,8-Heptachloro dibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
Octachloro dibenzo-p-dioxin	OCDD
Toxic Furan Congeners	
2,3,7,8-Tetrachloro dibenzofuran	2,3,7,8-TCDF
2,3,4,7,8-Pentachloro dibenzofuran	2,3,4,7,8-PeCDF
2,3,4,6,7,8-Hexachloro dibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,7,8-Pentachloro dibenzofuran	1,2,3,7,8-PeCDF
1,2,3,7,8,9-Hexachloro dibenzofuran	1,2,3,7,8,9-HxCDF
1,2,3,6,7,8-Hexachloro dibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,4,7,8-Hexachloro dibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,4,7,8,9-Heptachloro dibenzofuran	1,2,3,4,7,8,9-HpCDF
1,2,3,4,6,7,8-Heptachloro dibenzofuran	1,2,3,4,6,7,8-HpCDF
Octachloro dibenzofuran	OCDF
Miscellaneous Congeners	
Other PCDDs and PCDFs	PCDD/Fs
Summary Value	
Toxic Equivalent to 2,3,7,8-TCDD	TEQ
Total Toxic Congeners by Chlorination Level	
Total Tetrachloro dibenzo-p-dioxin	Total TCDD
Total Heptachloro dibenzo-p-dioxin	Total HpCDD
Total Hexachloro dibenzo-p-dioxin	Total HxCDD
Total Pentachloro dibenzo-p-dioxin	Total PeCDD
Total Tetrachloro dibenzofuran	Total TCDF
Total Heptachloro dibenzofuran	Total HpCDF
Total Hexachloro dibenzofuran	Total HxCDF
Total Pentachloro dibenzofuran	Total PeCDF
Manufacturing Byproduct	
1,2,4,5,7,8-Hexachloro(9h)xanthene	HCX

Table 2. Pesticide and PCB Aroclor Target Analytes

Target Analytes	Abbreviation
PCB Aroclors	
Aroclor-1016	AR1016
Aroclor-1221	AR1221
Aroclor-1232	AR1232
Aroclor-1242	AR1242
Aroclor-1248	AR1248
Aroclor-1254	AR1254
Aroclor-1260	AR1260
Aroclor, Total	TPCB
Pesticide Target Analytes	
4,4'-DDD	DDD
4,4'-DDE	DDE
4,4'-DDT	DDT
Aldrin	ALD
alpha-BHC	aBHC
beta-BHC	bBHC
delta-BHC	dBHC
gamma-BHC	gBHC
Dieldrin	DIEL
Endosulfan I	ES1
Endosulfan II	ES2
Endosulfan Sulfate	ES
Endrin	END
Endrin Aldehyde	EA
Endrin Ketone	EK
alpha-Chlordane	aC
gamma-Chlordane	gC
Technical Chlordane	TC
Heptachlor	HEPT
Heptachlor Epoxide	HE
Methoxychlor	M
Toxaphene	TOX
Total Pesticides	TPEST

