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TECHNICAL MEMORANDUM

MANTON AND DYERVILLE REACHES

SEDIMENT SAMPLING

CENTREDALE MANOR RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND

RESPONSE ACTION CONTRACT (RAC), REGION I

For
U.S. Environmental Protection Agency

By
Tetra Tech NUS, Inc.

EPA Contract No. 68-W6-0045
EPA Work Assignment No. 043-ANLA-016P
TtNUS Project No. N0400

January 2001

TETRA TECH NUS, INC.

SDMS DocID 25903

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Stephen S. Parker
Project Manager

for Arnold Ostrofsky
George D. Gardner, P.E.
Program Manager

DRAFT

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SEDIMENT SAMPLING
CENTREDALE MANOR RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND

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EXECUTIVE SUMMARY

This technical memorandum has been prepared to describe the tasks and information gathered during the investigations of the Woonasquatucket River downstream of Lymansville Dam performed by TtNUS in December 2000. This work was authorized by the U.S. Environmental Protection Agency (EPA) under work assignment 043-ANLA-016P, Contract No. 68-W6-0045.

This follow-on investigation was conducted to gather further understanding of the distribution of dioxins and other contaminants in the sediment of the Woonasquatucket River downstream of Lymansville. Studies performed in 1998 and 1999 indicated that dioxins were present at concentrations exceeding the action level of 1 ppb (TEQ) in the sediments of Allendale and Lymansville Pond. In 1999, elevated levels of dioxins were detected in a single sample collected on the downstream side of the Lymansville Dam. This was an indication that the still sound Lymansville dam was not providing a barrier for downstream migration of contaminants, as was believed by EPA.

Sediment samples were collected from 11 additional stations downstream of the Lymansville Dam, in the areas of Manton and Dyerville, in Providence. The results from this data was combined with data collected from six stations in 1998 and 1999, and the resulting data set showed only two locations out of a total of 16 where dioxins exceeded 1 ppb. These locations were limited to sample Station 2054, collected in 1999 immediately below the dam (4.61 ppb TEQ), and sample Station 2058 collected on the west side of Manton Pond, near an industrial facility (1.01 ppb).

These findings indicate that concentrations of dioxin decrease with distance downstream from the source area, and that Lymansville Dam is retaining much of the sediment with dioxin within Lymansville Pond.

1.0 PROJECT INTRODUCTION

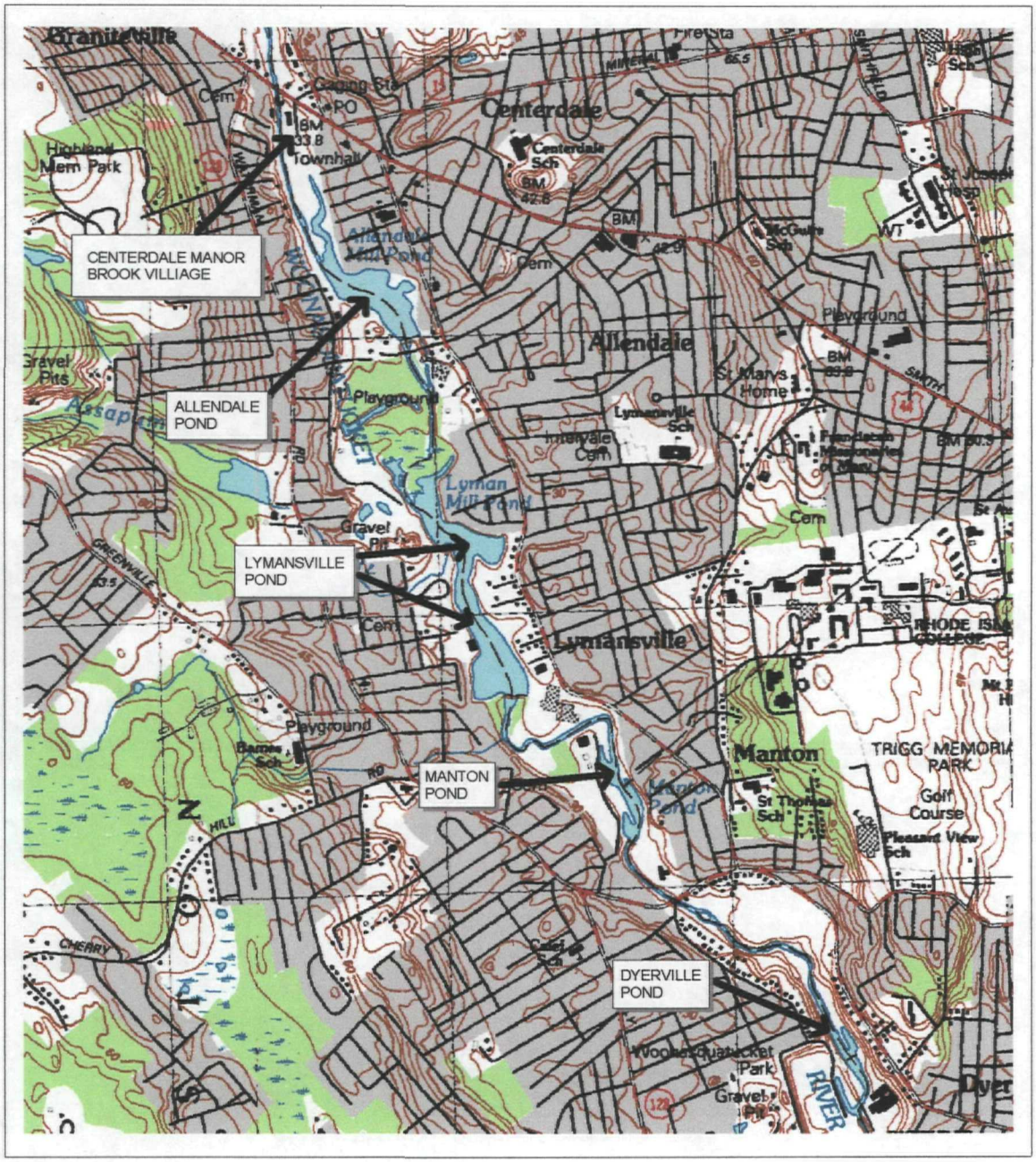
This Technical Memorandum report has been prepared to describe the sampling and analysis program and the analytical results for continued technical assistance support for the Centredale Manor Restoration Project Site located in North Providence, Rhode Island. This work was authorized under Work Assignment Number 043-ANLA-016P, Contract No. 68-W6-0045.

The scope of work for this phase of technical assistance involved collection and analysis of sediment samples from the Woonasquatucket River between the Lymansville Dam, and the Dyerville Dam. This area includes the Manton and Dyerville ponds. In addition, samples were also collected from a reference area, Assapumpsett Pond.

The purpose of this field sampling program was to conduct additional sampling in areas that may have been impacted by contaminants released from the Site and transported and deposited by the waters of the Woonsquatucket River downstream of Lymansville Dam. The study was performed to augment existing data collected between 1998 and 1999, to determine the downstream limit of dioxins at concentrations above 1 ppb previously identified in the river system. The data were collected such that the analytical results could be used to support full human health and ecological risk assessments as necessary.

The samples were collected downstream of the Centredale Manor Restoration Project Site where dioxins, polychlorinated biphenyls (PCBs), metals, and other contaminants have previously been detected. The Woonasquatucket River study area defined for this investigation is depicted on Figure 1-1.

This technical memorandum includes five sections: introduction; Site Background, including a brief summary of existing data; the sampling and analysis program performed for this study; the findings of the investigation; and the summary and conclusions from the study. The chemical data from samples collected are presented in Appendix A. Data validation memoranda are presented as Appendix B. Field documentation is presented in Appendix C.



BASEMAP: PORTION OF THE FOLLOWING U.S.G.S. QUADRANGLE MAP: PROVIDENCE, RI, 1957, PHOTOREVISED 1970 AND 1975.

GRAPHIC SCALE

0.5 0 0.5 1 Miles

QUADRANGLE LOCATION

SITE LOCUS FIGURE			FIGURE 1-1
CENTREDALE MANOR RESTORATION PROJECT SITE			TETRA TECH NUS, INC.
NORTH PROVIDENCE, RHODE ISLAND			55 JONSPIN ROAD WILMINGTON, MA 01887 (978)658-7899
DRAWN BY:	J. R. PICCUITO	REV.: 0	
CHECKED BY:	S. PARKER	DATE: JANUARY 18, 2001	
SCALE:	AS NOTED	ACAD NAME: FILE: ...\CENTERDALE.APR D:\PDF\CENSITEFIG1_1.PDF	

2.0 SITE BACKGROUND AND LOCATION INFORMATION

This section presents a brief summary of background information and pertinent data collected to date, which has been previously published in referenced documents. For a full description of the site background and a description of data collected prior to this sampling effort, refer to the Engineering Evaluation/Cost Analysis (TtNUS, September 2000) and the Approval Memorandum (USEPA, January, 2000) for the site.

2.1 Sediment Investigation Background

Figure 1-1 depicts the location of the site. Figure 2-1 provides some detail of the site features. The Centredale Manor Apartment Building and the adjacent apartment building known as "Brook Village", are located on the site of the former Metro-Atlantic Chemical Corporation, which operated from the 1940s to the 1970s in a former mill complex on the site. Parking lots, roadways, lawn areas, and two high-rise residential buildings currently cover this "source area". The Woonasquatucket River follows the west boundary of the Centredale Manor and Brook Village Properties. The remains of a raceway for the former mill complex are present on the eastern boundary of the site.

The Site, as discussed in this and other reports, consists of all contaminated areas within this area as well as any other location to which contamination from this area has come to be located or from which this contamination originated. Documentation of the activities at the properties now occupied by Centredale Manor and Brook Village is presented in the Technical Memorandum for the Woonasquatucket River Sediment Investigation (TtNUS, June 2000) (June 2000 Technical Memorandum) and the Engineering Evaluation/Cost Analysis for the Centredale Manor Restoration Project Site (TtNUS, September 2000) (EE/CA), and others.

Previous sampling programs completed in the Woonasquatucket River (EPA 1998 and Weston 1999) indicated that dioxins were present at concentrations in excess of 1 ppb, toxicity equivalency quotient (TEQ) in sediment samples of the Woonasquatucket River. However, these initial studies indicated that sediments with dioxins at concentrations above 1 ppb were restricted to the reaches of the river upstream of the Lymansville Dam. Samples that were collected below the Lymansville Dam showed concentrations below 0.5 ppb TEQ.

In November and December 1999, Tetra Tech NUS, Inc. completed a more thorough investigation of the Allendale and Lymansville reaches, and also collected one sediment sample on the downstream side of the Lymansville Dam. Analysis of this furthest downstream sample indicated dioxin TEQ was present at 4.61 ppb.

Based on this finding, it was determined that additional samples should be taken from the next two reaches of the Woonasquatucket River to determine the downstream extent of dioxins exceeding 1 ppb TEQ. This portion of the Woonasquatucket River Sediment Investigation focused on the Manton and Dyerville reaches of the Woonasquatucket River (Figure 2-1).

2.2 Description of the Woonasquatucket River

The Woonasquatucket River flows in a southeasterly direction through relatively flat and level terrain in the area of the Centredale Manor and Brook Village Properties. A series of impoundments, held by mill dams are located within the study area. The surrounding area is a densely populated mix of suburban residential and light industrial/manufacturing facilities northwest of Providence, Rhode Island.

The Woonasquatucket River drainage area is approximately 38.5 square miles. Approximately 8.5 miles downstream of the site, the Woonasquatucket River discharges to Providence Harbor in Narragansett Bay. Selected historical flow data from a USGS gauging station located near the site is presented in Appendix F (USGS 2000) of the June 2000 Technical Memorandum.

For the purposes of the Centredale studies, the river has been divided into sections termed "reaches", which are defined by changes in river configuration, impounding structures, and stream junctures. Reaches are identified as CMW, WRC, APB/APC, WRL, LPX, WRM, MAP, WRD, and DYP (as defined in the Sampling and Analysis Plan, TtNUS 10-99) which follow in order from upstream to downstream. Tributaries, or reference areas are identified as RAB and RCC. The limits of the reaches CMW, WRC, APB/APC, WRL, LPX, were investigated in the November and December 1999 sampling program and are described in detail in the June 2000 Technical Memorandum. The reaches WRM, MAP, WRD, and DYP were investigated under the September 2000 sampling program and are described below.

2.3 Description of Manton and Dyerville

The Manton reach extends from the downstream side of Lymansville Dam south to the Manton Dam in Providence. The Dyerville reach extends from the downstream side of the Manton Dam south to the Dyerville Dam, also located in Providence. Both Manton and Dyerville dams are mill dams of the same era as Allendale and Lymansville, and currently impound water as shown on the USGS Providence Quadrangle map. Both ponds provide some depositional areas behind the dams and in the upstream shallows.

The river reach between the Lymansville Dam and Manton Pond (WRM) starts out similar to that at Centredale, with a gravel and sand bottom, and short riffle areas. However, downstream, the water moves more slowly, turning to the east and then again to the south. Large manufacturing facilities are present on both the North Providence and Johnston sides of this reach. Some pockets of depositional sediments suitable for sample collection were found below the Lymansville Dam. A swale, also with depositional sediments was noted at the southward bend. This swale was believed to be the remains of a raceway that once took water from the Lymansville Dam. However it was impossible to identify the previous path of this former raceway because the ground to the north of this point shows such heavy disturbance.

Manton Pond (MAP) is a small shallow impoundment held by the Manton Dam. Abutting the Manton Dam are two apartment complexes, one of which is abandoned and one of which is occupied. Depositional sediment was found in most of the pond, all the way north to the southward bend described above. No evidence of a raceway taking water from the Manton Dam is evident. However, the apartment complex parking lots are positioned on top of the east side of the river in this reach, which is where the Manton raceway is most likely to have been.

The river reach between the Manton Dam and Dyerville Pond (WRD) consists of a long southeastward run, with a stony bottom. Several areas of this reach were investigated for possible sample collection, and only one was found to be suitable due to the limited amount of depositional sediment. The water slows approximately one quarter mile to the south, behind the existing Stop and Shop property, and widens to form Dyerville Pond.

Dyerville Pond (DYP) was found to be a steep sided pond of unknown depth. Access is difficult, particularly on the Providence side. Depositional areas were found in the northern section,

while the southern portion had rocky, steep banks with very little depositional sediment. The area on the north end of Dyerville Pond does not contain as much open water as is shown on USGS and GIS maps, indicating some filling of wetlands in this in the past 20 years.

2.4 Description of the Reference Areas

The reference areas investigated in 1999 are described in detail in the June 2000 Technical Memorandum. In 1999, reference samples were collected from the stream (Assapumpsett Brook) upstream of the Assapumpsett Pond. As a part of the sampling conducted in September 2000, two additional samples were collected from the depositional sediments within this pond. These samples (RAB-SD-2069 and 2070) were collected on the western and southern edges of the pond.

3.0 FIELD PROCEDURES

This section describes the field sampling procedures used for collection of sediment samples in the Manton and Dyerville reaches of the Woonsquatucket River.

3.1 Field Sample Collection

The sample collection effort was conducted in accordance with the Work Plan for Sediment Investigation (TtNUS, October, 1999), the Sampling and Analysis Plan (SAP) for Woonasquatucket River Sediment Investigation (TtNUS October, 1999).

Surface sediment samples were collected from a depth interval of 0 to 0.5 feet below ground surface (bgs) at pre-determined depositional areas. These samples were analyzed for pesticides/PCBs (CLP OLM04.2), SVOCs (CLP OLM04.2), metals (ILM04.0), dioxins and HCX (Method 8290A), as well as for SEM and AVS (Allen, H.E. et. al.), TOC (Lloyd Kahn Method) and grain size distribution (ASTM D422-63).

Surface sediment samples were collected at depositional locations within ponds or river channel. All samples collected during this portion of the investigation were taken from aquatic environments and designed as "SD". No samples collected during this effort were collected

above the water level or within the floodplain. In accordance with previous investigations for the Centredale, Allendale and Lymansville reaches, samples given the "SD" designation were collected in areas inundated with more than 1 foot of water for most of the year.

Sediment samples were collected following TtNUS SOP SA-1.2 using an Ekman dredge. Recovered sediment was carefully placed into a stainless steel mixing bowl, and aliquots were removed with minimum disturbance for analysis of SEM, AVS and TOC. The remaining sediment was thoroughly homogenized by hand using a decontaminated scoop or large mixing spoon. The homogenized sample was transferred to the appropriate sample containers for laboratory analysis for SVOCs, metals, dioxins, and grain size distribution.

Field observations made during the collection of samples were documented on solid phase sample log sheets, which are provided in Appendix C. These include a field sketch of the sample location, observations made during collection, and a description of the material collected.

3.2 Reference Area Sampling

Two stations were sampled using the same procedures described above as reference locations. The reference stations were located at the Assapumpsett Pond in Johnston, Rhode Island. Assapumpsett Pond drains into Assapumsett Brook, which is a tributary to the Woonsquatucket River. These reference samples were collected to provide sediment chemistry data in support of this evaluation and the ongoing ecological risk assessment for the Woonasquatucket River.

3.3 Sample Location Survey

All sediment sampling stations were surveyed using Global Positioning System (GPS) equipment to sub-meter accuracy. Location information was converted to Rhode Island State Plane Coordinates (NAD 1983) for mapping and stored in the project data management system.