Table 3. Summary of Target Analyte Concentrations by Location

PARAMETER	Source Area Soil[a] n	% Det	Median[b]	Allendale Sediment n	% Det	Median[b]	PH[c]	Allendale Soil[a] n	% Det	Median[b]	Lyman Mill Sediment n	% Det	Median[b]	PH[c]	Lyman Mill Soil[a] n	% Det	Median[b]	Manton Sediment n	% Det	Median[b]	PH[c]	Downstream Sediment n	% Det	Median[b]	PH[c]	(Reference) Assapumpset Sediment n	% Det	Median[b]	PH[c]	(Background) Upstream Sediment n	% Det	Median[b]
Polychlorinated Dibenzodioxins (PCDDs ng/kg dry)																																
1,2,4,5,7,8-hexachloro(9h)xanthene	75	89	126	74	89	678	H	9	44	2.28	63	79	549	H	112	42	8.77	10	100	259	H	15	60	345	H	3	33	17.2	NA	28	50	135
2,3,7,8-TCDD	744	69	101	296	97	1590	H	50	86	22.4	82	99	718	H	127	87	6.3	13	100	190	H	15	93	120	H	5	60	3.4	NA	27	52	2.1
1,2,3,7,8-PeCDD	113	63	1.1	148	73	6.3	-	33	48	1.1	75	79	4.75	-	117	56	1.1	13	62	2.16	-	15	40	1.6	-	5	20	1.1	NA	27	56	2.66
1,2,3,7,8,9-HxCDD	113	73	2.58	149	83	21.7	-	33	67	1.46	75	83	11.8	-	117	63	2.3	13	92	8.1	-	15	87	5.2	-	5	20	2.3	NA	28	79	15.9
1,2,3,6,7,8-HxCDD	113	79	3.32	148	80	27.2	-	33	64	2.04	73	90	15.7	-	117	64	1.9	13	92	12.2	-	13	92	6.95	-	5	40	3.04	NA	26	92	15.2
1,2,3,4,7,8-HxCDD	113	65	0.89	149	72	6.95	-	33	79	1.13	75	73	4.2	-	117	64	1.15	13	62	4.85	-	15	40	1.4	L	5	20	1.15	NA	28	71	4.15
1,2,3,4,6,7,8-HpCDD	113	90	56.6	149	90	286	-	33	97	32.5	75	81	375	-	117	91	30.2	13	100	161	-	15	60	130	-	5	80	7.7	NA	28	75	195
OCDD	113	94	431	149	93	1620	-	33	100	256	75	84	1980	-	117	97	202	13	100	522	-	15	40	652	-	5	60	181	NA	28	71	788
Polychlorinated Dibenzofurans (PCDFs ng/kg dry)																																
2,3,7,8-TCDF	113	85	3.43	149	89	14.5	-	33	88	3.4	75	87	11.9	-	117	68	2.8	13	77	11.2	-	15	80	5.83	-	5	60	0.605	NA	28	82	6.84
2,3,4,7,8-PeCDF	113	79	2.9	149	79	10.7	-	33	82	4.12	75	81	5.89	-	117	68	1.2	13	69	6.7	-	15	73	1.63	-	5	20	2	NA	28	71	4.52
2,3,4,6,7,8-HxCDF	112	76	3.04	148	73	15.4	-	33	97	4.1	71	83	7.8	-	117	80	2.16	13	69	7	-	13	77	2.51	L	5	40	2.16	NA	26	85	7.46
1,2,3,7,8-PeCDF	106	59	1.1	145	80	5.1	-	33	79	1.76	72	83	4.5	-	117	69	1.75	13	54	3.7	-	12	67	1.91	-	5	0	3.04	NA	25	72	3.43
1,2,3,7,8,9-HxCDF	111	41	0.845	139	47	2.21	-	33	70	1.22	65	31	1.37	-	117	26	1.25	13	46	2.68	-	6	17	7.7	NA	5	20	1.25	NA	21	33	1.25
1,2,3,6,7,8-HxCDF	113	79	2.3	139	91	21.9	-	33	94	2.8	71	87	9.34	-	115	72	1.47	13	54	15.6	H	13	92	3.2	-	5	20	2.1	NA	24	88	13.3
1,2,3,4,7,8-HxCDF	112	83	3.76	146	84	20.9	-	33	88	2.88	71	87	16.1	-	117	63	3.08	13	62	21	H	12	83	4.1	-	5	20	2.5	NA	25	88	19.2
1,2,3,4,7,8,9-HpCDF	113	64	1.8	148	75	13.4	-	33	70	1.21	75	69	5.6	-	117	62	1.7	13	62	5.69	-	15	33	1.39	L	5	40	1.7	NA	28	79	4.77
1,2,3,4,6,7,8-HpCDF	113	88	13.7	146	95	190	-	33	100	15.2	75	89	123	-	117	84	11.5	13	100	50.6	-	15	73	28.4	L	5	60	8.02	NA	28	96	122
OCDF	113	83	26.6	144	85	286	-	33	100	18.1	74	80	166	-	117	97	15.2	13	100	201	-	13	46	39.7	-	5	80	10.7	NA	28	75	114
Polychlorinated Biphenyls (PCBs ug/kg dry)																																
Aroclor-1016	420	1	95	138	1	23	-	5	0	18.5	63	0	17.7	NA	41	0	23	13	0	5.08	NA	15	0	21.3	NA	6	0	5.08	NA	30	0	17.5
Aroclor-1221	420	0	90	138	1	41.5	-	5	0	37	63	0	18.5	-	41	0	46.5	13	0	2.11	-	15	0	43	-	6	0	2.11	NA	30	3	26
Aroclor-1232	420	1	90	138	1	23.5	-	5	0	18.5	63	0	17.7	NA	41	0	23	13	0	1.35	NA	15	0	21.3	NA	6	0	1.35	NA	30	0	17.5
Aroclor-1242	421	4	90	138	1	23	-	5	0	18.5	63	0	17.7	NA	41	2	23	13	0	4.64	NA	15	13	22.3	n	6	0	4.64	NA	30	0	17.5