4.0 FINDINGS OF THE INVESTIGATION

This section describes the results from the analysis of samples collected from the Manton and Dyerville reaches of the Woonasquatucket River during the recent phase of the sediment investigation.

4.1 Sample Analysis and Validation

Samples were collected and analyzed for parameters described in Section 3. The dioxin analysis for sediment sample was performed by Triangle Laboratories under DAS subcontract No. S99-RAC1-150. The analysis for sediment for metals, TOC, grain size, SVOCs, and AVS & SEM was performed by Katahdin Analytical Services under Subcontract No. S99-RAC1-151.

A Tier I data review was performed on TOC and grain size analysis by TtNUS chemists. Tier II data validation following EPA Region I Guidelines was conducted by TtNUS for metals, SVOCs, and AVS & SEM DAS laboratory data from the sampling event. Tier III data validation was performed by EPA for the dioxins data results. Data validation resulted in the qualification of some data. Qualification of data is described in data validation memoranda submitted to EPA and provided in Appendix B.

Some compounds have estimated values or raised detection limits due to factors such as blank contamination and dilutions. Overall, the data was found to be of sufficient and acceptable quality to be used for the purposes of quantified risk analysis under the Risk Assessment Guidance for Superfund (RAGS) document and its amendments.

Complete analytical results for the parameters tested for are presented in Appendix A. Data validation memoranda are presented in Appendix B. Table 4-1 presents a summary table of detected parameters for this data set.

4.2 Contaminant Distribution

The discussion of this Technical Memorandum focuses on dioxins, but also describes semivolatile organic compounds, polychlorinated biphenyls (PCBs), and metals. These are described in the subsections that follow.

TABLE 4-1
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
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CENTREDALE MANOR RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Semivolatile Organic Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
1,1'-Biphenyl	500	U	180	J	400	U	460	U	990	U
2,4-Dinitrotoluene	500	U	920	U	400	U	460	U	990	U
2-Chlorophenol	500	U	920	U	400	U	460	U	990	U
2-Methylnaphthalene	500	U	490	J	400	U	31	J	990	U
4-Chloro-3-methylphenol	500	U	920	U	400	U	460	U	990	U
4-Nitrophenol	1200	U	2300	U	1000	U	1200	U	2500	U
Acenaphthene	500	U	2000		400	U	140	J	990	U
Acenaphthylene	500	U	210	J	43	J	160	J	990	U
Anthracene	500	U	4000		79	J	550		990	U
Atrazine	500	U	920	U	400	U	73	J	990	U
Benzaldehyde	34	JEB	920	U	400	U	86	J	990	U
Benzo(a)anthracene	500	U	21000	*	380	J	2600		300	J
Benzo(a)pyrene	500	U	6800	J	310	J	2200		370	J
Benzo(b)fluoranthene	26	J	24000	J*	590		4000	*	640	J
Benzo(g,h,i)perylene	500	U	3600	J	190	J	1600		220	J
Benzo(k)fluoranthene	500	U	2300	J	130	J	1100		200	J
bis(2-Ethylhexyl)phthalate	60	J	230	J	600	J	1600	J*	430	J
Butylbenzylphthalate	500	UJ	920	U	76	J	340	J	990	U
Carbazole	500	U	1300		37	J	410	J	52	J
Chrysene	500	U	19000	*	280	J	2400		460	J
Di-n-Butylphthalate	500	U	920	U	400	U	51	J	990	U
Dibenzo(a,h)anthracene	500	U	780	J	38	J	320	J	990	U
Dibenzofuran	500	U	1500		400	U	100	J	990	U
Fluoranthene	38	J	51000	*	600		5400	*	810	J
Fluorene	500	U	2000		33	J	220	J	990	U
Indeno(1,2,3-cd)pyrene	500	U	4400	J	280	J	2000		290	J
N-Nitroso-di-n-propylamine	500	U	920	U	400	U	460	U	990	U
Naphthalene	500	U	880	J	400	U	39	J	990	U
Pentachlorophenol	1200	U	2300	U	1000	U	1200	U	2500	U
Phenanthrene	500	U	40000	*	330	J	2900		300	J
Phenol	500	U	920	U	400	U	460	U	990	U
Pyrene	33	J	42000	*	600		4200	*	600	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TA. . 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
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Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Pesticide/PCB Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
4,4'-DDD	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
4,4'-DDE	5.0	U	5.0	U	4.0	U	7.0		5.0	U
4,4'-DDT	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
alpha-Chlordane	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Aroclor-1254	49	U	47	U	150		48	U	50	U
gamma-Chlordane	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Dioxin Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
1,2,3,4,6,7,8-HpCDD	0.0053		0.0677	J	0.0579		0.13	J	0.622	
1,2,3,4,6,7,8-HpCDF	0.0014	J	0.0477		0.0158		0.0497	J	0.233	
1,2,3,4,7,8,9-HpCDF	0.00006	U	0.00093	EMPC	0.0015	J	0.0025	J	0.0055	
1,2,3,4,7,8-HxCDD	0.00004	U	0.00048	J	0.001	J	0.0018	EMPC	0.00099	EMPC
1,2,3,4,7,8-HxCDF	0.00017	U	0.0143	J	0.0028	J	0.0041	J	0.0095	
1,2,3,6,7,8-HxCDD	0.00015	J	0.003	J	0.0034	J	0.0063	J	0.0122	
1,2,3,6,7,8-HxCDF	0.00002	U	0.0053	J	0.0017	J	0.0032	J	0.0044	J
1,2,3,7,8,9-HxCDD	0.0001	EMPC	0.0019	EMPC	0.0025	J	0.006	J	0.0061	
1,2,3,7,8,9-HxCDF	0.00003	U	0.00048	EMPC	0.0003	U	0.0003	U	0.00053	EMPC
1,2,3,7,8-PeCDD	0.00002	U	0.0005	J	0.0016	J	0.0016	J	0.00084	J
1,2,3,7,8-PeCDF	0.00002	U	0.0028	J	0.0002	U	0.0002	U	0.0012	EMPC
1,2,4,5,7,8-hexachloro(9H)xanthene	NR		0.0625	J	0.035	J	0.0368	J	0.263	J
2,3,4,6,7,8-HxCDF	0.00002	U	0.0068		0.0025	J	0.004	J	0.007	
2,3,4,7,8-PeCDF	0.00002	U	0.0059		0.0014	EMPC	0.0018	J	0.0027	EMPC
2,3,7,8-TCDD	0.024		0.115	J	0.129		0.144	J	0.982	$
2,3,7,8-TCDF	0.00016	EMPC	0.0149		0.0047		0.0067	J	0.0112	
OCDD	0.0615	J	0.427	J	0.36		0.737	J	12.33	$
OCDF	0.0019	J	0.0762	J	0.0397		0.0937	J	1.34	
Total HpCDD	0.01	J	0.132	J	0.105	J	0.242	J	1.26	J
Total HpCDF	0.0014	UJ	0.0943	J	0.0403	J	0.111	J	1.03	J
Total HxCDD	0.0011	JEB	0.0091	JEB	0.0233	JEB	0.0435	JEB	0.0952	JEB
Total HxCDF	0.0028	EMPC	0.116	J	0.0456	J	0.0542	J	0.263	J
Total PeCDD	0.00038	EMPC	0.0016	J	0.0073	J	0.0081	J	0.0023	J
Total PeCDF	0.00038	J	0.124	J	0.0638	J	0.056	J	0.0758	J
Total TCDD	0.0259	J	0.134	J	0.143	J	0.157	J	0.982	J$
Total TCDF	0.0037	UJ	0.103	J	0.0712	J	0.0621	J	0.105	J
Toxicity Equivalency	0.0242	J	0.125	J	0.134	J	0.152	J	1.01	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
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Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
TAL Metal Analysis (MG/KG)	D02179		D02191		D02185		D02186		D02193	
Aluminum	4750		2000		3000		3190		2470	
Antimony	0.59	UJ	1.3	J	0.64	UJ	0.60	UJ	0.57	UJ
Arsenic	1.6	J	2.6	J	1.2	J	2.1	J	0.97	J
Barium	29.5		45.1		31.7		55.8		38.1	
Beryllium	0.99		0.33		0.28		0.65		0.43	
Cadmium	0.52	UJ	1.5	J	0.57	UJ	0.73	J	0.96	J
Calcium	851		899		789		1590		1390	
Chromium	6.5	J	21.6	J	10.7	J	70.8	J	17.5	J
Cobalt	2.8		2.0		3.4		5.0		3.5	
Copper	2.4		108		12.5		48.9		63.5	
Iron	6010	J	8500	J	8070	J	7960	J	4770	J
Lead	10.2	J	1230	J	39.8	J	132	J	91.0	J
Magnesium	707		363		1410		932		523	
Manganese	260	J	78.5	J	184	J	214	J	219	J
Nickel	3.2	UJ	12.8	J	9.9	UJ	17.0	J	11.0	UJ
Potassium	269	U	544	U	252	U	400	U	347	U
Silver	0.55	U	0.84	UJ	0.60	U	0.74	UJ	0.56	UJ
Sodium	98.0		77.0		51.9	U	110		77.4	
Vanadium	8.6		5.6		8.9		10.8		7.1	
Zinc	19.2		106		55.9		172		161	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02179		D02191		D02185		D02186		D02193	
Acid Volatile Sulfide	1.0	UJ	2.0	J	1.0	UJ	2.0	J	4.0	J
Cadmium	0.0014	J	0.012		0.0011	J	0.0074	J	0.0075	J
Copper	0.028	J	0.91	J	0.46	J	0.61	J	0.41	J
Lead	0.044	J	0.46	J	0.22	J	0.59	J	0.67	J
Mercury	0.00005	J	0.00005	J	0.0001	J		R		R
Nickel	0.039	UJ	0.15	J	0.27		0.22		0.15	J
Zinc	0.25	U	1.9		1.4		2.5		2.4	
Total Organic Carbon Analysis (MG/KG)	D02179		D02191		D02185		D02186		D02193	
Total Organic Carbon	13200		54200		1350		20400		41800	

U - Not detected; UJ - Detection limit approximate, J - Quantitation approximate; EB - Equipment Blank Contamination, NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
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Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
Semivolatile Organic Analysis (UG/KG)	D02303		D02301		D02192		D02182		D02183	
1,1'-Biphenyl	960	U	460	U	120	J	500	U	430	U
2,4-Dinitrotoluene	960	U	460	U	990	U	500	U	430	U
2-Chlorophenol	960	U	460	U	990	U	500	U	430	U
2-Methylnaphthalene	960	U	460	U	240	J	500	U	430	U
4-Chloro-3-methylphenol	960	U	460	U	990	U	500	U	430	U
4-Nitrophenol	2400	U	1200	U	2500	U	1200	U	1100	U
Acenaphthene	960	U	460	UJ	2300		500	U	430	U
Acenaphthylene	960	U	460	U	420	J	47	J	430	U
Anthracene	960	U	460	U	5900		100	J	430	U
Atrazine	960	U	460	U	990	U	500	U	430	U
Benzaldehyde	960	U	460	U	990	U	31	JEB	430	U
Benzo(a)anthracene	110	J	25	J	18000	*	1000		430	U
Benzo(a)pyrene	130	J	32	J	15000	J*	840		430	U
Benzo(b)fluoranthene	230	J	55	J	18000	*	1400		22	J
Benzo(g,h,i)perylene	100	J	23	J	8300	J	510		430	U
Benzo(k)fluoranthene	100	J	460	U	4600	J	370	J	8	J
bis(2-Ethylhexyl)phthalate	310	J	180	J	890	J	1000	J	95	J
Butylbenzylphthalate	98	J	460	U	990	U	460	J	430	UJ
Carbazole	960	U	460	U	1600		82	J	430	U
Chrysene	180	J	42	J	18000	*	1100		430	U
Di-n-Butylphthalate	960	U	460	U	990	U	500	U	34	J
Dibenzo(a,h)anthracene	960	U	460	U	1300		130	J	430	U
Dibenzofuran	960	U	460	U	1400		500	U	430	U
Fluoranthene	290	J	68	J	46000	*	1700		23	J
Fluorene	960	U	460	U	2200		36	J	430	U
Indeno(1,2,3-cd)pyrene	120	J	28	J	7700	J	650		430	U
N-Nitroso-di-n-propylamine	960	U	460	UJ	990	U	500	U	430	U
Naphthalene	960	U	460	U	250	J	500	U	430	U
Pentachlorophenol	2400	U	1200	U	2500	U	1200	U	1100	U
Phenanthrene	99	J	23	J	35000	*	790		430	U
Phenol	960	U	460	U	990	U	500	U	430	U
Pyrene	240	J	51	J	42000	*	1600		430	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
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Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
Pesticide/PCB Analysis (UG/KG)	**D02303**		**D02301**		**D02192**		**D02182**		**D02183**	
4,4'-DDD	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
4,4'-DDE	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
4,4'-DDT	5.0	U	5.0	U	5.0	U	9.0		4.0	U
alpha-Chlordane	4.0		2.0	U	2.0	U	3.0	U	2.0	U
Aroclor-1254	49	U	45	U	47	U	50	U	43	U
gamma-Chlordane	5.0		2.0	U	2.0	U	3.0	U	2.0	U
Dioxin Analysis (UG/KG)	D02303		D02301		D02192		D02182		D02183	
1,2,3,4,6,7,8-HpCDD	0.0312		0.0164		0.0331	J	0.024		0.0017	J
1,2,3,4,6,7,8-HpCDF	0.0083		0.0039	J	0.0506		0.0071		0.00078	U
1,2,3,4,7,8,9-HpCDF	0.00022	J	0.00007	U	0.00098	J	0.00054	EMPC	0.0002	U
1,2,3,4,7,8-HxCDD	0.00014	EMPC	0.00005	U	0.00045	J	0.00083	EMPC	0.0002	U
1,2,3,4,7,8-HxCDF	0.0005	EMPC	0.00027	U	0.021	J	0.0025	J	0.00041	U
1,2,3,6,7,8-HxCDD	0.00054	J	0.00026	J	0.0015	J	0.0027	J	0.0002	U
1,2,3,6,7,8-HxCDF	0.00031	U	0.00016	U	0.0072	J	0.0021	J	0.00021	U
1,2,3,7,8,9-HxCDD	0.00043	EMPC	0.00027	J	0.0013	EMPC	0.0023	J	0.0002	U
1,2,3,7,8,9-HxCDF	0.00005	EMPC	0.00004	U	0.00033	J	0.001	EMPC	0.0002	U
1,2,3,7,8-PeCDD	0.00009	U	0.00008	EMPC	0.00039	EMPC	0.0011	J	0.0002	U
1,2,3,7,8-PeCDF	0.00007	U	0.00003	U	0.0037	J	0.0001	U	0.0002	U
1,2,4,5,7,8-hexachloro(9H)xanthene	0.0704	J	0.0188	J	0.0334	J	NR		NR	
2,3,4,6,7,8-HxCDF	0.00044	J	0.00017	EMPC	0.0076		0.0041	J	0.00018	EMPC
2,3,4,7,8-PeCDF	0.00025	EMPC	0.00017	J	0.0067	EMPC	0.002	J	0.0002	U
2,3,7,8-TCDD	0.19		0.109	J	0.0576	J	0.0034		0.0002	U
2,3,7,8-TCDF	0.0014		0.0009	J	0.0136		0.0034		0.00056	J
OCDD	0.266	J	0.132		0.276	J	0.181		0.0082	U
OCDF	0.0084	J	0.0043	J	0.0471	J	0.0165		0.00074	J
Total HpCDD	0.0652	J	0.0312	J	0.0679	J	0.049	J	0.003	J
Total HpCDF	0.0165	J	0.0041	J	0.0736	J	0.0153	J	0.00078	UJ
Total HxCDD	0.0045	JEB	0.0011	JEB	0.0019	JEB	0.027	JEB	0.00052	JEB
Total HxCDF	0.0146	J	0.0039	UJ	0.116	J	0.0584	J	0.0014	EMPC
Total PeCDD	0.0012	EMPC	0.001	EMPC	0.0124	EMPC	0.0064	J	0.0005	J
Total PeCDF	0.0087	J	0.0038	J	0.0814	J	0.0858	J	0.0012	J
Total TCDD	0.193	J	0.109	J	0.064	J	0.0075	J	0.00036	EMPC
Total TCDF	0.013	J	0.0084	J	0.0694	J	0.0435	J	0.0015	EMPC
Toxicity Equivalency	0.191	J	0.11	J	0.0678	J	0.00736	J	0.0000917	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
DRAFT TECHNICAL MEMORANDUM
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Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
TAL Metal Analysis (MG/KG)	D02303		D02301		D02192		D02182		D02183	
Aluminum	1800		2390		2400		2980		3120	
Antimony	0.61	UJ	0.59	UJ	2.5	J	0.57	UJ	0.58	UJ
Arsenic	0.75	J	0.60	J	13.7	J	0.84	J	0.48	UJ
Barium	18.7		16.3		64.1		26.4		30.3	
Beryllium	0.28		0.23		0.47		0.42		0.41	
Cadmium	0.83	J	0.52	UJ	2.2	J	0.51	UJ	0.51	UJ
Calcium	682		621		1390		1110		710	
Chromium	18.6	J	4.2	J	40.8	J	5.9	J	3.7	J
Cobalt	1.9		1.6		6.0		3.8		2.1	
Copper	21.0		4.0		119		7.9		11.7	
Iron	3370	J	3900	J	37900	J	6780	J	5230	J
Lead	34.0	J	12.7	J	278	J	34.6	J	8.5	J
Magnesium	431		513		457		1060		1000	
Manganese	67.6	J	98.6	J	241	J	161	J	99.9	J
Nickel	5.9	UJ	3.3	UJ	92.2	J	6.7	UJ	6.6	UJ
Potassium	371	U	372	U	363	UJ	388	U	412	U
Silver	0.56	U	0.54	U	0.70	UJ	0.53	U	0.53	U
Sodium	48.6	U	47.6	U	117		74.9		57.4	
Vanadium	5.2		4.6		8.6		7.4		5.8	
Zinc	51.5		23.0		176		46.4		28.0	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02303		D02301		D02192		D02182		D02183	
Acid Volatile Sulfide	1.0	UJ	1.0	UJ	4.0	J	1.0	UJ	1.0	UJ
Cadmium	0.0052	J	0.002	U	0.0089		0.0028	J	0.00018	U
Copper	0.14	J	0.035	J	0.51	J	0.12	J	0.14	J
Lead	0.096	J	0.039	J	0.83	J	0.21	J	0.029	J
Mercury		R		R		R		R		R
Nickel	0.099	J	0.029	UJ	0.14		0.11	J	0.051	UJ
Zinc	0.50	U	0.27	U	2.9		0.94		0.35	U
Total Organic Carbon Analysis (MG/KG)	D02303		D02301		D02192		D02182		D02183	
Total Organic Carbon	11400		4050		39800		6640		128	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
DRAFT TECHNICAL MEMORANDUM
CENTREDALE MANOR RESTORATION PROJECT
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Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		81	
Semivolatile Organic Analysis (UG/KG)	D02302		D02304		D02187		D02305		D02188	
1,1'-Biphenyl	990	U	990	UJ	500	U	990	U	400	U
2,4-Dinitrotoluene	990	U	1200	J	500	U	990	U	400	U
2-Chlorophenol	990	U	1800	J	500	U	990	U	400	U
2-Methylnaphthalene	990	U	990	UJ	500	U	100	J	400	U
4-Chloro-3-methylphenol	990	U	2200	J	500	U	990	U	400	U
4-Nitrophenol	2500	U	2200	J	1200	U	2500	U	1000	U
Acenaphthene	110	J	1800	J	500	U	580	J	48	J
Acenaphthylene	62	J	180	J	500	U	240	J	400	U
Anthracene	300	J	970	J	500	U	1400		160	J
Atrazine	990	U	990	UJ	500	U	990	U	400	U
Benzaldehyde	93	JEB	170	JEB	500	U	120	JEB	400	U
Benzo(a)anthracene	1100		5500	J	20	J	4900		980	
Benzo(a)pyrene	1100		3900	J	190	J	3500		820	
Benzo(b)fluoranthene	1800		13000	J*	500	U	6500		1500	
Benzo(g,h,i)perylene	650	J	3800	J	500	U	2100		520	
Benzo(k)fluoranthene	490	J	490	J	500	U	1800		470	
bis(2-Ethylhexyl)phthalate	930	J	50000	J*	100	J	4700		850	
Butylbenzylphthalate	990	U	990	UJ	500	U	990	U	64	J
Carbazole	190	J	320	J	500	U	850	J	180	J
Chrysene	1200		4100	J	24	J	3500		950	
Di-n-Butylphthalate	990	U	1800	J	500	U	990	U	400	U
Dibenzo(a,h)anthracene	130	J	620	J	500	U	450	J	110	J
Dibenzofuran	76	J	220	J	500	U	310	J	27	J
Fluoranthene	2600		3300	J	39	J	9500	*	2000	
Fluorene	140	J	470	J	500	U	660	J	71	J
Indeno(1,2,3-cd)pyrene	800	J	3900	J	500	U	2700		720	
N-Nitroso-di-n-propylamine	990	U	1400	J	500	U	990	U	400	U
Naphthalene	990	U	110	J	500	U	160	J	400	U
Pentachlorophenol	2500	U	1400	J	1200	U	2500	U	1000	U
Phenanthrene	1600		4400	J	500	U	5600		1200	
Phenol	990	U	1900	JEB	500	U	990	U	400	U
Pyrene	2400		6500	J	41	J	7100	*	1900	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
DRAFT TECHNICAL MEMORANDUM
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Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		81	
Pesticide/PCB Analysis (UG/KG)	D02302		D02304		D02187		D02305		D02188	
4,4'-DDD	92	*	5.0	U	5.0	U	52		4.0	U
4,4'-DDE	5.0	U	11		5.0	U	48		4.0	U
4,4'-DDT	520	*	5.0	U	5.0	U	5.0	U	4.0	U
alpha-Chlordane	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Aroclor-1254	50	U	50	U	50	U	2200	*	40	U
gamma-Chlordane	3.0	U	3.0	U	3.0	U	3.0	U	4.0	
Dioxin Analysis (UG/KG)	D02302		D02304		D02187		D02305		D02188	
1,2,3,4,6,7,8-HpCDD	0.531		0.921		0.006	EMPC	0.69	J	0.30	
1,2,3,4,6,7,8-HpCDF	2.67	$	0.251		0.0018	EMPC	0.305	J	0.0462	
1,2,3,4,7,8,9-HpCDF	0.105		0.0136	EMPC	0.0019	UJ	0.0069	J	0.0054	
1,2,3,4,7,8-HxCDD	0.019		0.0088		0.0015	UJ	0.0088	J	0.0029	J
1,2,3,4,7,8-HxCDF	0.592		0.0242		0.001	UJ	0.0363	J	0.0029	J
1,2,3,6,7,8-HxCDD	0.0342		0.0319		0.0015	UJ	0.0318	J	0.0105	
1,2,3,6,7,8-HxCDF	0.178		0.0156		0.0009	UJ	0.0217	J	0.0022	J
1,2,3,7,8,9-HxCDD	0.0628		0.0265		0.0015	UJ	0.0317	J	0.0081	
1,2,3,7,8,9-HxCDF	0.0077	EMPC	0.003	J	0.0013	UJ	0.0022	EMPC	0.0004	U
1,2,3,7,8-PeCDD	0.0085		0.0037	J	0.0014	UJ	0.0173	J	0.0018	J
1,2,3,7,8-PeCDF	0.0372		0.0033	J	0.0016	J	0.005	EMPC	0.0003	U
1,2,4,5,7,8-hexachloro(9H)xanthene	0.114	J	0.254	J			1.71	J		
2,3,4,6,7,8-HxCDF	0.223		0.0169		0.001	UJ	0.0263	J	0.0032	J
2,3,4,7,8-PeCDF	0.0929		0.0047	EMPC	0.001	UJ	0.0187	J	0.0003	U
2,3,7,8-TCDD	0.26		0.678	$	0.0233	J	0.586	J$	0.0064	
2,3,7,8-TCDF	0.101		0.0168		0.0008	UJ	0.0642	J	0.0014	
OCDD	2.66	J	6.97	$	0.0495	J	0.522	J$	2.1	
OCDF	1.25	J	0.545	J	0.0035	EMPC	0.302	J	0.276	
Total HpCDD	1.14	J	1.74	J	0.007	J	1.32	J	0.456	J
Total HpCDF	3.76	J$	0.58	J	0.0022	J	0.577	J	0.175	J
Total HxCDD	0.451	JEB	0.251	JEB	0.0015	UJ	0.319	JEB	0.0508	JEB
Total HxCDF	1.97	J	0.379	J	0.0025	UJ	0.65	J	0.0349	J
Total PeCDD	0.0452	J	0.008	J	0.0026	EMPC	0.101	J	0.0018	J
Total PeCDF	1.03	J	0.257	J	0.0016	J	1.03	J	0.0158	J
Total TCDD	0.315	J	0.678	J$	0.0299	J	0.628	J$	0.008	J
Total TCDF	0.552	J	0.183	J	0.0123	J	0.17	J$	0.0113	J
Toxicity Equivalency	0.471	J	0.716	J	0.0235	J	0.637	J	0.0163	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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TABLE 4-1 (cont.)
DETECTED PARAMETERS IN SEDIMENT COLLECTED OCTOBER 2000
DRAFT TECHNICAL MEMORANDUM
CENTREDALE MANOR RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND
PAGE 9 OF 9

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		81	
TAL Metal Analysis (MG/KG)	D02302		D02304		D02187		D02305		D02188	
Aluminum	3240		8140		4390		7380		2580	
Antimony	3.4	J	5.3	J	0.60	UJ	0.66	J	0.58	UJ
Arsenic	6.3	J	5.1	J	1.1	J	8.5	J	1.2	J
Barium	228		155		30.0		105		21.9	
Beryllium	0.68		0.71		1.0		1.4		0.31	
Cadmium	95.1		23.9		0.53	UJ	3.7	J	0.51	U
Calcium	2290		1810		795		3260		560	
Chromium	45.6	J	80.0	J	5.3	J	310	J	17.5	J
Cobalt	5.1		9.3		2.5		17.3		3.1	
Copper	146		1110		1.5		164		6.6	
Iron	22200	J	11500	J	4770	J	20500	J	9970	J
Lead	553	J	721	J	8.9	J	446	J	26.4	J
Magnesium	835		1960		600		1620		1320	
Manganese	319	J	484	J	155	J	414	J	232	J
Nickel	30.5	J	187	J	3.1	UJ	141	J	7.0	UJ
Potassium	381	UJ	1110		198	U	848	J	672	
Silver	1.6	U	4.6		0.56	U	1.6	U	0.63	UJ
Sodium	132		137		90.5		207		42.4	U
Vanadium	12.6		32.5		7.2		38.2		7.9	
Zinc	814		1050		14.2		491		42.3	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02302		D02304		D02187		D02305		D02188	
Acid Volatile Sulfide	1.0	J	4.0	J	1.0	UJ	4.0	J	1.0	UJ
Cadmium	0.052		0.16		0.00071	J	0.027		0.00089	J
Copper	1.8	J	15.3	J	0.015	J	2.0	J	0.076	J
Lead	1.2	J	2.7	J	0.031	J	2.1	J	0.088	J
Mercury	0.0001	J	0.0001	J		R		R		R
Nickel	0.52		1.4		0.027	UJ	1.2		0.051	UJ
Zinc	13.6		14.3		0.17	U	7.8		0.61	U
Total Organic Carbon Analysis (MG/KG)	D02302		D02304		D02187		D02305		D02188	
Total Organic Carbon	44500		79700		11500		76600		1980	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate; EB - Equipment Blank Contamination; NR - Not Reported
*, or $ - From dilution analysis; R - Rejected; NA - Not Analyzed; EMPC - Estimated Maximum Possible Concentration

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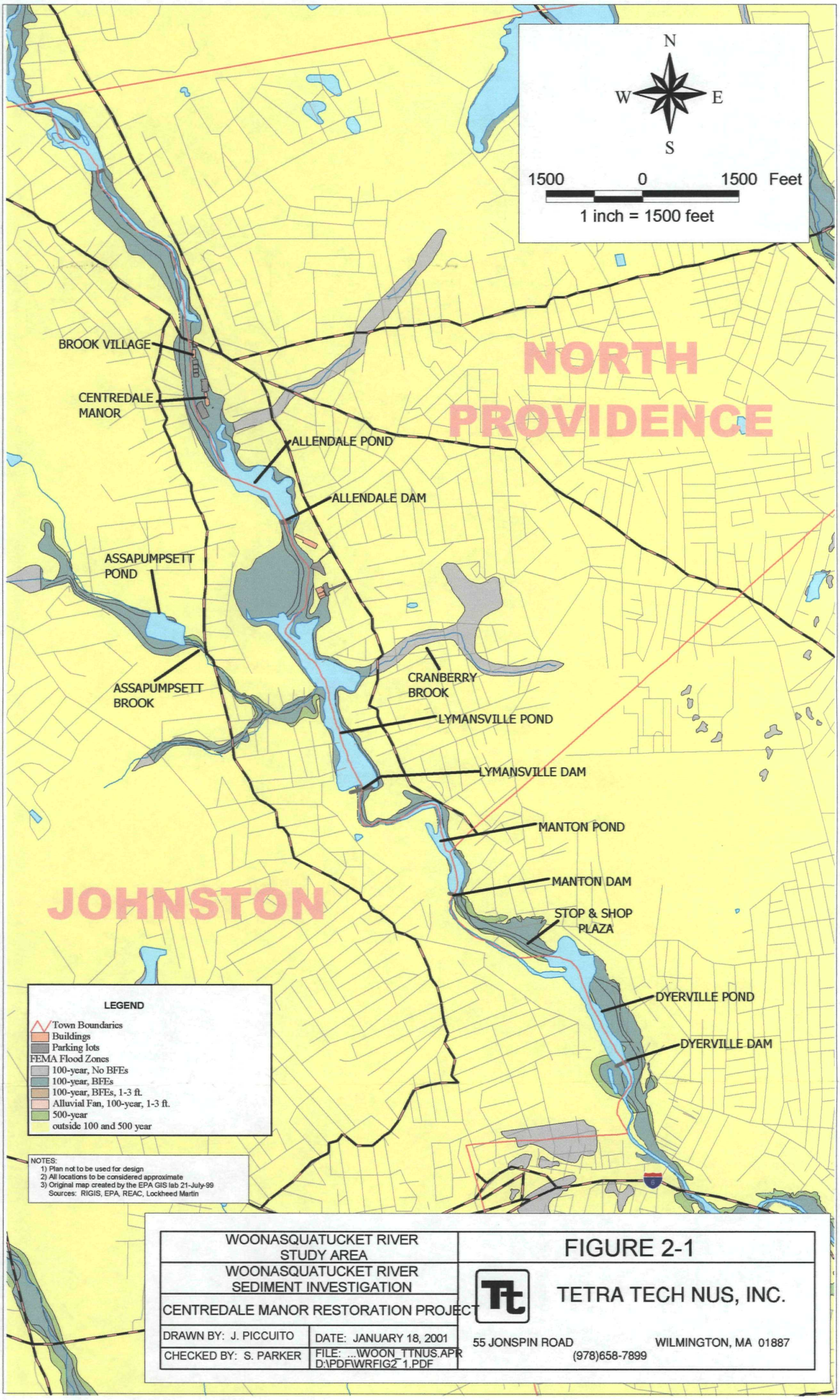


WOONASQUATUCKET RIVER STUDY AREA	FIGURE 2-1
WOONASQUATUCKET RIVER SEDIMENT INVESTIGATION	TETRA TECH NUS, INC.
CENTREDALE MANOR RESTORATION PROJECT	
DRAWN BY: J. PICCUITO / DATE: JANUARY 18, 2001	55 JONSPIN ROAD WILMINGTON, MA 01887
CHECKED BY: S. PARKER / FILE: ...\WOON_TTNUS.APR D:\PDF\WRFIG2_1.PDF	(978)658-7899

Sediments were mostly composed of sands and silt. Those with finer sands and more silt generally indicate higher deposition, and thus higher likelihood of contaminants transported by water currents. However, the differences in grain size distribution analysis were not remarkable since samples were all intentionally collected from depositional areas. Grain size analysis reports are presented at the end of Appendix B.

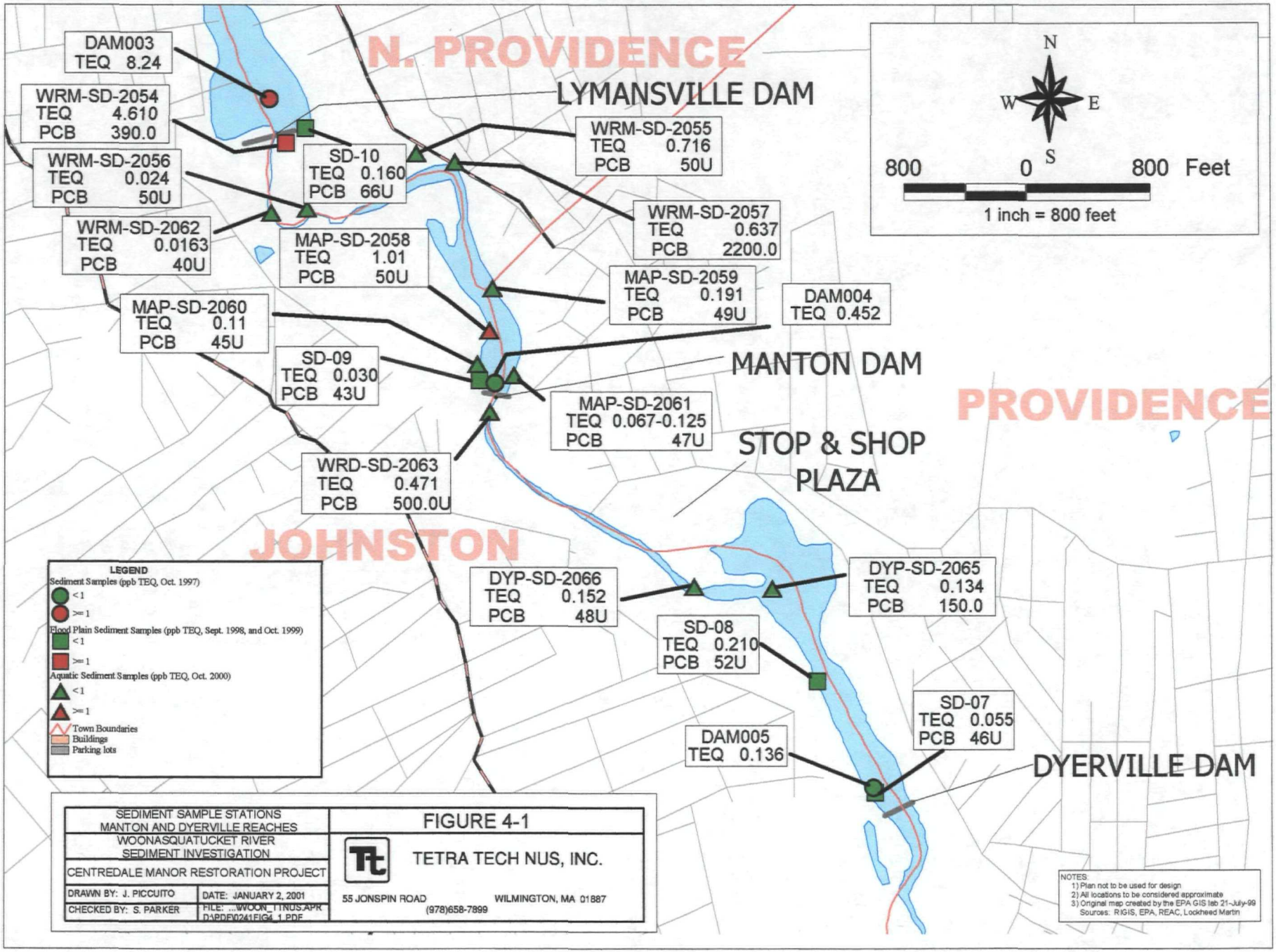
4.2.1 Dioxins

Dioxins are a group of anthropogenic chemical compounds formed as by-products through a number of activities including combustion, certain types of herbicide manufacture, chlorine bleaching of pulp and paper, and other industrial processes.