Aroclor-1248	420	9	108	139	9	26.8	H	5	0	18.5	63	25	20.8	H	41	0	23	13	0	1.08	NA	15	0	21.3	NA	6	0	1.34	NA	30	0	17.5
Aroclor-1254	425	70	350	145	90	290	H	5	80	210	65	75	93	-	41	44	40	13	31	1.26	-	15	27	24	L	6	50	13.2	NA	30	67	120
Aroclor-1260	424	3	95	138	2	24	-	5	0	18.5	63	11	19	-	41	5	23	13	0	4.64	-	15	0	21.3	-	6	0	4.64	NA	30	7	18.5
Aroclor-1268	2	100	3180	12	100	62	NA	0	NA	NA	10	100	72.4	NA	8	50	14	2	100	16.5	NA	3	33	120	NA	2	100	23.1	NA	9	100	83.6
Chlorinated Pesticides (Pest ug/kg dry)																																
4,4'-DDD	144	24	2.35	91	30	2.15	-	5	20	1.85	63	29	2	-	41	32	2.55	13	23	0.095	-	15	87	3	-	6	33	0.152	NA	30	53	2.03
4,4'-DDE	148	57	5.75	97	46	27	NA	4	75	1.93	63	35	1.9	NA	41	59	5.2	13	31	0.069	-	15	73	3.6	-	6	33	0.069	NA	29	45	1.9
4,4'-DDT	145	14	2.45	92	27	2.05	NA	5	20	1.85	65	32	1.9	-	41	59	5.3	13	0	0.0525	L	11	73	6.3	-	6	33	0.547	NA	30	37	2.3
Aldrin	142	14	1.2	92	1	1	-	5	0	0.95	63	2	0.95	NA	41	2	1.2	13	0	0.107	-	15	7	1.08	-	6	0	0.107	NA	30	3	0.95
alpha-BHC	144	15	1.23	92	1	1	-	5	0	0.95	63	0	0.95	NA	41	0	1.2	13	0	0.184	NA	15	0	1.1	NA	6	0	0.184	NA	30	0	0.95
beta-BHC	144	18	1.6	89	3	0.975	-	4	25	0.95	62	0	0.95	NA	41	0	1.2	13	0	0.106	NA	15	0	1.15	NA	6	0	0.106	NA	28	0	0.9
delta-BHC	143	6	1.15	93	2	1	-	4	0	0.95	59	0	0.95	-	41	0	1.2	13	0	0.0865	-	15	0	1.1	-	6	0	0.0865	NA	30	3	0.9
gamma-BHC	144	8	1.2	92	3	1	-	5	0	0.95	62	3	0.95	-	41	0	1.2	13	0	0.074	NA	15	0	1.1	NA	6	0	0.0745	NA	30	0	0.95
Dieldrin	145	53	8	92	33	2.45	H	3	33	0.98	63	24	2	-	41	20	2.5	13	0	0.0535	-	14	29	2.2	-	6	33	0.118	NA	30	27	2.05
Endosulfan I	143	8	1.2	92	4	1	-	4	0	0.95	59	0	0.95	-	41	0	1.2	13	15	0.0675	L	15	7	1.1	-	6	0	0.071	NA	30	3	0.9
Endosulfan II	145	12	2.3	94	32	2.15	-	4	0	1.4	63	22	2.03	-	41	15	2.36	13	15	0.056	-	15	13	2.23	-	6	0	0.067	NA	30	10	1.85
Endosulfan Sulfate	143	23	2.9	90	10	1.95	-	4	25	1.4	62	6	1.55	-	41	17	2.35	13	0	0.068	-	11	9	2.1	-	6	0	0.214	NA	29	14	1.82
Endrin	144	19	2.2	92	7	1.95	-	5	0	1.85	63	5	1.48	-	41	0	2.3	13	0	0.059	-	15	7	2.1	-	6	0	0.275	NA	30	3	1.75
Endrin Aldehyde	145	26	2.6	92	9	1.9	-	5	20	1.85	59	0	1.39	NA	41	0	2.3	13	0	0.897	NA	15	20	2.13	H	6	0	0.854	NA	30	0	1.7
Endrin Ketone	110	21	2.6	90	6	1.9	-	1	0	1.85	57	0	1.27	-	41	10	2.35	13	0	0.065	-	9	11	2.05	NA	6	0	0.117	NA	30	10	1.7
alpha-Chlordane	109	37	3.2	91	56	2.8	-	3	67	1	66	59	3.8	-	42	57	3.17	13	23	0.06	-	15	47	1.2	-	6	33	0.06	NA	30	63	3.3
gamma-Chlordane	108	32	2.03	91	52	2.95	-	3	0	1.1	64	52	2.8	-	42	38	2.03	13	31	0.061	-	14	14	1.1	-	6	17	0.061	NA	28	50	1.94
Technical Chlordane	52	17	47.5	25	56	28.3	NA	2	0	9	11	91	992	NA	8	100	482	2	0	NA	NA	3	0	NA	NA	2	100	108	NA	9	89	355
Heptachlor	144	9	1.2	92	8	1	H	4	25	0.9	63	5	0.948	-	41	7	1.25	13	0	0.13	NA	15	13	1.05	-	6	0	0.13	NA	30	0	0.95
Heptachlor Epoxide	144	12	1.18	90	4	1	-	4	25	0.95	61	3	0.95	-	41	22	1.3	13	0	0.066	-	15	13	1.08	-	6	0	0.066	NA	30	7	0.95
Methoxychlor	129	11	11	96	13	9.5	-	3	0	1.85	62	5	1.51	-	41	0	12	13	0	0.075	-	12	0	10.5	-	6	0	0.625	NA	30	3	7.3
Toxaphene	144	1	115	92	1	38.5	-	5	0	95	63	0	36.9	NA	41	0	120	13	0	125	NA	15	0	120	NA	6	0	21.5	NA	30	0	80
Totals																																
Dioxin TEQ (ng/kg dry)	759	100	101	296	100	1600	H	68	100	40.1	82	100	725	H	143	100	15	13	100	191	H	15	100	132	L	5	100	3.9	NA	28	100	24.8
Aroclor, Total (TPCB ug/kg dry)	417	74	400	148	89	320	-	5	80	210	59	76	109	-	38	39	55	3	100	227		12	25	49.3		4	75	28.3	NA	30	67	169