Table 4-1 presents a summary of the dioxin compounds detected in the data set from the Manton and Dyerville reaches during the September 2000. As shown in Table 4-1 and in Appendix A, there are a number of related compounds known as dioxins and furans that are detectable by the analytical method used for this project. The 2,3,7,8-TCDD compound is believed to be the most toxic, but the others can contribute to this overall toxicity as well.

Dioxins results are typically expressed in a Toxicity Equivalency Quotient, or TEQ. The TEQ considers all the related compounds and their relative toxicity. However, due to the toxicity of 2,3,7,8 TCDD, the TEQ values are dominated by this compound. The concentration of each compound is multiplied by a toxicity factor. The 2,3,7,8-TCDD toxicity factor is 1 and the other dioxins or furans toxicity factors range from 0 to 0.5. Other reports have stated that 2,3,7,8-TCDD generally constitutes 95 percent to 100 percent of the TEQ. Table 4-2 presents a summary of the TEQ values reported for this data set, and the portion (reported as %) of that TEQ which is attributed to 2,3,7,8-TCDD.

TEQs for samples collected in the Manton and Dyerville reaches of the Woonasquatucket River are depicted on Figure 4-1. This figure also shows TEQs for samples collected in previous sample collection efforts in 1998 and 1999. Table 4-2 and Figure 4-1 both show concentrations of dioxin TEQ at or below 1 part per billion (ug/kg) in these reaches at all sample stations with two exceptions. The Sample WRM-SD-2054, which is located immediately downstream of the Lymansville Dam had a dioxin TEQ of 4.6 ppb, and the sample MAP-SD-2058, located on the west side of Manton Pond provided a dioxin TEQ of 1.0 ppb.


N. PROVIDENCE
LYMANSVILLE DAM
DAM003
TEQ 8.24
WRM-SD-2054
TEQ 4.610
PCB 390.0
WRM-SD-2056
TEQ 0.024
PCB 50U
WRM-SD-2062
TEQ 0.0163
PCB 40U
SD-10
TEQ 0.160
PCB 66U
WRM-SD-2055
TEQ 0.716
PCB 50U
WRM-SD-2057
TEQ 0.637
PCB 2200.0
MAP-SD-2058
TEQ 1.01
PCB 50U
MAP-SD-2059
TEQ 0.191
PCB 49U
DAM004
TEQ 0.452
MAP-SD-2060
TEQ 0.11
PCB 45U
SD-09
TEQ 0.030
PCB 43U
MANTON DAM
MAP-SD-2061
TEQ 0.067-0.125
PCB 47U
PROVIDENCE
STOP & SHOP
PLAZA
WRD-SD-2063
TEQ 0.471
PCB 500.0U
JOHNSTON
DYP-SD-2066
TEQ 0.152
PCB 48U
DYP-SD-2065
TEQ 0.134
PCB 150.0
SD-08
TEQ 0.210
PCB 52U
SD-07
TEQ 0.055
PCB 46U
DAM005
TEQ 0.136
DYERVILLE DAM
N
W
E
S
800 0 800 Feet
1 inch = 800 feet
LEGEND
Sediment Samples (ppb TEQ, Oct. 1997)
<1
>=1
Flood Plain Sediment Samples (ppb TEQ, Sept. 1998, and Oct. 1999)
<1
>=1
Aquatic Sediment Samples (ppb TEQ, Oct. 2000)
<1
>=1
Town Boundaries
Buildings
Parking lots
SEDIMENT SAMPLE STATIONS
MANTON AND DYERVILLE REACHES
WOONASQUATUCKET RIVER
SEDIMENT INVESTIGATION
CENTREDALE MANOR RESTORATION PROJECT
DRAWN BY: J. PICCUITO
DATE: JANUARY 2, 2001
CHECKED BY: S. PARKER
FILE: ...WOON_TTNUS.APR
D:\PDF\0241FIG4_1.PDF
FIGURE 4-1
TETRA TECH NUS, INC.
55 JONSPIN ROAD
WILMINGTON, MA 01887
(978)658-7899
NOTES:
1) Plan not to be used for design
2) All locations to be considered approximate
3) Original map created by the EPA GIS lab 21-July-99
Sources: RIGIS, EPA, REAC, Lockheed Martin

DRAFT

TABLE 4-2
2,3,7,8-TCDD AS A PERCENTAGE OF TEQ
DRAFT TECHNICAL MEMORANDUM
WOONASQUATUCKET RIVER SEDIMENT INVESTIGATION - MANTON AND DYERVILLE
CENTREDALE MANOR RESTORATION PROJECT
NORTH PROVIDENCE, RHODE ISLAND

Location	Sample Number	Date Sampled	2,3,7,8-TCDD (ug/kg)	Toxicity Equivalency (ug/kg)	TCDD/TEQ Ratio
Woonasquatucket River Stations					
DYP-SD-2065	DYP-SD-2065-01	9/19/00	0.129	0.134 J	96%
DYP-SD-2066	DYP-SD-2066-01	9/19/00	0.144 J	0.152 J	95%
MAP-SD-2058	MAP-SD-2058-01	9/21/00	0.982 $	1.010 J	97%
MAP-SD-2059	MAP-SD-2059-01	9/21/00	0.190	0.191 J	100%
MAP-SD-2060	MAP-SD-2060-01	9/21/00	0.109 J	0.110 J	99%
MAP-SD-2061	CMS-DU-092100A**	9/21/00	0.115 J	0.125 J	92%
MAP-SD-2061	MAP-SD-2061-01**	9/21/00	0.0576 J	0.068 J	85%
WRD-SD-2063	WRD-SD-2063-01	9/21/00	0.260	0.471 J	55%
WRM-SD-2055	WRM-SD-2055-01	9/21/00	0.678 $	0.716 J	95%
WRM-SD-2056	CMS-DU-091900A**	9/19/00	0.024	0.024 J	99%
WRM-SD-2056	WRM-SD-2056-01**	9/19/00	0.0233 J	0.024 J	99%
WRM-SD-2057	WRM-SD-2057-01	9/21/00	0.586 J$	0.637 J	92%
WRM-SD-2062	WRM-SD-2062-01	9/19/00	0.0064	0.016 J	39%
Reference Stations					
RAB-SD-2069	RAB-SD-2069-01	9/18/00	0.0034	0.00736 J	46%
RAB-SD-2070	RAB-SD-2070-01	9/18/00	0.0002 U	0.00009 J	0%

J - Quantitation approximate; U - Not detected;
ND - Not detected and no detection limit reported; $ - From dilution analysis
Hexachloroxanthene is reported as a tentatively identified compound only
** Samples noted are field duplicates

The compound 1,2,4,5,7,8-Hexachloro(9H)xanthene (HCX) results are reported from the dioxin analysis. HCX was requested as an additional target compound for EPA Method 8290 (dioxin and furans analysis). However, because there is no commercial standard available for this compound, the laboratory reported HCX as a "tentatively identified compound" (TIC) and the identifications and concentrations are approximated.

HCX was identified and quantitated using the masses, ratios, and retention time information provided by EPA Region VII based on the following reference presented at the Pittcon 99 (poster presentation): "Industrial Marker By-Products Found with 2,3,7,8-Tetrachlorodibenzo-p-dioxin" Jeffrey C. Archer, Terry A. Crone; USEPA Region VII.

Dioxin TEQs do not show an obvious decrease from upstream to downstream within this single data set, however the trend may be more evident when compiled with data collected from Allendale and Lymansville Ponds. In addition, only a single station out of seven sampled exceeded 1 ppb in Manton Pond, and no samples were found to exceed 1 ppb in sediments below Manton dam in Dyerville Pond. This indicates that dioxin TEQ concentrations are decreasing with distance from the former source area at Centredale.

Analysis of reference samples collected from the surface sediments of Assapumpsett Pond revealed very low concentrations of dioxins and furans detected.

4.2.2 Polychlorinated Biphenyls

Polychlorinated Biphenyls (PCBs) are derived from anthropogenic sources and are extremely stable chemicals with a wide range of physical properties. They have been historically used in plasticizers, adhesives, lubricants, heat transfer fluids, and as dielectric fluids in transformers and capacitors. The PCBs detected in the environmental samples collected from Allendale and Lymansville in 1999 consisted primarily of Aroclor 1254, but Aroclor 1242 and Aroclor 1260 were also detected in some residential soil samples. The PCBs detected in sediment samples from Manton and Dyerville areas consisted exclusively of Aroclor 1254.

Analysis of most samples in the Manton and Dyerville reaches did not detect PCBs, however, Aroclor 1254 was detected on the east side of the upstream end of Manton Pond at 2200 ppb (SD-2057) and on the east side of the upstream end of Dyerville Pond at 150 ppb (SD-2065).

TOC in these samples was 76,600 and 1350 mg/kg respectively. The high TOC in the SD-2057 sample, as well as a high fines content in the grain size distribution indicates this is a highly depositional area. Analysis of other samples did not detect any PCB Aroclor mixtures at or above the detection limits stated.

4.2.3 Semivolatile Organic Compounds

Semivolatile organic compounds (SVOCs) include polyaromatic hydrocarbons (PAHs) and derivatives, as well as phenolic and phthalate compounds. The SVOCs detected in the Manton and Dyerville reaches of the Woonasquatucket River were almost exclusively PAHs, which is typical for a river system within an industrial and urbanized setting. PAHs are typically attributed to asphalt run-off and fuel combustion and deposition. All fuels contain and generate some PAH components when burned, and concentrations such as those noted in Appendix A are typical of such urban activities. The highest concentrations of PAHs were noted in the sample MAP-SD-2061, and it's field duplicate sample. Analysis of these samples showed concentrations of numerous PAH compounds well over 10,000 ppb, and some that approached 50,000 ppb (fluoranthene and pyrene). This station is located at the upstream side of the Manton Dam, on the east side of the pond.

4.2.4 Metals

Sediment samples were analyzed for total metals as well as for acid volatile sulfides (AVS) and simultaneously extracted metals (SEM). The AVS and SEM data are evaluated together to provide an indication of the bioavailability of the metals to biota living within the sediment, and interpretation of this data will be performed as a part of the ecological risk assessment for the site, anticipated in 2001.

Total metals data concentration in sediment samples are typical of an industrial river (see Table 4-1). High concentrations of zinc (1050 mg/kg) were reported in sample WRM-SD-2055, collected in what is believed to be the remains of the downstream end of the Lymansville Raceway. Elevated concentrations of iron (>20,000 mg/kg) and zinc (>400 ug/kg) were also reported in samples WRD-SD-2063, immediately downstream of Manton Dam and WRM-SD-2057, at the upstream end of Manton Pond. A high concentration of lead (1230 mg/kg was

found in the field duplicate sample for station WRM-SD-2061, although this was not matched in the field duplicate sample collected at that location.

5.0 SUMMARY

Samples of sediment were collected from the Manton and Dyerville reaches of the Woonasquatucket River for chemical contaminants and physical parameters. The study was performed to augment existing data collected, and to determine the downstream extent of dioxins exceeding concentrations of 1 ppb TEQ that have been previously identified in the river system. The data was collected such that the analytical results could be used to support a full human health and ecological risk assessment if necessary.

Dioxins characterized by the presence of 2,3,7,8-TCDD are present in the surface sediments of the river system below Lymansville Dam, however, most of the locations sampled showed concentrations below 1 ppb TEQ. The highest concentration of dioxin TEQ was found in sediment immediately behind the Lymansville dam, in the wash out areas behind the spillway. The only other location where dioxin TEQ was detected at concentrations above 1 ppb TEQ was on the west side of Manton Pond. The concentration at this location was calculated to be 1.01 ppb TEQ. Elevated concentrations near the dam are the likely result of direct discharges over the dam. Significant downstream migration of dioxins does not appear to be occurring.

The June 2000 Technical Memorandum concluded that it appeared that concentrations of dioxins decrease with distance downstream of the present location of the Centredale Manor apartment complex. The data collected and described in this report support that observation, since that concentrations of dioxin in aquatic sediment in Manton and Dyerville appear to be approximately one order of magnitude lower than those measured in Lymansville Pond. Furthermore, Lymansville Dam does appear to provide a barrier against downstream migration of dioxins, evidenced by the significant drop of dioxin concentrations in the Manton reach.

Other contaminants were also found in the river sediments during this investigation. Contaminants included polyaromatic hydrocarbons (PAHs), other SVOCs, pesticides and metals, which are not unexpected in industrial and urban river settings.

REFERENCES

REFERENCES

Agency for the Toxic Substances and Disease Registry, 1999. Dioxins: Answers to Frequently Asked Health Questions. ATSDR, Atlanta, GA

Office of Senator John Chaffee, September 17, 1996, News from the Senator John Chaffee, Chaffee Secures Funding for Historic Allendale Dam Restoration, 505 Dirksen Building, Washington DC.

Federal Emergency Management Agency, September 30, 1993. Flood Insurance Rate Map (FIRM) Town of North Providence Rhode Island, Panel 440020-0001. National Flood Insurance Program.

Federal Emergency Management Agency, September 30, 1993. Flood Insurance Rate Map (FIRM) Town of North Providence Rhode Island, Panel 440020-0002. National Flood Insurance Program.

Goldman Environmental Consultants, Inc. April 14, 1999. Boring logs for Brook Village. Subsurface Investigation, Brook Village, 2072 Smith Street, North Providence Rhode Island. GEC Inc., Braintree, MA.

IT Corporation, March 16, 2000. Final Site Investigation Report. Centredale Manor Restoration Project, North Providence Rhode Island. Submitted to USEPA under contract no. 68-R1-98-01. IT Corporation, Hopkinton MA.

Louis Federici and Associates. October 1999. North Providence Tax Plat No. 10. Louis Federici & Assoc. Providence Rhode Island.

Louis Federici and Associates. October 1999. North Providence Tax Plat No. 11. Louis Federici & Assoc. Providence Rhode Island

Louis Federici and Associates. October 1999. North Providence Tax Plat No. 12. Louis Federici & Assoc. Providence Rhode Island.

Louis Federici and Associates. October 1999. North Providence Tax Plat No. 14. Louis Federici & Assoc. Providence Rhode Island.

USEPA and Lockheed Martin, September 19, 1999. Final Report for Centredale Manor (Woonasquatucket River) North Providence Rhode Island. REAC Emergency Response Team. Submitted to USEPA under contract no. 68-C99-223. USEPA Office of Emergency Response, Boston MA.

Roy F. Weston, March 9, 1999. Final Summary Report for the Expanded Site Investigation, Centredale Manor Site, North Providence Rhode Island. Prepared for USEPA Region I, Under Contract No. 68-W5-0009. R.F. Weston, Burlington, MA

Tetra Tech NUS, Inc., September 1999. Sampling and Analysis Plan for Woonasquatucket River Sediment Investigation, Centredale Manor Site, North Providence Rhode Island. Prepared for USEPA under Contract No. 68-W6-045. TtNUS Inc. Wilmington, MA.

Tetra Tech NUS, Inc., October 1999. Draft Final Work Plan for Technical Assistance, Centredale Manor, North Providence Rhode Island. Prepared for USEPA under Contract no. 68-W6-045. TtNUS Inc. Wilmington, MA.

Tetra Tech NUS, Inc., October 4 1999. Meeting Notes, Centredale Manor Site, Sampling and Analysis Plan. Meeting held September 20, 1999. Notes prepared for attendees under RAC 1 WA no. 043-TATA-016P. TtNUS Inc. Wilmington, MA.

U.S. Army Corps of Engineers, April 2, 1999. Letter to Richard Boynton, Subject: Need for Further Site Characterizations of Dioxin Contamination at the Allendale Dam, North Providence Rhode Island. US Army Corps of Engineers, New England District, Concord MA.

USEPA, (United States Environmental Protection Agency), December 1999. Quality Assurance Project Plan For the Denver Front Range Dioxin Study. USEPA Region 8, Denver CO.