(a) Statistical comparisons were only conducted on sediment data

(b) The median is the nonparametric method for estimating the central tendency of the distribution.

(c) PH = Proportional Hazard tests sediment results against Upstream Background concentrations at the 0.05 significance level.
Statistical comparisons were only conducted for chemicals with at least 10 observations in both the upstream and the "test" location.
"H" indicates that the chemical of concern is significantly greater than Background while "L" values are significantly less than Background.
"-" indicates that there is no significant difference in the chemical of concern between the Background and the "test" location.

NA, Not applicable.

Figure 1. Site Map

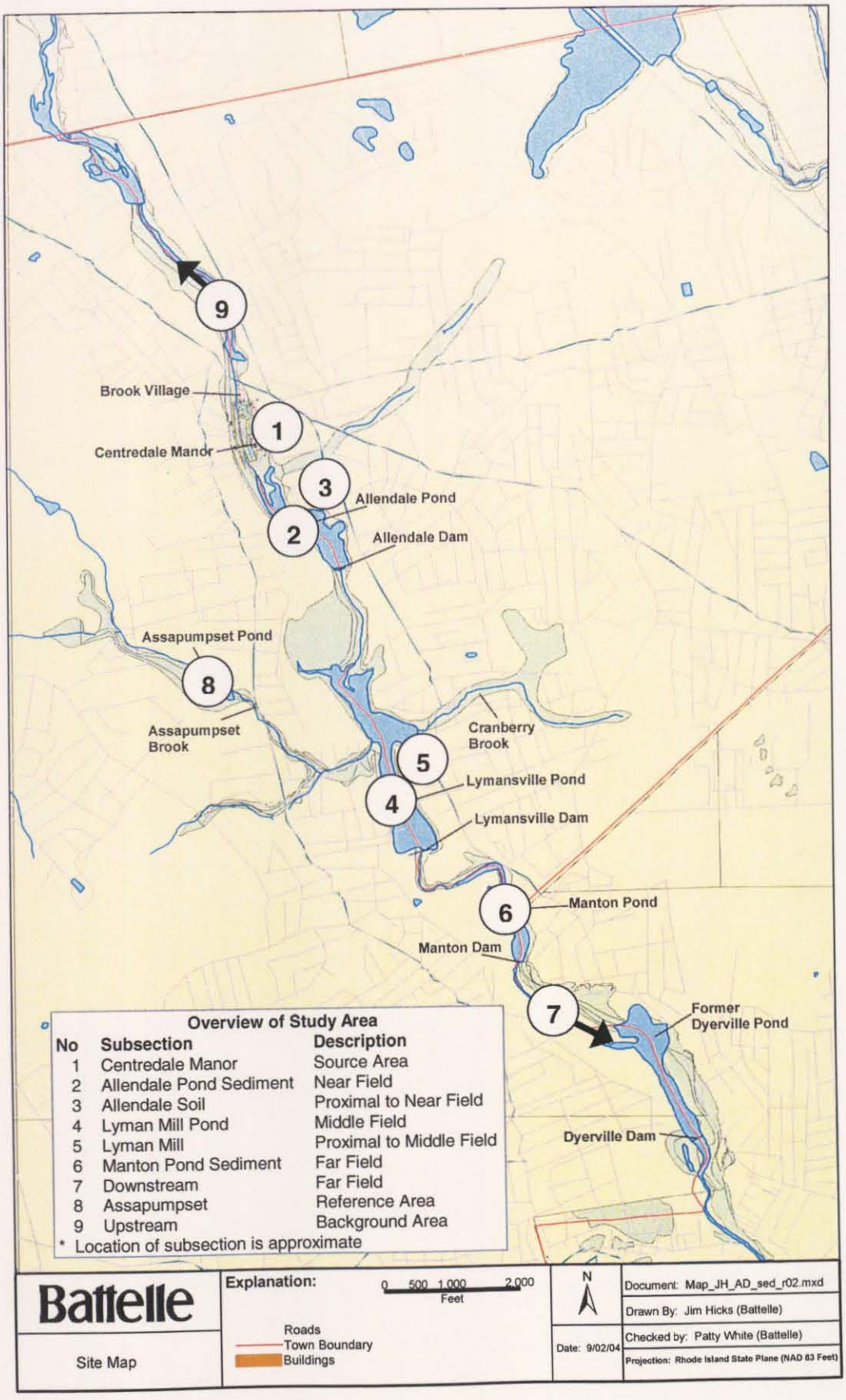
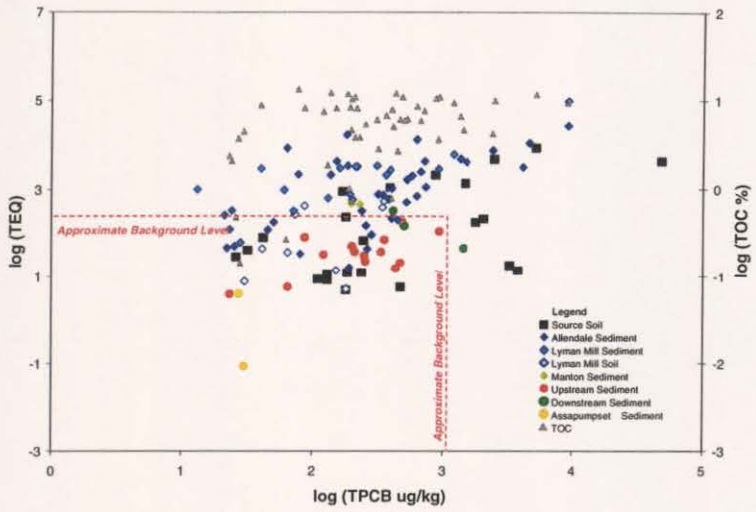


Figure 2. General Relationships of TEQ, Total PCBs, and Total Pesticides.

a. TPCB v TEQ

Dioxins (TEQ) were poorly correlated with PCBs (TPCB) and TOC. Many samples from the Source Area, Allendale Pond and Lyman Mill Pond were greater than the background samples collected from Upstream sampling locations (see samples that plot above and to the right of the cluster of red circles). Fewer samples from the Manton and Downstream areas were greater than the background samples.



b. TPCB v TPEST

A fair correlation existed between pesticides (TPEST) and PCBs (TPCB). Due to the relatively high levels of pesticides in the Upstream samples (see red circles ranging high on the y-axis), only a few samples from the Source and Allendale Pond areas were greater than background.

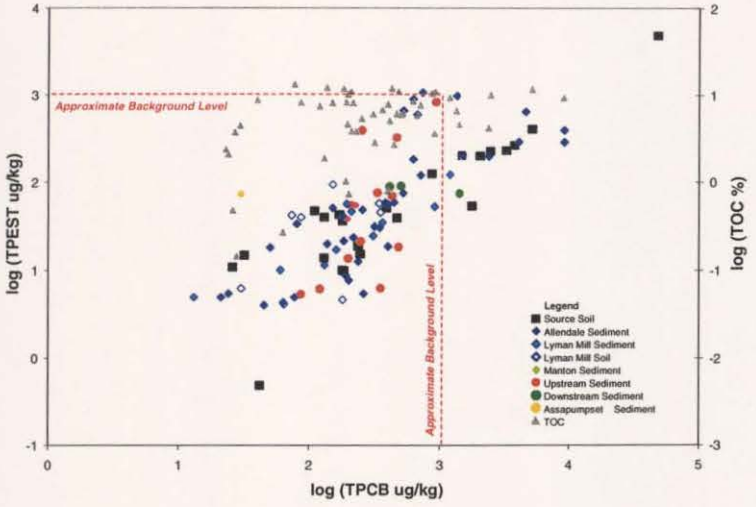
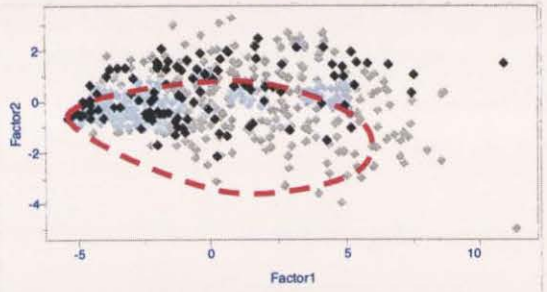
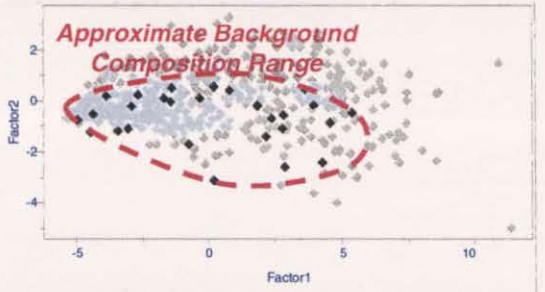