USEPA (United States Environmental Protection Agency), July 31, 1998. Woonasquatucket River Sediment/Water Quality Analysis Project Report. USEPA Region I New England, Office of Environmental Management and Evaluation Ecosystem Assessment. USEPA Lexington, MA.

USEPA (United States Environmental Protection Agency) August 23, 1999. Centredale Manor Indoor Air Survey, Final Report. USEPA New England Regional Laboratory, OEME, Lexington MA.

USEPA (United States Environmental Protection Agency) January 19, 2000. Memorandum Implementing FY 2000 Appropriations Report Language on Sediment Dredging. Stephen Luftig and Barry Breen, USEPA Washington DC.

USGS (United States Geological Survey) January 11, 2000. Distribution of Volatile Organic Compounds at the Interface Between Ground Water and Surface Water Determined with Water to Vapor Diffusion Samplers, Centredale Manor Site, North Providence Rhode Island. USGS Water Resources Division, 10 Bearfoot Road, Northborough MA

USGS (United States Geological Survey), March 2000. Water Elevations at the Woonasquatucket River Centredale Station no. 01114500. Centredale, RI.: http://waterdata.usgs.gov/nwis-w/RI/data.components/hist.cgi?statnum=01114500

Viswanathan, Tenkasi S. and Kleopfer, Robert D. 1986. The Presence of Hexachloroxanthene at Missouri Dioxin Sites. Chlorinated Dioxin and Dibenzofurans in Perspective. Lewis Publishers, Inc. Chelsea, MI

Wait, Dallas A. March 1999. Evolution of Organic Analytical Methods in Environmental Forensic Chemistry. International Journal of Environmental Forensics. ISSN 1523-1763.

APPENDIX A

SUMMARY OF ANALYTICAL RESULTS

Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Semivolatile Organic Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
1,1'-Biphenyl	500	U	180	J	400	U	460	U	990	U
2,2'-oxybis(1-Chloropropane)	500	U	920	U	400	U	460	U	990	U
2,4,5-Trichlorophenol	1200	U	2300	U	1000	U	1200	U	2500	U
2,4,6-Trichlorophenol	500	U	920	U	400	U	460	U	990	U
2,4-Dichlorophenol	500	U	920	U	400	U	460	U	990	U
2,4-Dimethylphenol	500	U	920	U	400	U	460	U	990	U
2,4-Dinitrophenol	1200	U	2300	U	1000	U	1200	U	2500	U
2,4-Dinitrotoluene	500	U	920	U	400	U	460	U	990	U
2,6-Dinitrotoluene	500	U	920	U	400	U	460	U	990	U
2-Chloronaphthalene	500	U	920	U	400	U	460	U	990	U
2-Chlorophenol	500	U	920	U	400	U	460	U	990	U
2-Methylnaphthalene	500	U	490	J	400	U	31	J	990	U
2-Methylphenol	500	U	920	U	400	U	460	U	990	U
2-Nitroaniline	1200	U	2300	U	1000	U	1200	U	2500	U
2-Nitrophenol	500	U	920	U	400	U	460	U	990	U
3,3'-Dichlorobenzidine	500	UJ	920	U	400	UJ	460	UJ	990	U
3-Nitroaniline	1200	U	2300	U	1000	U	1200	U	2500	U
4,6-Dinitro-2-methylphenol	1200	U	2300	U	1000	U	1200	U	2500	U
4-Bromophenyl-phenylether	500	U	920	U	400	U	460	U	990	U
4-Chloro-3-methylphenol	500	U	920	U	400	U	460	U	990	U
4-Chloroaniline	500	U	920	U	400	U	460	U	990	U
4-Chlorophenyl-phenylether	500	U	920	U	400	U	460	U	990	U
4-Methylphenol	500	U	920	U	400	U	460	U	990	U
4-Nitroaniline	1200	U	2300	U	1000	U	1200	U	2500	U
4-Nitrophenol	1200	U	2300	U	1000	U	1200	U	2500	U
Acenaphthene	500	U	2000		400	U	140	J	990	U
Acenaphthylene	500	U	210	J	43	J	160	J	990	U
Acetophenone	500	U	920	U	400	U	460	U	990	U
Anthracene	500	U	4000		79	J	550		990	U
Atrazine	500	U	920	U	400	U	73	J	990	U
Benzaldehyde	34	JEB	920	U	400	U	86	J	990	U
Benzo(a)anthracene	500	U	21000	*	380	J	2600		300	J
Benzo(a)pyrene	500	U	6500	J	310	J	2200		370	J
Benzo(b)fluoranthene	26	J	24000	J*	590		4000	*	640	J

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Benzo(g,h,i)perylene	500	U	3600	J	190	J	1600		220	J
Benzo(k)fluoranthene	500	U	2300	J	130	J	1100		200	J
Bis(2-Chloroethoxy)methane	500	U	920	U	400	U	460	U	990	U
Bis(2-Chloroethyl)ether	500	U	920	U	400	U	460	U	990	U
bis(2-Ethylhexyl)phthalate	60	J	230	J	600	J	1600	J*	430	J
Butylbenzylphthalate	500	UJ	920	U	76	J	340	J	990	U
Caprolactam	500	U	920	U	400	U	460	U	990	U
Carbazole	500	U	1300		37	J	410	J	52	J
Chrysene	500	U	19000	*	280	J	2400		460	J
Di-n-Butylphthalate	500	U	920	U	400	U	51	J	990	U
Di-n-octylphthalate	500	UJ	920	U	400	UJ	460	UJ	990	U
Dibenzo(a,h)anthracene	500	U	780	J	38	J	320	J	990	U
Dibenzofuran	500	U	1500		400	U	100	J	990	U
Diethylphthalate	500	U	920	U	400	U	460	U	990	U
Dimethylphthalate	500	U	920	U	400	U	460	U	990	U
Fluoranthene	38	J	51000	*	600		5400	*	810	J
Fluorene	500	U	2000		33	J	220	J	990	U
Hexachlorobenzene	500	U	920	U	400	U	460	U	990	U
Hexachlorobutadiene	500	U	920	U	400	U	460	U	990	U
Hexachlorocyclopentadiene	500	U	920	U	400	U	460	U	990	U
Hexachloroethane	500	U	920	U	400	U	460	U	990	U
Indeno(1,2,3-cd)pyrene	500	U	4400	J	280	J	2000		290	J
Isophorone	500	U	920	U	400	U	460	U	990	U
N-Nitroso-di-n-propylamine	500	U	920	U	400	U	460	U	990	U
N-Nitroso-diphenylamine	500	U	920	U	400	U	460	U	990	U
Naphthalene	500	U	880	J	400	U	39	J	990	U
Nitrobenzene	500	U	920	U	400	U	460	U	990	U
Pentachlorophenol	1200	U	2300	U	1000	U	1200	U	2500	U
Phenanthrene	500	U	40000	*	330	J	2900		300	J
Phenol	500	U	920	U	400	U	460	U	990	U
Pyrene	33	J	42000	*	600		4200	*	600	J

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Pesticide/PCB Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
4,4'-DDD	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
4,4'-DDE	5.0	U	5.0	U	4.0	U	7.0		5.0	U
4,4'-DDT	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Aldrin	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
alpha-BHC	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
alpha-Chlordane	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Aroclor-1016	49	U	47	U	40	U	48	U	50	U
Aroclor-1221	98	U	94	U	79	U	97	U	99	U
Aroclor-1232	49	U	47	U	40	U	48	U	50	U
Aroclor-1242	49	U	47	U	40	U	48	U	50	U
Aroclor-1248	49	U	47	U	40	U	48	U	50	U
Aroclor-1254	49	U	47	U	150		48	U	50	U
Aroclor-1260	49	U	47	U	40	U	48	U	50	U
beta-BHC	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
delta-BHC	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Dieldrin	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Endosulfan I	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Endosulfan II	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Endosulfan Sulfate	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Endrin	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Endrin Aldehyde	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
Endrin Ketone	5.0	U	5.0	U	4.0	U	5.0	U	5.0	U
gamma-BHC	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
gamma-Chlordane	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Heptachlor	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Heptachlor Epoxide	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Methoxychlor	25	U	23	U	20	U	24	U	25	U
Toxaphene	250	U	230	U	200	U	240	U	250	U

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
Dioxin Analysis (UG/KG)	D02179		D02191		D02185		D02186		D02193	
1,2,3,4,6,7,8-HpCDD	0.0053		0.0677	J	0.0579		0.13	J	0.622	
1,2,3,4,6,7,8-HpCDF	0.0014	J	0.0477		0.0158		0.0497	J	0.233	
~~1,2,3,4,7,8,9-HpCDF~~	~~0.00009~~	~~U~~	~~0.00080~~	~~EMPC~~	~~0.0015~~	~~J~~	~~0.0025~~	~~J~~	~~0.0055~~	
1,2,3,4,7,8-HxCDD	0.00004	U	0.00048	J	0.001	J	0.0018	EMPC	0.00099	EMPC
1,2,3,4,7,8-HxCDF	0.00017	U	0.0143	J	0.0028	J	0.0041	J	0.0095	
1,2,3,6,7,8-HxCDD	0.00015	J	0.003	J	0.0034	J	0.0083	J	0.0122	
1,2,3,6,7,8-HxCDF	0.00002	U	0.0053	J	0.0017	J	0.0032	J	0.0044	J
1,2,3,7,8,9-HxCDD	0.0001	EMPC	0.0019	EMPC	0.0025	J	0.006	J	0.0061	
1,2,3,7,8,9-HxCDF	0.00003	U	0.00048	EMPC	0.0003	U	0.0003	U	0.00053	EMPC
1,2,3,7,8-PeCDD	0.00002	U	0.0005	J	0.0016	J	0.0016	J	0.00064	J
1,2,3,7,8-PeCDF	0.00002	U	0.0028	J	0.0002	U	0.0002	U	0.0012	EMPC
1,2,4,5,7,8-hexachloro(9H)xanthene			0.0625	J	0.035	J	0.0368	J	0.263	J
2,3,4,6,7,8-HxCDF	0.00002	U	0.0068		0.0025	J	0.004	J	0.007	
2,3,4,7,8-PeCDF	0.00002	U	0.0059		0.0014	EMPC	0.0016	J	0.0027	EMPC
2,3,7,8-TCDD	0.024		0.115	J	0.129		0.144	J	0.982	$
2,3,7,8-TCDF	0.00016	EMPC	0.0149		0.0047		0.0067	J	0.0112	
OCDD	0.0615	J	0.427	J	0.36		0.737	J	12.33	$
OCDF	0.0019	J	0.0762	J	0.0397		0.0937	J	1.34	
Total HpCDD	0.01	J	0.132	J	0.105	J	0.242	J	1.28	J
Total HpCDF	0.0014	UJ	0.0943	J	0.0403	J	0.111	J	1.03	J
Total HxCDD	0.0011	JEB	0.0091	JEB	0.0233	JEB	0.0435	JEB	0.0952	JEB
Total HxCDF	0.0026	EMPC	0.118	J	0.0456	J	0.0542	J	0.263	J
Total PeCDD	0.00036	EMPC	0.0016	J	0.0073	J	0.0061	J	0.0023	J
Total PeCDF	0.00036	J	0.124	J	0.0638	J	0.056	J	0.0758	J
Total TCDD	0.0259	J	0.134	J	0.143	J	0.157	J	0.982	J$
Total TCDF	0.0037	UJ	0.103	J	0.0712	J	0.0621	J	0.105	J
Toxicity Equivalency	0.0242	J	0.125	J	0.134	J	0.152	J	1.01	J

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	CMS-DU-091900A		CMS-DU-092100A		DYP-SD-2065-01		DYP-SD-2066-01		MAP-SD-2058-01	
Date Sampled	9/19/2000		9/21/2000		9/19/2000		9/19/2000		9/20/2000	
QC Identifier	Field Dup. WRM-SD-2056-01		Field Dup. MAP-SD-2061-01		None		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	55.7		59		62.2		42		42.7	
TAL Metal Analysis (MG/KG)	D02179		D02191		D02185		D02186		D02193	
Aluminum	4750		2000		3000		3190		2470	
Antimony	0.59	UJ	1.3	J	0.84	UJ	0.60	UJ	0.57	UJ
Arsenic	1.6	J	2.6	J	1.2	J	2.1	J	0.97	J
Barium	29.5		45.1		31.7		55.8		38.1	
Beryllium	0.99		0.33		0.28		0.65		0.43	
Cadmium	0.52	UJ	1.5	J	0.57	UJ	0.73	J	0.96	J
Calcium	851		899		789		1590		1390	
Chromium	6.5	J	21.6	J	10.7	J	70.8	J	17.5	J
Cobalt	2.8		2.0		3.4		5.0		3.5	
Copper	2.4		108		12.5		48.9		63.5	
Iron	8010	J	8500	J	8070	J	7960	J	4770	J
Lead	10.2	J	1230	J	39.8	J	132	J	91.0	J
Magnesium	707		363		1410		932		523	
Manganese	260	J	78.5	J	184	J	214	J	219	J
Mercury	0.04	U	0.27	U	0.03	U	0.22	U	0.04	UJ
Nickel	3.2	UJ	12.6	J	9.9	UJ	17.0	J	11.0	UJ
Potassium	269	U	544	U	252	U	400	U	347	U
Selenium	0.48	UJ	0.56	UJ	0.52	UJ	0.48	UJ	0.46	UJ
Silver	0.55	U	0.84	UJ	0.60	U	0.74	UJ	0.56	UJ
Sodium	98.0		77.0		51.9	U	110		77.4	
Thallium	1.02	U	1.19	U	1.11	U	1.03	U	0.99	U
Vanadium	8.6		6.6		8.9		10.8		7.1	
Zinc	19.2		106		55.9		172		161	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02179		D02191		D02185		D02186		D02193	
Acid Volatile Sulfide	1.0	UJ	2.0	J	1.0	UJ	2.0	J	4.0	J
Cadmium	0.0014	J	0.012		0.0011	J	0.0074	J	0.0075	J
Copper	0.028	J	0.91	J	0.46	J	0.61	J	0.41	J
Lead	0.044	J	0.46	J	0.22	J	0.59	J	0.67	J
Mercury	0.00005	J	0.00005	J	0.0001	J		R		R
Nickel	0.039	UJ	0.15	J	0.27		0.22		0.15	J
Zinc	0.25	U	1.9		1.4		2.5		2.4	
Total Organic Carbon Analysis (MG/KG)	D02179		D02191		D02185		D02186		D02193	
Total Organic Carbon	13200		54200		1350		20400		41600	

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		56		50		77	
Semivolatile Organic Analysis (UG/KG)	D02303		D02301		D02192		D02182		D02183	
1,1'-Biphenyl	960	U	460	U	120	J	500	U	430	U
2,2'-oxybis(1-Chloropropane)	960	U	460	U	990	U	500	U	430	U
2,4,5-Trichlorophenol	2400	U	1200	U	2500	U	1200	U	1100	U
2,4,6-Trichlorophenol	960	U	460	U	990	U	500	U	430	U
2,4-Dichlorophenol	960	U	460	U	990	U	500	U	430	U
2,4-Dimethylphenol	960	U	460	U	990	U	500	U	430	U
2,4-Dinitrophenol	2400	U	1200	U	2500	U	1200	U	1100	U
2,4-Dinitrotoluene	960	U	460	U	990	U	500	U	430	U
2,6-Dinitrotoluene	960	U	460	U	990	U	500	U	430	U
2-Chloronaphthalene	960	U	460	U	990	U	500	U	430	U
2-Chlorophenol	960	U	460	U	990	U	500	U	430	U
2-Methylnaphthalene	960	U	460	U	240	J	500	U	430	U
2-Methylphenol	960	U	460	U	990	U	500	U	430	U
2-Nitroaniline	2400	U	1200	U	2500	U	1200	U	1100	U
2-Nitrophenol	960	U	460	U	990	U	500	U	430	U
3,3'-Dichlorobenzidine	960	U	460	U	990	U	500	UJ	430	UJ
3-Nitroaniline	2400	U	1200	U	2500	U	1200	U	1100	U
4,6-Dinitro-2-methylphenol	2400	U	1200	U	2500	U	1200	U	1100	U
4-Bromophenyl-phenylether	960	U	460	U	990	U	500	U	430	U
4-Chloro-3-methylphenol	960	U	460	U	990	U	500	U	430	U
4-Chloroaniline	960	U	460	U	990	U	500	U	430	U
4-Chlorophenyl-phenylether	960	U	460	U	990	U	500	U	430	U
4-Methylphenol	960	U	460	U	990	U	500	U	430	U
4-Nitroaniline	2400	U	1200	U	2500	U	1200	U	1100	U
4-Nitrophenol	2400	U	1200	U	2500	U	1200	U	1100	U
Acenaphthene	960	U	460	UJ	2300		500	U	430	U
Acenaphthylene	960	U	460	U	420	J	47	J	430	U
Acetophenone	960	U	460	U	990	U	500	U	430	U
Anthracene	960	U	460	U	5900		100	J	430	U
Atrazine	960	U	460	U	990	U	500	U	430	U
Benzaldehyde	960	U	460	U	990	U	31	JEB	430	U
Benzo(a)anthracene	110	J	25	J	18000	*	1000		430	U
Benzo(a)pyrene	130	J	32	J	15000	J*	840		430	U
Benzo(b)fluoranthene	230	J	55	J	18000	*	1400		22	J