Figure 3. PCA Results for PCDD and PCDF Isomers

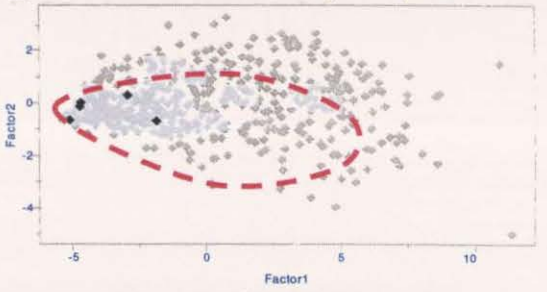
a. Score Plot: Source Soils



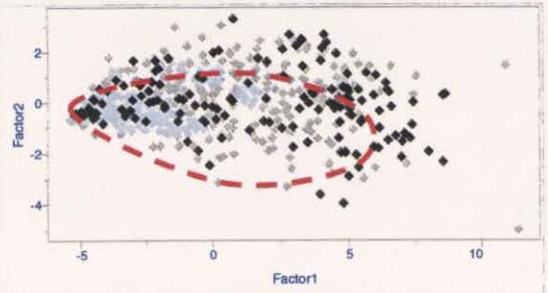
d. Score Plot: Upstream



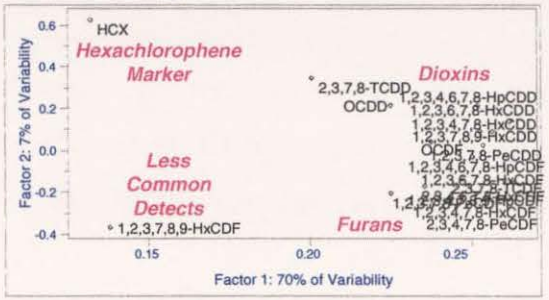
g. Score Plot: Assapumpset



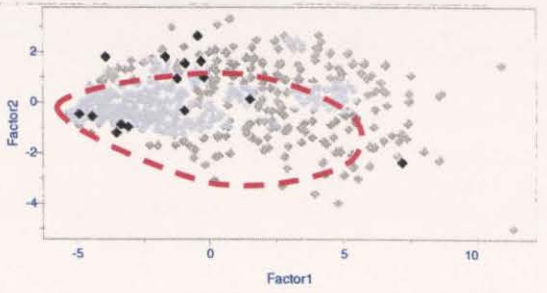
b. Score Plot: Allendale Seds



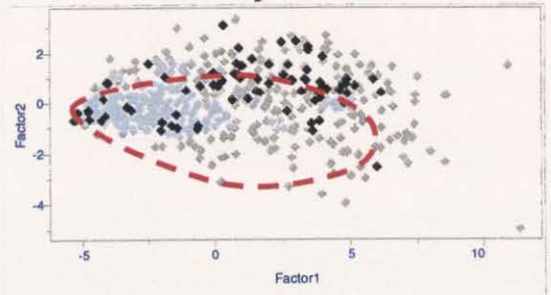
e. Loading Plot



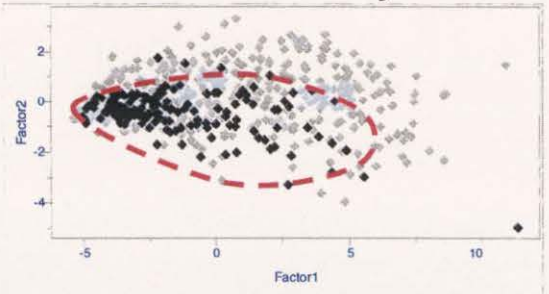
h. Score Plot: Downstream



c. Score Plot: Lyman Sediments



f. Score Plot: Allen & Lyman Soil



i. Score Plot: Manton Sediments

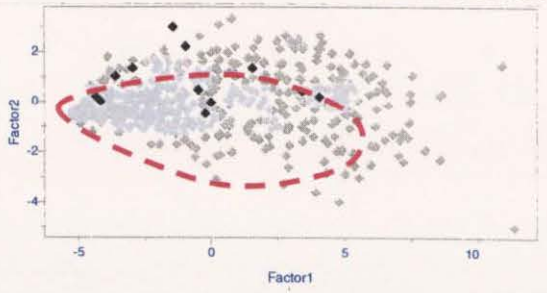


Figure 4. PCA Results for PCB Aroclors.

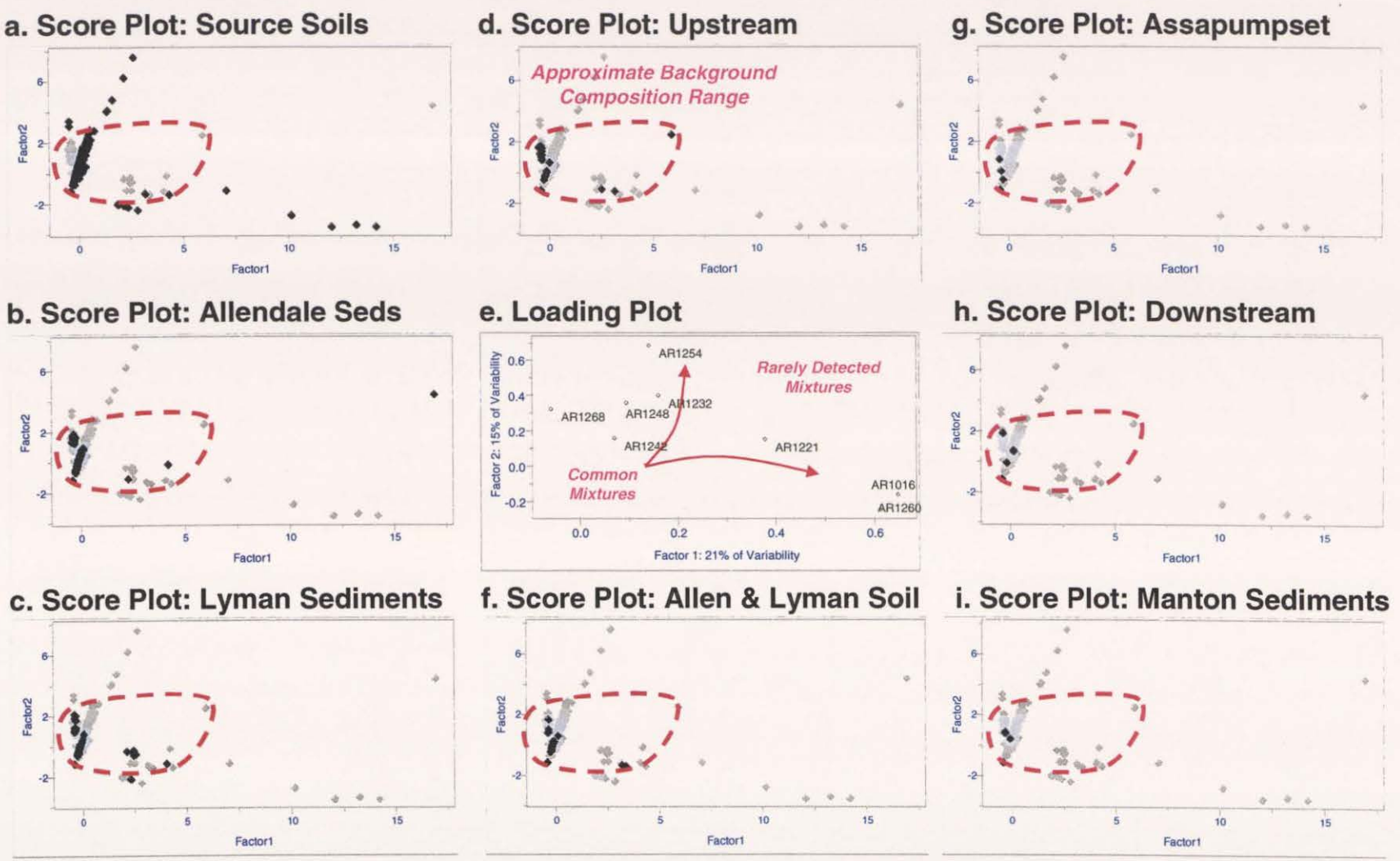


Figure 5. PCA Results for Pesticides.

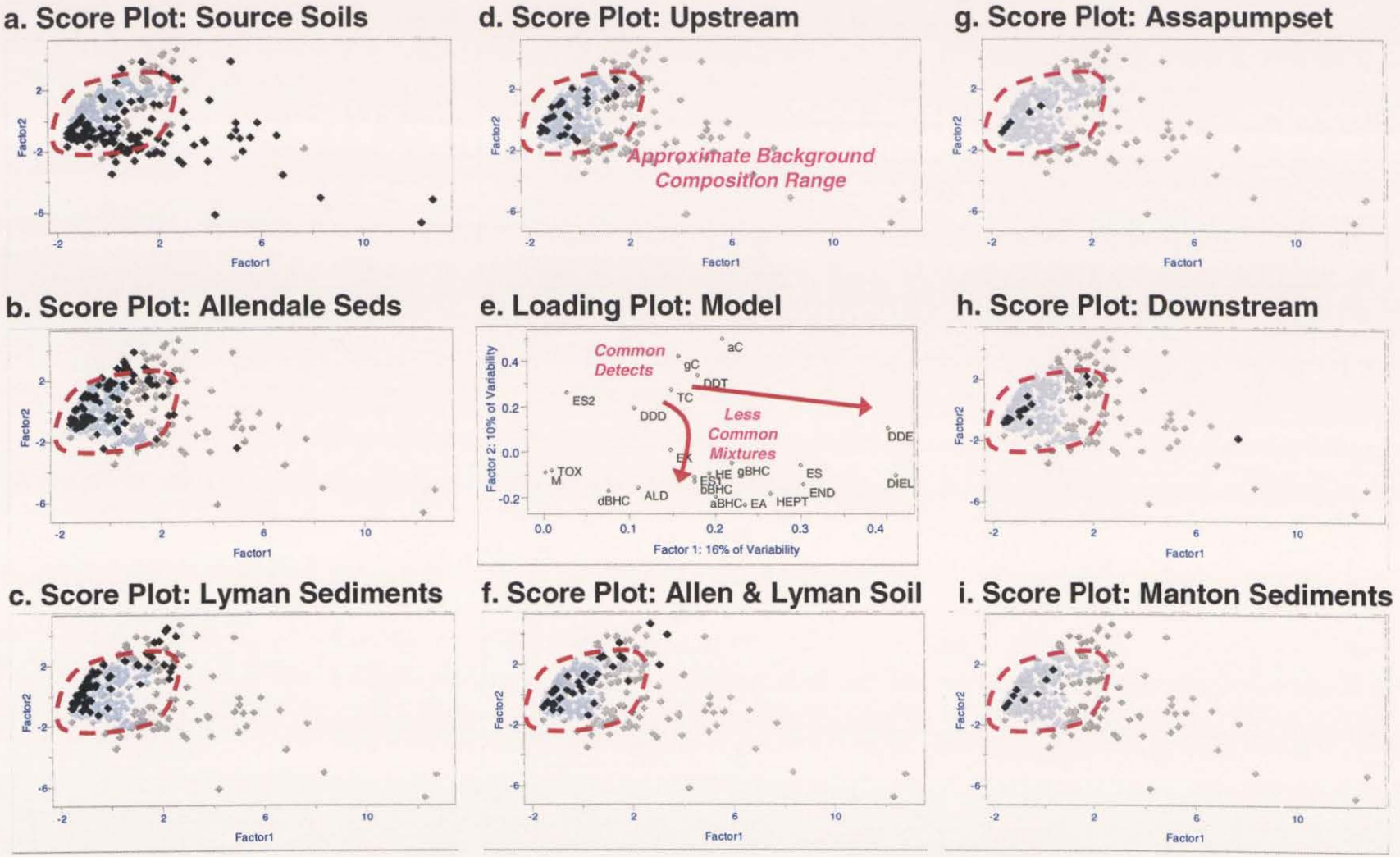


Figure 6. PCA Results by Concentration Range.