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
Benzo(g,h,i)perylene	100	J	23	J	6300	J	510		430	U
Benzo(k)fluoranthene	100	J	460	U	4600	J	370	J	6	J
Bis(2-Chloroethoxy)methane	960	U	460	U	990	U	500	U	430	U
Bis(2-Chloroethyl)ether	960	U	460	U	990	U	500	U	430	U
bis(2-Ethylhexyl)phthalate	310	J	180	J	890	J	1000	J	95	J
Butylbenzylphthalate	96	J	460	U	990	U	460	J	430	UJ
Caprolactam	960	U	460	U	990	U	500	U	430	U
Carbazole	960	U	460	U	1600		82	J	430	U
Chrysene	180	J	42	J	18000	*	1100		430	U
Di-n-Butylphthalate	960	U	460	U	990	U	500	U	34	J
Di-n-octylphthalate	960	U	460	U	990	U	500	UJ	430	UJ
Dibenzo(a,h)anthracene	960	U	460	U	1300		130	J	430	U
Dibenzofuran	960	U	460	U	1400		500	U	430	U
Diethylphthalate	960	U	460	U	990	U	500	U	430	U
Dimethylphthalate	960	U	460	U	990	U	500	U	430	U
Fluoranthene	290	J	88	J	46000	*	1700		23	J
Fluorene	960	U	460	U	2200		36	J	430	U
Hexachlorobenzene	960	U	460	U	990	U	500	U	430	U
Hexachlorobutadiene	960	U	460	U	990	U	500	U	430	U
Hexachlorocyclopentadiene	960	U	460	U	990	U	500	U	430	U
Hexachloroethane	960	U	460	U	990	U	500	U	430	U
Indeno(1,2,3-cd)pyrene	120	J	28	J	7700	J	650		430	U
Isophorone	960	U	460	U	990	U	500	U	430	U
N-Nitroso-di-n-propylamine	960	U	460	UJ	990	U	500	U	430	U
N-Nitroso-diphenylamine	960	U	460	U	990	U	500	U	430	U
Naphthalene	960	U	460	U	250	J	500	U	430	U
Nitrobenzene	960	U	460	U	990	U	500	U	430	U
Pentachlorophenol	2400	U	1200	U	2500	U	1200	U	1100	U
Phenanthrene	99	J	23	J	35000	*	790		430	U
Phenol	960	U	460	U	990	U	500	U	430	U
Pyrene	240	J	51	J	42000	*	1600		430	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
Pesticide/PCB Analysis (UG/KG)	D02303		D02301		D02192		D02182		D02183	
4,4'-DDD	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
4,4'-DDE	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
4,4'-DDT	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Aldrin	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
alpha-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
alpha-Chlordane	4.0		2.0	U	2.0	U	3.0	U	2.0	U
Aroclor-1016	49	U	45	U	47	U	50	U	43	U
Aroclor-1221	98	U	90	U	93	U	100	U	87	U
Aroclor-1232	49	U	45	U	47	U	50	U	43	U
Aroclor-1242	49	U	45	U	47	U	50	U	43	U
Aroclor-1248	49	U	45	U	47	U	50	U	43	U
Aroclor-1254	49	U	45	U	47	U	50	U	43	U
Aroclor-1260	49	U	45	U	47	U	50	U	43	U
beta-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
delta-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
Dieldrin	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endosulfan I	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
Endosulfan II	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endosulfan Sulfate	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin Aldehyde	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin Ketone	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
gamma-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
gamma-Chlordane	5.0		2.0	U	2.0	U	3.0	U	2.0	U
Heptachlor	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
Heptachlor Epoxide	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U
Methoxychlor	24	U	23	U	23	U	25	U	22	U
Toxaphene	240	U	230	U	230	U	250	U	220	U

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		58		50		77	
Dioxin Analysis (UG/KG)	D02303		D02301		D02192		D02182		D02183	
1,2,3,4,6,7,8-HpCDD	0.0312		0.0184		0.0331	J	0.024		0.0017	J
1,2,3,4,6,7,8-HpCDF	0.0083		0.0039	J	0.0506		0.0071		0.00078	U
1,2,3,4,7,8,9-HpCDF	0.00022	J	0.00007	U	0.00098	J	0.00054	EMPC	0.0002	U
1,2,3,4,7,8-HxCDD	0.00014	EMPC	0.00005	U	0.00045	J	0.00083	EMPC	0.0002	U
1,2,3,4,7,8-HxCDF	0.0005	EMPC	0.00027	U	0.021	J	0.0025	J	0.00041	U
1,2,3,6,7,8-HxCDD	0.00054	J	0.00026	J	0.0015	J	0.0027	J	0.0002	U
1,2,3,6,7,8-HxCDF	0.00031	U	0.00016	U	0.0072	J	0.0021	J	0.00021	U
1,2,3,7,8,9-HxCDD	0.00043	EMPC	0.00027	J	0.0013	EMPC	0.0023	J	0.0002	U
1,2,3,7,8,9-HxCDF	0.00005	EMPC	0.00004	U	0.00033	J	0.001	EMPC	0.0002	U
1,2,3,7,8-PeCDD	0.00009	U	0.00008	EMPC	0.00039	EMPC	0.0011	J	0.0002	U
1,2,3,7,8-PeCDF	0.00007	U	0.00003	U	0.0037	J	0.0001	U	0.0002	U
1,2,4,5,7,8-hexachloro(9H)xanthene	0.0704	J	0.0188	J	0.0334	J				
2,3,4,6,7,8-HxCDF	0.00044	J	0.00017	EMPC	0.0076		0.0041	J	0.00018	EMPC
2,3,4,7,8-PeCDF	0.00025	EMPC	0.00017	J	0.0067	EMPC	0.002	J	0.0002	U
2,3,7,8-TCDD	0.19		0.109	J	0.0576	J	0.0034		0.0002	U
2,3,7,8-TCDF	0.0014		0.0009	J	0.0136		0.0034		0.00056	J
OCDD	0.266	J	0.132		0.276	J	0.181		0.0082	U
OCDF	0.0084	J	0.0043	J	0.0471	J	0.0165		0.00074	J
Total HpCDD	0.0652	J	0.0312	J	0.0679	J	0.049	J	0.003	J
Total HpCDF	0.0165	J	0.0041	J	0.0736	J	0.0153	J	0.00078	UJ
Total HxCDD	0.0045	JEB	0.0011	JEB	0.0019	JEB	0.027	JEB	0.00052	JEB
Total HxCDF	0.0146	J	0.0039	UJ	0.116	J	0.0584	J	0.0014	EMPC
Total PeCDD	0.0012	EMPC	0.001	EMPC	0.0124	EMPC	0.0064	J	0.0005	J
Total PeCDF	0.0067	J	0.0038	J	0.0614	J	0.0858	J	0.0012	J
Total TCDD	0.193	J	0.109	J	0.064	J	0.0075	J	0.00036	EMPC
Total TCDF	0.013	J	0.0064	J	0.0694	J	0.0435	J	0.0015	EMPC
Toxicity Equivalency	0.191	J	0.11	J	0.0676	J	0.00736	J	0.0000917	J

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	MAP-SD-2059-01		MAP-SD-2060-01		MAP-SD-2061-01		RAB-SD-2069-01		RAB-SD-2070-01	
Date Sampled	9/20/2000		9/20/2000		9/21/2000		9/18/2000		9/18/2000	
QC Identifier	None		None		Field Dup. MAP-SD-2061-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	43		71.6		56		50		77	
TAL Metal Analysis (MG/KG)	D02303		D02301		D02192		D02182		D02183	
Aluminum	1600		2390		2400		2980		3120	
Antimony	0.61	UJ	0.59	UJ	2.5	J	0.57	UJ	0.58	UJ
Arsenic	0.75	J	0.60	J	13.7	J	0.84	J	0.45	UJ
Barium	18.7		16.3		64.1		26.4		30.3	
Beryllium	0.28		0.23		0.47		0.42		0.41	
Cadmium	0.63	J	0.52	UJ	2.2	J	0.51	UJ	0.51	UJ
Calcium	682		621		1390		1110		710	
Chromium	18.6	J	4.2	J	40.8	J	5.9	J	3.7	J
Cobalt	1.9		1.6		6.0		3.8		2.1	
Copper	21.0		4.0		119		7.9		11.7	
Iron	3370	J	3900	J	37900	J	6780	J	5230	J
Lead	34.0	J	12.7	J	278	J	34.6	J	8.5	J
Magnesium	431		513		457		1060		1000	
Manganese	67.8	J	98.8	J	241	J	161	J	99.9	J
Mercury	0.05	U	0.02	UJ	0.11	U	0.04	U	0.02	UJ
Nickel	5.9	UJ	3.3	UJ	92.2	J	6.7	UJ	6.6	UJ
Potassium	371	U	372	U	363	UJ	368	U	412	U
Selenium	0.49	UJ	0.47	UJ		R	0.46	UJ	0.46	UJ
Silver	0.56	U	0.54	U	0.70	UJ	0.53	U	0.53	U
Sodium	48.6	U	47.8	U	117		74.9		57.4	
Thallium	1.05	U	1.01	U	1.05	U	0.99	U	1.0	U
Vanadium	5.2		4.8		8.6		7.4		5.8	
Zinc	51.5		23.0		178		46.4		28.0	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02303		D02301		D02192		D02182		D02183	
Acid Volatile Sulfide	1.0	UJ	1.0	UJ	4.0	J	1.0	UJ	1.0	UJ
Cadmium	0.0052	J	0.002	U	0.0069		0.0026	J	0.00018	U
Copper	0.14	J	0.035	J	0.51	J	0.12	J	0.14	J
Lead	0.096	J	0.039	J	0.83	J	0.21	J	0.029	J
Mercury		R		R		R		R		R
Nickel	0.099	J	0.029	UJ	0.14		0.11	J	0.051	UJ
Zinc	0.50	U	0.27	U	2.9		0.94		0.35	U
Total Organic Carbon Analysis (MG/KG)	D02303		D02301		D02192		D02182		D02183	
Total Organic Carbon	11400		4050		39800		6640		128	U

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		61	
Semivolatile Organic Analysis (UG/KG)	D02302		D02304		D02187		D02306		D02188	
1,1'-Biphenyl	990	U	990	UJ	500	U	990	U	400	U
2,2'-oxybis(1-Chloropropane)	990	U	990	UJ	500	U	990	U	400	U
2,4,5-Trichlorophenol	2500	U	2500	UJ	1200	U	2500	U	1000	U
2,4,6-Trichlorophenol	990	U	990	UJ	500	U	990	U	400	U
2,4-Dichlorophenol	990	U	990	UJ	500	U	990	U	400	U
2,4-Dimethylphenol	990	U	990	UJ	500	U	990	U	400	U
2,4-Dinitrophenol	2500	U	2500	UJ	1200	U	2500	U	1000	U
2,4-Dinitrotoluene	990	U	1200	J	500	U	990	U	400	U
2,6-Dinitrotoluene	990	U	990	UJ	500	U	990	U	400	U
2-Chloronaphthalene	990	U	990	UJ	500	U	990	U	400	U
2-Chlorophenol	990	U	1800	J	500	U	990	U	400	U
2-Methylnaphthalene	990	U	990	UJ	500	U	100	J	400	U
2-Methylphenol	990	U	990	UJ	500	U	990	U	400	U
2-Nitroaniline	2500	U	2500	UJ	1200	U	2500	U	1000	U
2-Nitrophenol	990	U	990	UJ	500	U	990	U	400	U
3,3'-Dichlorobenzidine	990	U	990	UJ	500	U	990	U	400	U
3-Nitroaniline	2500	U	2500	UJ	1200	U	2500	U	1000	U
4,6-Dinitro-2-methylphenol	2500	U	2500	UJ	1200	U	2500	U	1000	U
4-Bromophenyl-phenylether	990	U	990	UJ	500	U	990	U	400	U
4-Chloro-3-methylphenol	990	U	2200	J	500	U	990	U	400	U
4-Chloroaniline	990	U	990	UJ	500	U	990	U	400	U
4-Chlorophenyl-phenylether	990	U	990	UJ	500	U	990	U	400	U
4-Methylphenol	990	U	990	UJ	500	U	990	U	400	U
4-Nitroaniline	2500	U	2500	UJ	1200	U	2500	U	1000	U
4-Nitrophenol	2500	U	2200	J	1200	U	2500	U	1000	U
Acenaphthene	110	J	1800	J	500	U	560	J	48	J
Acenaphthylene	62	J	180	J	500	U	240	J	400	U
Acetophenone	990	U	990	UJ	500	U	990	U	400	U
Anthracene	300	J	970	J	500	U	1400		160	J
Atrazine	990	U	990	UJ	500	U	990	U	400	U
Benzaldehyde	93	JEB	170	JEB	500	U	120	JEB	400	U
Benzo(a)anthracene	1100		5500	J	20	J	4900		980	
Benzo(a)pyrene	1100		3900	J	190	J	3500		820	
Benzo(b)fluoranthene	1800		13000	J*	500	U	6500		1500	

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		61	
Benzo(g,h,i)perylene	650	J	3800	J	500	U	2100		520	
Benzo(k)fluoranthene	490	J	490	J	500	U	1800		470	
Bis(2-Chloroethoxy)methane	990	U	990	UJ	500	U	990	U	400	U
Bis(2-Chloroethyl)ether	990	U	990	UJ	500	U	990	U	400	U
bis(2-Ethylhexyl)phthalate	930	J	50000	J*	100	J	4700		850	
Butylbenzylphthalate	990	U	990	UJ	500	U	990	U	54	J
Caprolactam	990	U	990	UJ	500	U	990	U	400	U
Carbazole	190	J	320	J	500	U	850	J	180	J
Chrysene	1200		4100	J	24	J	3500		950	
Di-n-Butylphthalate	990	U	1800	J	500	U	990	U	400	U
Di-n-octylphthalate	990	U	990	UJ	500	U	990	U	400	U
Dibenzo(a,h)anthracene	130	J	620	J	500	U	450	J	110	J
Dibenzofuran	76	J	220	J	500	U	310	J	27	J
Diethylphthalate	990	U	990	UJ	500	U	990	U	400	U
Dimethylphthalate	990	U	990	UJ	500	U	990	U	400	U
Fluoranthene	2600		3300	J	39	J	9500	*	2000	
Fluorene	140	J	470	J	500	U	660	J	71	J
Hexachlorobenzene	990	U	990	UJ	500	U	990	U	400	U
Hexachlorobutadiene	990	U	990	UJ	500	U	990	U	400	U
Hexachlorocyclopentadiene	990	U	990	UJ	500	U	990	U	400	U
Hexachloroethane	990	U	990	UJ	500	U	990	U	400	U
Indeno(1,2,3-cd)pyrene	800	J	3900	J	500	U	2700		720	
Isophorone	990	U	990	UJ	500	U	990	U	400	U
N-Nitroso-di-n-propylamine	990	U	1400	J	500	U	990	U	400	U
N-Nitroso-diphenylamine	990	U	990	UJ	500	U	990	U	400	U
Naphthalene	990	U	110	J	500	U	160	J	400	U
Nitrobenzene	990	U	990	UJ	500	U	990	U	400	U
Pentachlorophenol	2500	U	1400	J	1200	U	2500	U	1000	U
Phenanthrene	1600		4400	J	500	U	5600		1200	
Phenol	990	U	1900	JEB	500	U	990	U	400	U
Pyrene	2400		6500	J	41	J	7100	*	1900	

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Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		61	
Pesticide/PCB Analysis (UG/KG)	D02302		D02304		D02187		D02305		D02188	
4,4'-DDD	92	*	5.0	U	5.0	U	52		4.0	U
4,4'-DDE	5.0	U	11		5.0	U	48		4.0	U
4,4'-DDT	520	*	5.0	U	5.0	U	5.0	U	4.0	U
Aldrin	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
alpha-BHC	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
alpha-Chlordane	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Aroclor-1016	50	U	50	U	50	U	50	U	40	U
Aroclor-1221	100	U	100	U	100	U	100	U	80	U
Aroclor-1232	50	U	50	U	50	U	50	U	40	U
Aroclor-1242	50	U	50	U	50	U	50	U	40	U
Aroclor-1248	50	U	50	U	50	U	50	U	40	U
Aroclor-1254	50	U	50	U	50	U	2200	*	40	U
Aroclor-1260	50	U	50	U	50	U	50	U	40	U
beta-BHC	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
delta-BHC	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Dieldrin	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endosulfan I	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Endosulfan II	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endosulfan Sulfate	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin Aldehyde	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
Endrin Ketone	5.0	U	5.0	U	5.0	U	5.0	U	4.0	U
gamma-BHC	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
gamma-Chlordane	3.0	U	3.0	U	3.0	U	3.0	U	4.0	
Heptachlor	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Heptachlor Epoxide	3.0	U	3.0	U	3.0	U	3.0	U	2.0	U
Methoxychlor	25	U	25	U	25	U	25	U	20	U
Toxaphene	250	U	250	U	250	U	250	U	200	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; NA - Not Analyzed

Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		61	
Dioxin Analysis (UG/KG)	D02302		D02304		D02187		D02305		D02188	
1,2,3,4,6,7,8-HpCDD	0.531		0.921		0.006	EMPC	0.69	J	0.30	
1,2,3,4,6,7,8-HpCDF	2.67	$	0.251		0.0018	EMPC	0.305	J	0.0462	
1,2,3,4,7,8,9-HpCDF	0.106		0.0136	EMPC	0.0019	UJ	0.0069	J	0.0054	
1,2,3,4,7,8-HxCDD	0.019		0.0088		0.0015	UJ	0.0068	J	0.0029	J
1,2,3,4,7,8-HxCDF	0.592		0.0242		0.001	UJ	0.0363	J	0.0029	J
1,2,3,6,7,8-HxCDD	0.0342		0.0319		0.0015	UJ	0.0318	J	0.0105	
1,2,3,6,7,8-HxCDF	0.178		0.0188		0.0009	UJ	0.0217	J	0.0022	J
1,2,3,7,8,9-HxCDD	0.0626		0.0265		0.0015	UJ	0.0317	J	0.0081	
1,2,3,7,8,9-HxCDF	0.0077	EMPC	0.003	J	0.0013	UJ	0.0022	EMPC	0.0004	U
1,2,3,7,8-PeCDD	0.0085		0.0037	J	0.0014	UJ	0.0173	J	0.0018	J
1,2,3,7,8-PeCDF	0.0372		0.0033	J	0.0016	J	0.005	EMPC	0.0003	U
1,2,4,5,7,8-hexachloro(9H)xanthene	0.114	J	0.254	J			1.71	J		
2,3,4,6,7,8-HxCDF	0.223		0.0189		0.001	UJ	0.0263	J	0.0032	J
2,3,4,7,8-PeCDF	0.0929		0.0047	EMPC	0.001	UJ	0.0187	J	0.0003	U
2,3,7,8-TCDD	0.26		0.678	$	0.0233	J	0.586	J$	0.0064	
2,3,7,8-TCDF	0.101		0.0188		0.0008	UJ	0.0642	J	0.0014	
OCDD	2.66	J	6.97	$	0.0495	J	0.522	J$	2.1	
OCDF	1.25	J	0.545	J	0.0035	EMPC	0.302	J	0.276	
Total HpCDD	1.14	J	1.74	J	0.007	J	1.32	J	0.456	J
Total HpCDF	3.76	J$	0.56	J	0.0022	J	0.577	J	0.175	J
Total HxCDD	0.451	JEB	0.251	JEB	0.0015	UJ	0.319	JEB	0.0508	JEB
Total HxCDF	1.97	J	0.379	J	0.0025	UJ	0.65	J	0.0349	J
Total PeCDD	0.0452	J	0.006	J	0.0028	EMPC	0.101	J	0.0018	J
Total PeCDF	1.03	J	0.257	J	0.0018	J	1.03	J	0.0158	J
Total TCDD	0.315	J	0.678	J$	0.0299	J	0.828	J$	0.008	J
Total TCDF	0.552	J	0.183	J	0.0123	J	0.17	J$	0.0113	J
Toxicity Equivalency	0.471	J	0.716	J	0.0235	J	0.637	J	0.0183	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; NA - Not Analyzed

Analytical Results for Sediment Collected October 2000
Centredale Manor Restoration Project Site
North Providence, Rhode Island

Sample Number	WRD-SD-2063-01		WRM-SD-2055-01		WRM-SD-2056-01		WRM-SD-2057-01		WRM-SD-2062-01	
Date Sampled	9/20/2000		9/20/2000		9/19/2000		9/20/2000		9/19/2000	
QC Identifier	None		None		Field Dup. WRM-SD-2056-01		None		None	
Depth (ft)	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
Percent Solids	36		35		58		25.6		81	
TAL Metal Analysis (MG/KG)	D02302		D02304		D02187		D02305		D02188	
Aluminum	3240		8140		4390		7380		2580	
Antimony	3.4	J	5.3	J	0.60	UJ	0.66	J	0.58	UJ
Arsenic	6.3	J	5.1	J	1.1	J	8.5	J	1.2	J
Barium	228		155		30.0		105		21.9	
Beryllium	0.68		0.71		1.0		1.4		0.31	
Cadmium	95.1		23.9		0.53	UJ	3.7	J	0.51	U
Calcium	2290		1810		795		3260		560	
Chromium	45.6	J	80.0	J	5.3	J	310	J	17.5	J
Cobalt	5.1		9.3		2.5		17.3		3.1	
Copper	148		1110		1.5		164		6.6	
Iron	22200	J	11500	J	4770	J	20500	J	9970	J
Lead	553	J	721	J	8.9	J	446	J	26.4	J
Magnesium	835		1960		600		1620		1320	
Manganese	319	J	484	J	155	J	414	J	232	J
Mercury	0.40	U	0.28	U	0.04	U	0.27	UJ	0.02	UJ
Nickel	30.5	J	187	J	3.1	UJ	141	J	7.0	UJ
Potassium	381	UJ	1110		198	U	848	J	672	
Selenium	0.47	UJ	0.48	UJ	0.49	UJ	0.47	UJ	0.47	UJ
Silver	1.6	U	4.6		0.56	U	1.6	U	0.63	UJ
Sodium	132		137		90.5		207		42.4	U
Thallium	1.01	U	1.02	U	1.04	U	1.01	U	1.01	U
Vanadium	12.6		32.5		7.2		38.2		7.9	
Zinc	814		1050		14.2		491		42.3	
Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (UMOL/G)	D02302		D02304		D02187		D02305		D02188	
Acid Volatile Sulfide	1.0	J	4.0	J	1.0	UJ	4.0	J	1.0	UJ
Cadmium	0.052		0.16		0.00071	J	0.027		0.00089	J
Copper	1.8	J	15.3	J	0.015	J	2.0	J	0.076	J
Lead	1.2	J	2.7	J	0.031	J	2.1	J	0.088	J
Mercury	0.0001	J	0.0001	J		R		R		R
Nickel	0.52		1.4		0.027	UJ	1.2		0.051	UJ
Zinc	13.6		14.3		0.17	U	7.8		0.61	U
Total Organic Carbon Analysis (MG/KG)	D02302		D02304		D02187		D02305		D02188	
Total Organic Carbon	44500		79700		11500		76600		1980	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; NA - Not Analyzed

APPENDIX B

DATA VALIDATION MEMORANDA

File N 0400-26

Steve Stodola
US EPA Approval Signature

12/11/00
Date

December 1, 2000
B-00-12-W-02
Revised: December 11, 2000

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Re: WA No. 01-00-4-02, Task No. 2, TDF No. 479
Case No. 0176H/SDG No. D02179
Triangle Laboratories - Durham, NC
Woonasquatucket River/Centredale Manor, North Providence, RI

Dioxin/Furan and HCX: 15/Sediments/D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305 (Field Duplicate Pairs/D02191 and D02192, D02179 and D02187)

2/PE/D02189 (PC01018), D02190 (PC00793)

1/Aqueous Equipment Blank reported in SDG D02184/ D02184

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan and 124578-hexachloro(9H) xanthene (HCX) analytical data for 15 sediment, one equipment blank, and two PE samples collected by Tetra Tech NUS, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in North Providence, RI. The samples were analyzed according to EPA Method 8290A Rev. 1, January 1998 and Tetra Tech NUS, Inc.'s Technical Specification, Analysis of Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000. The samples were validated using first the criteria in Tetra Tech NUS, Inc.'s Technical Specification, Analysis of Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000 EPA as well as additional criteria in Method 8290A Rev. 1, January 1998, defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria, and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/01/00). The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)

*	•	Preservation and Technical Holding Times
*	•	PE Samples/Accuracy Check
*	•	Window Defining Mix
*	•	Initial and Continuing Calibrations
*	•	Chromatographic Resolution
*	•	Instrument Sensitivity Check
	•	Blanks
	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory and Field Duplicates
	•	Internal/Clean-up Standards
*	•	Sample Analysis and Identification
	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
	•	System Performance

* - All criteria were met for this parameter.

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine presence of contamination.
- To perform human health and ecological risk assessment.
- Later, the data will be used for engineering evaluation of remedial actions.

Two single blind performance evaluation (PE) samples (fortified native soil PC00793/D02190, and fortified native soil blank PC01018/D02189,) were evaluated for this SDG. All congeners were scored "Within Warning Limits" for the fortified native soil and "Within Limits" for the fortified native soil blank.

The low level positive results found in the clean-up and equipment blanks do not have a significant effect on the usability of the high level results found in the field samples. The sample data can be used for the site objectives. Standard validation procedures have been applied to account for the possibility of false positives due to blank contamination and qualifiers have been applied to the data where needed. See Table I for details of blank contamination.

124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound in the HxCDD descriptor window using the mass ions of 390 and 392. Qualitative identification was determined if the peaks in the HxCDD descriptor window met ion ratio criteria of 1.96 to 2.66. HCX was quantitated using the area of ^{13}C-123678-HxCDD as the internal standard and a Relative Response Factor (RRF) of 1.0. The reported concentrations of HCX are approximate values and therefore, are reported as estimated (J) values on the Data Summary Tables, since no independent standard for HCX was analyzed.

Data Completeness (CSF Audit - Tier I)

The data validation revealed missing information and/or discrepancies in the data package submitted by the laboratory. The following missing information/discrepancies are noted:

1. The laboratory was asked to submit the missing DC-2 forms for both SDGs. (The initial SDG delivery and the sample dilution SDG)

2. The laboratory was asked to submit the HCX data as required by the Technical Specifications.

3. The laboratory was asked to submit the ending calibration standard T005006 analyzed on 10/13/00.

4. The laboratory was asked to submit the TLI blank T004996 as the required instrument blank. Also, the laboratory was asked to identify and submit the instrument blank for the 12 hour period associated with the sequence beginning with the calibration standard with the filename S004609 analyzed on 10/13/00.

5. The laboratory was asked to submit the ending calibration standard T005151 analyzed on 10/21/00.

6. The data validator was unable to duplicate the HCX results for the following samples: D02192, D02179, D02185, and D02186. The laboratory was asked to clarify how they obtained the total area counts of HCX used to calculate the concentrations reported for these samples.

Items 1 thru 4 were requested via the WAM on October 30, 2000. Item 5 was requested on November 8, 2000. Item 6 was requested on November 22, 2000. Items 1 thru 4 were received November 21, 2000. Item 5 was received November 22, 2000. Item 6 was received on November 28, 2000. Items 1 thru 6 were adequately addressed.

Blanks

All of the blanks associated with this case were checked for possible sources of contamination. The following table summarizes the highest concentration that was detected in any blank for each analyte respectively. It also lists the action levels and the samples affected:

- Clean-up Blank

Compound	Type of Blank	Blank Concentration ng/Kg	Action Level ng/Kg	Samples Affected
OCDD	Clean-up Blank# (10/12/00)	1.2	12	D02183
123478-HxCDF	Clean-up Blank# (10/12/00)	0.24	1.2	D02179, D02183, D02301, D02303
123678-HxCDF	Clean-up Blank# (10/12/00)	0.22	1.1	D02183, D02301, D02303
1234678-HpCDF	Clean-up Blank# (10/12/00)	0.16	0.80	D02183
Total TCDF	Clean-up Blank# (10/12/00)	0.37*	3.7	D02179$, D02183
Total HxCDF	Clean-up Blank# (10/12/00)	0.45	4.5	D02179, D02183, D02187, D02301$
Total HpCDF	Clean-up Blank# (10/12/00)	0.16	1.6	D02179$, D02183

- Equipment Blank

Compound	Type of Blank	Blank Concentration pg/L	Action Level	Samples Affected
Total HxCDD	Equipment Blank (09/23/00)	2.2 *	NA	All Samples except D02187

NA Not Applicable

* EMPC

\# A clean-up blank consists of a clean sand spiked with internal and clean-up standards and is taken through the clean-up process.

$ When the concentration of the total homologue was below the blank action level but the associated EMPC concentration was above the action level, the detected concentration was reported as non-detected (U) instead of the associated EMPC value.

Blank actions are based on EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/01/00) criteria. Blank action levels are calculated as ten times the highest concentration of the contaminant determined in any blank for common contaminants (OCDD/OCDF and Total Homologues) and five times the highest concentration for all other analytes. The positive sample results that are less than the action level are reported as non-detects (U) at the reported concentration on the Data Summary Table.

Aqueous equipment blank results are used to determine the contamination associated with field sampling procedures. Compounds that are present in both the non-aqueous samples and the associated aqueous equipment blank are flagged "EB" in the samples.

Total HxCDD concentrations in sediment samples were flagged "EB" due to equipment blank contamination.

Matrix Spike/Matrix Spike Duplicate

One MS/MSD pair was evaluated for this SDG: D02301MS/D02301MSD.

The table below summarizes the sediment MS/MSD results which did not meet the expanded recovery criterion of 50-150%, or the expanded Relative Percent Difference (RPD) < 20% for soils/sediments as specified in Tetra Tech NUS, Inc.'s Technical Specification, Analysis of Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000.

D02301					
Compound	MS % Rec.	MSD% Rec.	RPD	Action	
				Positive Detects	NDs
2378-TCDD	-36.7	57.7*	899	J	UJ

* - within limits

2378-TCDD was estimated (J) in sample D02301.

Laboratory and Field Duplicates

Two field duplicate pairs were evaluated for this SDG (D02191/D02192, and D02179/D02187). Duplicate pair D02179 and D02187 met criteria.

The table below summarizes the sediment field duplicate results that did not meet the criterion of Relative Percent Difference (RPD) < 25% for soils/sediments as specified in Tetra Tech NUS, Inc.'s Technical Specification, Analysis of Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000:

Compound	D02191	D02192	RPD	Action		Affected Samples
	% Solids (62.0%)	% Solids (67.8%)				
	Sample Conc. (ng/Kg)	Duplicate Conc. (ng/Kg)		Positive Detects	NDs	
2378-TCDD	115	57.6	66.5	J	UJ	D02191, D02192
123478-HxCDF	14.3	21.0	38.0	J	UJ	D02191, D02192
123678-HxCDF	5.3	7.2	30.4	J	UJ	D02191, D02192
1234678-HpCDD	67.7	33.1	68.6	J	UJ	D02191, D02192
OCDD	427	276	43.0	J	UJ	D02191, D02192
OCDF	76.2	47.1	47.2	J	UJ	D02191, D02192

Professional judgment was used to estimate the positive results (J) for 2378-TCDD, 123478-HxCDF, 123678-HxCDF, 1234678-HpCDD, OCDD, and OCDF, in samples D02191 and D02192.

Internal/Surrogate/Clean-up Standards

- Internal Standards

The following table summarizes the internal standard recoveries which did not meet Method 8290 acceptance criterion of 40-135%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{13}C -OCDD	33.0	J	UJ	D02179
^{13}C -2378-TCDD	23.7	J	UJ	D02187
^{13}C -2378-TCDF	25.4	J	UJ	D02187
^{13}C -12378-PeCDD	25.0	J	UJ	D02187
^{13}C -12378-PeCDF	21.4	J	UJ	D02187
^{13}C -123678-HxCDD	24.6	J	UJ	D02187
^{13}C -123478-HxCDF	23.0	J	UJ	D02187
^{13}C -1234678-HpCDD	21.7	J	UJ	D02187

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{13}C -1234678-HpCDF	22.0	J	UJ	D02187
^{13}C - OCDD	15.1	J	UJ	D02187
^{13}C -OCDD	34.5	J	UJ	D02191
^{13}C -OCDD	25.7	J	UJ	D02302
^{13}C -OCDD	35.8	J	UJ	D02303
^{13}C -OCDD	30.1	J	UJ	D02304
^{13}C -OCDD	30.0	J	UJ	D02305

The corresponding non-labeled congener results were estimated as shown in the table due to internal standard % recoveries outside method acceptance criteria.

- Surrogate Standards

The Technical Specifications do not have surrogate standard criteria. Professional judgement was used to apply Method 8290 internal standard recovery criteria of 40-135%. The following table summarizes the surrogate standard recovery that did not meet acceptance criterion of 40-135%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{13}C -23478-PeCDF	21.8	J	UJ	D02187
^{13}C -123478-HxCDF	23.0	J	UJ	D02187
^{13}C -123478-HxCDD	23.8	J	UJ	D02187
^{13}C -1234789-HpCDF	21.3	J	UJ	D02187
^{13}C -123789-HxCDF	27.1	J	UJ	D02187
^{13}C -234678-HxCDF	25.1	J	UJ	D02187

The corresponding non-labeled congener results were estimated as shown in the table due to surrogate standard % recoveries outside method acceptance criteria.

- Clean-up Standards

The following table summarizes the clean-up standards recoveries which did not meet the recovery criterion of 40-135% in Tetra Tech NUS, Inc.'s Technical Specification, Analysis of

Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000 of 40-135%:

Standard	% Recovery	Action		Affected Samples
		Positive Detects	NDs	
^{37}Cl -2378-TCDD	137	J	U	D02186
^{37}Cl -2378-TCDD	186	J	U	D02305

Professional judgement was used to accept non-detects and qualified positive results since high recoveries may indicate interference in the clean-up process resulting in biased high results.

Sample Quantitation

The laboratory reported a value for Total TCDF, Total PeCDF and Total HxCDF flagged "X" by the laboratory to indicate co-elution with the associated diphenyl ether. Since total homologues are considered an approximate value and estimated (J) on the Data Summary Table, no further action is required:

Congener	Affected Samples
Total TCDF	D02179, D02182, D02185, D02186, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305
Total PeCDF	D02179, D02182, D02185, D02186, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305
Total HxCDF	D02182, D02186, D02188, D02301, D02304

Sample D02305 had < 30% solids. No action was taken since the laboratory compensated by increasing the sample size.

The laboratory reported a value for Total PeCDD which was flagged "Q" to indicate the presence of unknown quantitative interference:

Congener	Affected Samples
Total PeCDD#	D02191

Total homologues are considered an approximate value since there is no calibration curve

Total homologues are considered an approximate value since there is no calibration curve for the total homologues. The total homologue concentrations are calculated using the average response factor of the 2378-substituted isomer for the isomer series and they are estimated (J) on the Data Summary Table. As a result, no further action is required.