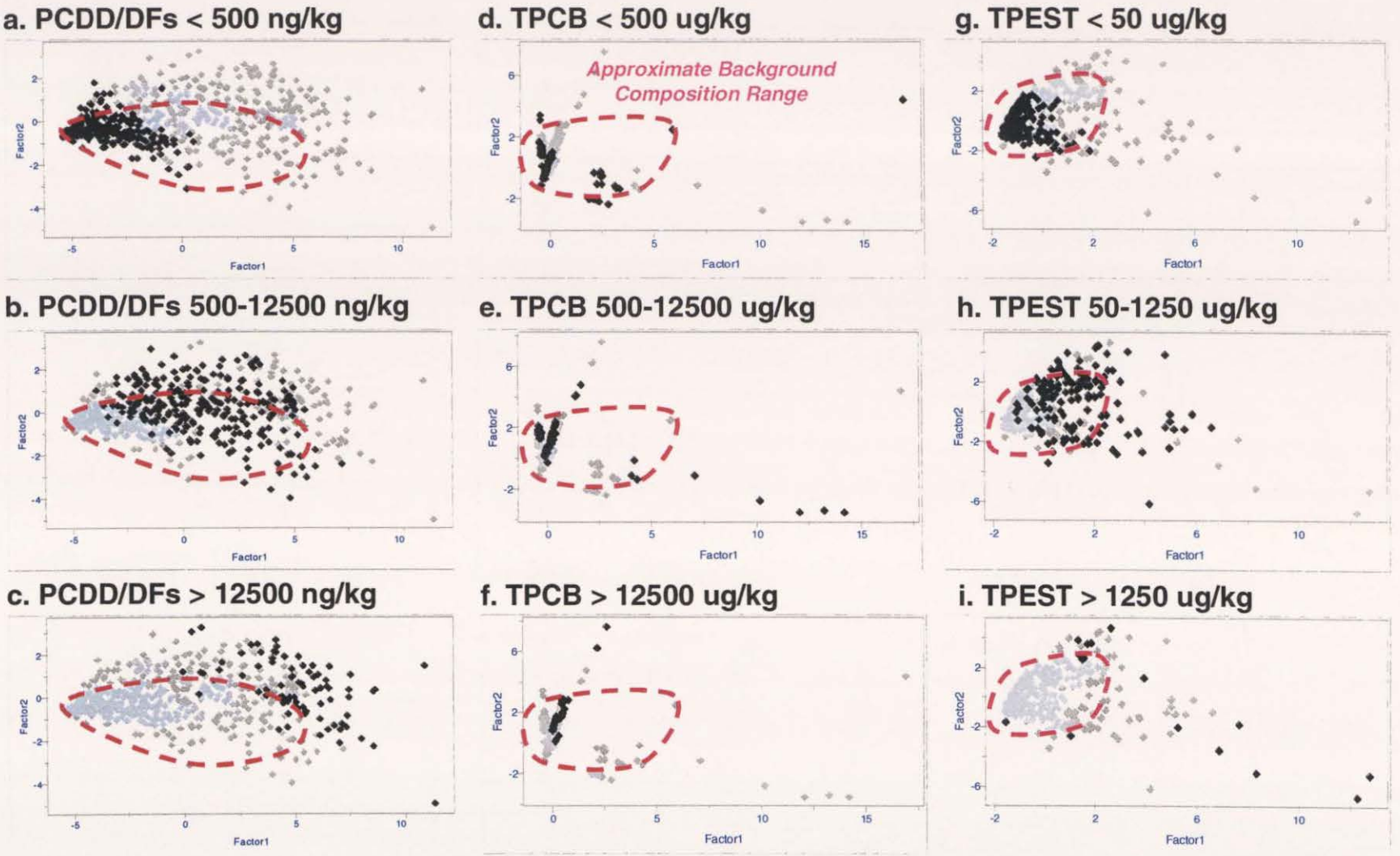
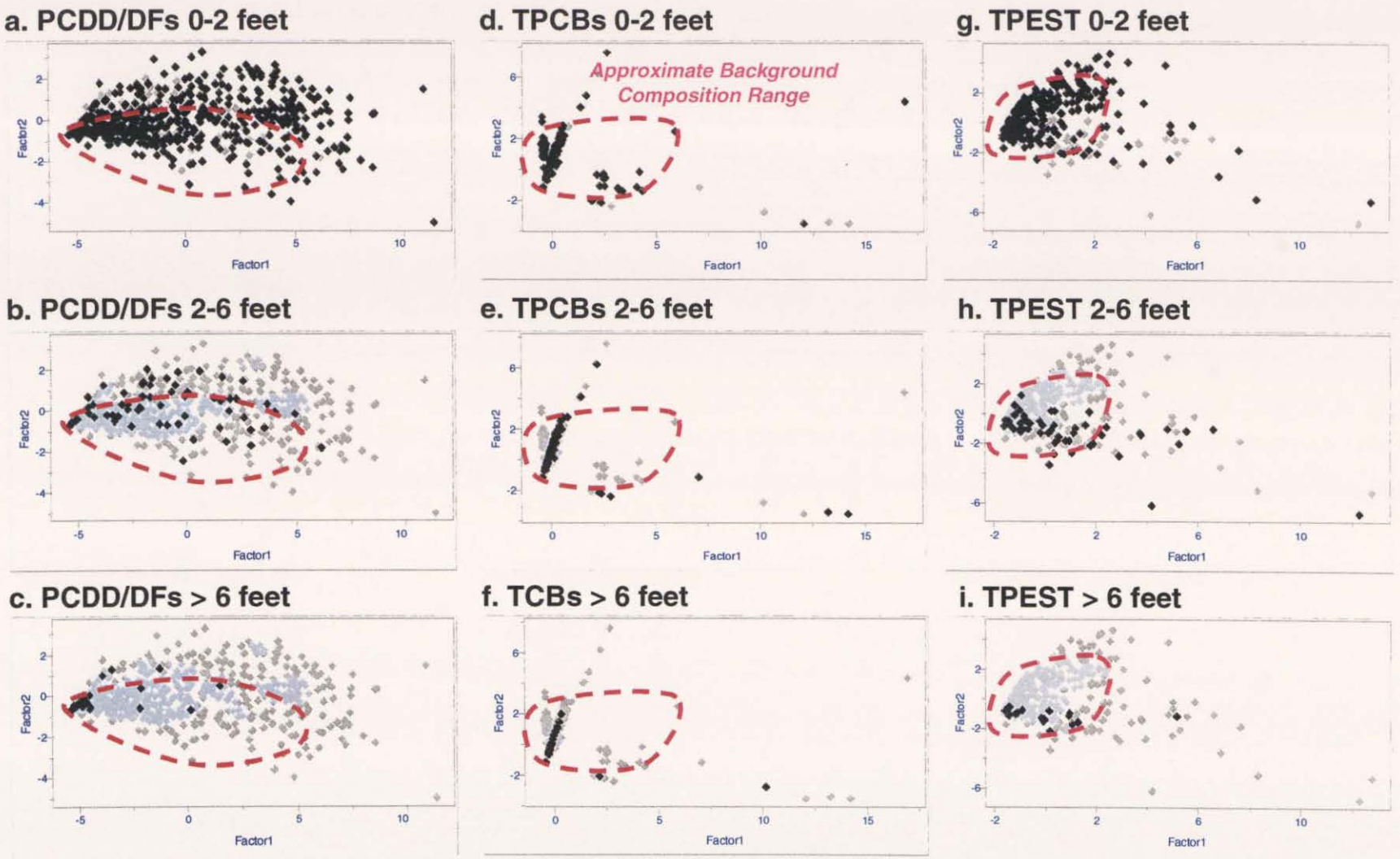


Figure 7. PCA Results by Sample Depth.



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