Concentrations quantitated below the lowest calibration standard are flagged (J) on the Data Summary Tables. Quantitation is not accurate when the reported results are below the lowest calibration standard.

124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound in the HxCDD descriptor window using the mass ions of 390 and 392. Qualitative identification was determined if the peaks in the HxCDD descriptor window met ion ratio criteria of 1.96 to 2.66. HCX was quantitated using the area of ^{13}C-123678-HxCDD as the internal standard and a RRF of 1.0. The reported concentrations of HCX are approximated values and therefore, are reported as estimated (J) values on the Data Summary Tables, since no independent standard for HCX was analyzed.

Since the HCX results did not meet the ion ratio limits in samples D02179 and D02188, the results were not reported.

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values are calculated by the ESAT data validator using the validated data. The data validation process may alter the laboratory's reported TEQ values. Region I TEQ calculations include the data validation results for blanks, sample dilution, and reported EMPC values. These calculated values are reported on the Data Summary Tables on a dry weight basis, where applicable. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs)" and 1989 Update, Part II, page 13.

System Performance

The low level positive results found in the clean-up and equipment blanks do not have a significant effect on the usability of the high level results found in the field samples. The sample data can be used for the site objectives. Standard validation procedures have been applied to account for the possibility of false positives due to blank contamination and qualifiers have been applied to the data where needed. See Table 1 for details of blank contamination.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Dan Wielandt
Senior QAPP Chemist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Analytical Method
PE Score Reports
Communications/Phone Logs
Field Sampling Notes
CSF Audit (DC-2 Form)
DQO Summary Form

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 0176H/SDG No.: D02179

Sample Nos.	D02179	D02182	D02183	D02185	D02186	D02187	D02188	D02191	D02192	D02193
Compound										
2378-TCDD	A	A	A	A	J[5]	J[4]	A	J[3]	J[3]	A
12378-PeCDD	A	A	A	A	J[5]	J[4]	A	A	A	A
123478-HxCDD	A	A	A	A	J[5]	J[4,6]	A	A	A	A
123678-HxCDD	A	A	A	A	J[5]	J[4]	A	A	A	A
123789-HxCDD	A	A	A	A	J[5]	J[4]	A	A	A	A
1234678-HpCDD	A	A	A	A	J[5]	J[4]	A	J[3]	J[3]	A
OCDD	J[4]	A	J[1]	A	J[5]	J[4]	A	J[3,4]	J[3]	A
2378-TCDF	A	A	A	A	J[5]	J[4]	A	A	A	A
12378-PeCDF	A	A	A	A	A	J[4]	A	A	A	A
23478-PeCDF	A	A	A	A	J[5]	J[4,6]	A	A	A	A
123478-HxCDF	J[1]	A	J[1]	A	J[5]	J[4,6]	A	J[3]	J[3]	A
123678-HxCDF	A	A	J[1]	A	J[5]	J[4]	A	J[3]	J[3]	A
234678-HxCDF	A	A	A	A	J[5]	J[4,6]	A	A	A	A
123789-HxCDF	A	A	A	A	A	J[4,6]	A	A	A	A
1234678-HpCDF	A	A	J[1]	A	J[5]	J[4]	A	A	A	A
1234789-HpCDF	A	A	A	A	J[5]	J[4,6]	A	A	A	A
OCDF	J[4]	A	A	A	J[5]	J[4]	A	J[3,4]	J[3]	A

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket River/Centredale Manor Site
Case No.: 0176H/SDG No. D02179

Sample Nos.	D02301	D02302	D02303	D02304	D02305
Compound					
2378-TCDD	J[2]	A	A	A	J[5]
12378-PeCDD	A	A	A	A	J[5]
123478-HxCDD	A	A	A	A	J[5]
123678-HxCDD	A	A	A	A	J[5]
123789-HxCDD	A	A	A	A	J[5]
1234678-HpCDD	A	A	A	A	J[5]
OCDD	A	J[4]	J[4]	A	J[5]
2378-TCDF	A	A	A	A	J[5]
12378-PeCDF	A	A	A	A	J[5]
23478-PeCDF	A	A	A	A	J[5]
123478-HxCDF	J[1]	A	J[1]	A	J[5]
123678-HxCDF	J[1]	A	J[1]	A	J[5]
234678-HxCDF	A	A	A	A	J[5]
123789-HxCDF	A	A	A	A	J[5]
1234678-HpCDF	A	A	A	A	J[5]
1234789-HpCDF	A	A	A	A	J[5]
OCDF	A	J[4]	J[4]	J[4]	J[4,5]

Table I
Recommendation Summary Table for Dioxins/Furans

A	-	Accept results.
J[1]	-	Clean-up blank contamination: U detects below the action levels.
J[2]	-	MS/MSD recovery/RPD outside of criteria: J detects.
J[3]	-	Field Duplicate Precision: J detects.
J[4]	-	Internal standard % recovery outside criteria: J detects; UJ non-detects.
J[5]	-	Clean-up standard % recovery outside criteria: J detects.
J[6]	-	Surrogate standard % recovery outside criteria: J detects; UJ non-detects.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error*		
To determine presence of contamination. To perform human health and ecological risk assessment. Later, the data will be used for engineering evaluation of remedial actions.	Yes, Sampling Method appropriate for all samples Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: $J^{1,2,4,5a}$	Refer to qualification in R/S Key on Table I: J^{3}	**	Two single blind performance evaluation (PE) samples (fortified native soil PC00793/D02190, and fortified native soil blank PC01018/D02189,) were evaluated for this SDG. All congeners were scored "Within Warning Limits" for the fortified native soil and "Within Limits" for the fortified native soil blank. The low level positive results found in the clean-up and equipment blanks do not have a significant effect on the usability of the high level results found in the field samples. The sample data can be used for the site objectives. Standard validation procedures have been applied to account for the possibility of false positives due to blank contamination and qualifiers have been applied to the data where needed. See Table I for details of blank contamination. 124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound in the HxCDD descriptor window using the mass ions of 390 and 392. Qualitative identification was determined if the peaks in the HxCDD descriptor window met ion ratio criteria of 1.96 to 2.66. HCX was quantitated using the area of ^{13}C-123678-HxCDD as the internal standard and a RRF of 1.0. The reported concentrations of HCX are approximated values and therefore, are reported as estimated (J) values on the Data Summary Tables, since no independent standard for HCX was analyzed.

* The evaluation of "sampling error" cannot be completely assessed in the data validation.

** Sampling variability is not assessed in data validation.

Validator: Dan Wilhelm

Date: 12/11/00

Data Summary Table
Dioxin/Furan Analysis - Sediment Samples
(Dry Weight)

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR, N. PROVIDENCE, RI
CASE NO.: 0178H SDG NO.: D02179
LABORATORY: TRIANGLE LABORATORIES, INC

SAMPLE NUMBER:	D02179#		D02182#		D02183#		D02185#		D02186#		D02187#	
STATION LOCATION:	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070--01		DYP-SD-2065-01		DYP--SD-2066-01		WRM-SD-2058-01	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	24.0		3.4		U	0.2	129		144 J		23.3 J	
1,2,3,7,8-PeCDD	U	0.02	1.1 J		U	0.2	1.6 J		1.6 J		UJ	1.4
1,2,3,4,7,8-HxCDD	U	0.04		0.83 *	U	0.2	1.0 J			1.8 *	UJ	1.5
1,2,3,6,7,8-HxCDD	0.15 J		2.7 J		U	0.2	3.4 J		6.3 J		UJ	1.5
1,2,3,7,8,9-HxCDD		0.10 *	2.3 J		U	0.2	2.5 J		6.0 J		UJ	1.5
1,2,3,4,6,7,8-HpCDD	5.3		24.0		1.7 J		57.9		130 J			6.0 *
OCDD	61.5 J		181		U	8.2	360		737 J		49.5 J	
2,3,7,8-TCDF		0.16 *	3.4		0.56 J		4.7		6.7 J		UJ	0.8
1,2,3,7,8-PeCDF	U	0.02	U	0.1	U	0.2	U	0.2	U	0.2	1.6 J	
2,3,4,7,8-PeCDF	U	0.02	2.0 J		U	0.2		1.4 *	1.8 J		UJ	1.0
1,2,3,4,7,8-HxCDF	U	0.17	2.5 J		U	0.41	2.8 J		4.1 J		UJ	1.0
1,2,3,6,7,8,-HxCDF	U	0.02	2.1 J		U	0.21	1.7 J	2.8	3.2 J		UJ	0.9
2,3,4,6,7,8-HxCDF	U	0.02	4.1 J			0.18 *	2.5 J		4.0 J		UJ	1.0
1,2,3,7,8,9-HxCDF	U	0.03		1.0 *	U	0.2	U	0.3	U	0.3	UJ	1.3
1,2,3,4,6,7,8-HpCDF	1.4 J		7.1		U	0.78	15.8		49.7 J			1.8 *
1,2,3,4,7,8,9-HpCDF	U	0.06		0.54 *	U	0.2	1.5 J		2.5 J		UJ	1.9
OCDF	1.9 J		16.5		0.74 J		39.7		93.7 J			3.5 *
TOTAL TCDD	25.9 J	26.1 *	7.5 J	9.3 *		0.36 *	143 J	145 *	157 J	158 *	29.9 J	
TOTAL PeCDD		0.36 *	6.4 J	14.5 *	0.50 J	1.0 *	7.3 J	11.6 *	8.1 J	13.6 *		2.6 *
TOTAL HxCDD	1.1 JEB	1.4 *	27.0 JEB	27.9 *	0.52 JEB	1.1 *	23.3 JEB		43.5 JEB	45.3 *	UJ	1.5
TOTAL HpCDD	10.0 J		49.0 J		3.0 J		105 J		242 J		7.0 J	12.9 *
TOTAL TCDF	UJ	3.7	43.5 J	251 *	UJ	1.5 *	71.2 J	163 *	82.1 J	147 *	12.3 J	14.3 *
TOTAL PeCDF	0.38 J	3.6 *	85.8 J	203 *	1.2 J	1.8 *	63.8 J	98.8 *	56.0 J	105 *	1.6 J	7.9 *
TOTAL HxCDF	UJ	2.8 *	58.4 J	68.6 *	UJ	1.4 *	45.6 J	49.7 *	54.2 J	97.1 *	UJ	2.5
TOTAL HpCDF	UJ	1.4	15.3 J	15.8 *	UJ	0.78	40.3 J		111 J	118 *	2.2 J	3.9 *
HCX^							35.0 J		36.8 J			
TOXICITY EQUIVALENCY:	24.2 J		7.36 J		0.0917 J		134 J		152 J		23.5 J	
% SOLIDS:	61.7		53.7		82.1		84.0		48.7		58.9	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	09/19/00		09/18/00		09/18/00		09/19/00		09/19/00		09/19/00	
DATE OF RECEIPT:	09/20/00		09/20/00		09/20/00		09/20/00		09/20/00		09/20/00	
SAMPLE EXTRACTION DATE:	10/09/00		10/09/00		10/09/00		10/09/00		10/09/00		10/09/00	
ANALYSIS DATE:	10/13/00		10/13/00		10/13/00		10/13/00		10/13/00		10/13/00	
LAB SAMPLE ID:	S004608		S004618		T004998		T004999		T005000		T005001	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.

= These values are reported on a dry weight basis.

Note: Concentrations reported by the laboratory below the lowest calibration standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table 1.

^ = 124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound. No value is reported if HCX has not been identified.

Data Summary Table
Dioxin/Furan Analysis - Sediment Samples
(Dry Weight)

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR, N. PROVIDENCE, RI
CASE NO.: 0176H SDG NO.: D02179
LABORATORY: TRIANGLE LABORATORIES, INC.

SAMPLE NUMBER:	D02188#		D02191#		D02192#		D02193#		D02301#		D02302#	
STATION LOCATION:	WRM-SD-2062-01		CMS-DU-92100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2080-01		WRD-SD-2083-01	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	6.4		115 J		57.6 J		982 $		109 J		260	
1,2,3,7,8-PeCDD	1.8 J		0.50 J			0.39 *	0.84 J			0.08 *	8.5	
1,2,3,4,7,8-HxCDD	2.9 J		0.48 J		0.45 J			0.99 *	U	0.05	19.0	
1,2,3,6,7,8-HxCDD	10.5		3.0 J		1.5 J		12.2		0.26 J		34.2	
1,2,3,7,8,9-HxCDD	8.1			1.9 *		1.3 *	6.1		0.27 J		62.6	
1,2,3,4,6,7,8-HpCDD	300		67.7 J		33.1 J		622		16.4		531	
OCDD	2100		427 J		276 J		12330 $		132		2660 J	
2,3,7,8-TCDF	1.4		14.9		13.6		11.2		0.80 J		101	
1,2,3,7,8-PeCDF	U	0.30	2.8 J		3.7 J			1.2 *	U	0.03	37.2	
2,3,4,7,8-PeCDF	U	0.30	5.9			6.7 *		2.7 *	0.17 J		92.9	
1,2,3,4,7,8-HxCDF	2.9 J		14.3 J		21.0 J		9.5		U	0.27	592	
1,2,3,6,7,8-HxCDF	2.2 J		5.3 J		7.2 J		4.4 J		U	0.16	176	
2,3,4,6,7,8-HxCDF	3.2 J		6.8		7.6		7.0			0.17 *	223	
1,2,3,7,8,9-HxCDF	U	0.4		0.46 *	0.33 J			0.53 *	U	0.04		7.7 *
1,2,3,4,6,7,8-HpCDF	46.2		47.7		60.6		233		3.9 J		2670 $	
1,2,3,4,7,8,9-HpCDF	6.4			0.93 *	0.98 J		5.5		U	0.07	105	
OCDF	276		76.2 J		47.1 J		1340		4.3 J		1250 J	
TOTAL TCDD	8.0 J	8.5 *	134 J	136 *	64 J	67.8 *	982 J$		109 J	111 *	315 J	318 *
TOTAL PeCDD	1.8 J	7.2 *	1.6 J	10.0 *		12.4 *	2.3 J	22.3 *		1.0 *	45.2 J	142 *
TOTAL HxCDD	50.8 JEB	53.6 *	9.1 JEB	34.5 *	1.9 JEB	25.1 *	95.2 JEB	96.1 *	1.1 JEB	2.4 *	451 JEB	
TOTAL HpCDD	456 J		132 J		67.9 J		1280 J		33.2 J		1140 J	
TOTAL TCDF	11.3 J	34.4 *	103 J	251 *	69.4 J	171 *	105 J	172 *	8.4 J	17.1 *	552 J	1180 *
TOTAL PeCDF	15.8 J	39.6 *	124 J	213 *	81.4 J	179 *	75.8 J	121 *	3.8 J	9.4 *	1030 J	1440 *
TOTAL HxCDF	34.9 J	103 *	116 J	127 *	116 J	123 *	263 J	283 *	UJ	3.9	1970 J	2030 *
TOTAL HpCDF	175 J	189 *	94.3 J	95.2 *	73.6 J		1030 J		4.1 J	7.3 *	3760 J$	
HCX^			62.5 J		33.4 J		263 J		16.8 J		114 J	
TOXICITY EQUIVALENCY:	16.3 J		125 J		67.8 J		1010 J		110 J		471 J	
% SOLIDS:	64.3		62.0		67.8		42.7		73.3		53.8	
DILUTION FACTOR:	1.0		1.0		1.0		1.0		1.0		1.0	
DATE SAMPLED:	09/19/00		09/21/00		09/21/00		09/21/00		09/21/00		09/21/00	
DATE OF RECEIPT:	09/20/00		09/22/00		09/22/00		09/22/00		09/22/00		09/22/00	
SAMPLE EXTRACTION DATE:	10/09/00		10/09/00		10/09/00		10/09/00		10/09/00		10/09/00	
ANALYSIS DATE:	10/13/00		10/13/00		10/13/00		10/13/00		10/13/00		10/13/00	
LAB SAMPLE ID:	T005002		S004599		S004598		S004600		S004601		S004604	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
$ = These values are reported on a dry weight basis.
Note: Concentrations reported by the laboratory below the lowest calibration standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table 1.
^ = 124678-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound. No value is reported if HCX has not been identified.
$ = Concentration was taken from a 1:100 dilution.

Data Summary Table
Dioxin/Furan Analysis - Sediment Samples
(Dry Weight)

SITE: WOONASQUATUCKET RIVER/CENTREDALE MANOR, N. PROVIDENCE, RI
CASE NO.: 0176H SDG NO.: D02179
LABORATORY: TRIANGLE LABORATORIES, INC.

SAMPLE NUMBER:	D02303#		D02304#		D02305#	
STATION LOCATION:	MAP-SD-2059-01		WRM-SD-2055-01		WRM-SD-2057-01	
MATRIX:	SEDIMENT		SEDIMENT		SEDIMENT	
TCDD/TCDF CONC.:	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*	ng/Kg	DL/EMPC*
2,3,7,8-TCDD	180		678 $		586 J$	
1,2,3,7,8-PeCDD	U	0.09	3.7 J		17.3 J	
1,2,3,4,7,8-HxCDD		0.14 *	8.8		8.8 J	
1,2,3,6,7,8-HxCDD	0.54 J		31.9		31.8 J	
1,2,3,7,8,9-HxCDD		0.43 *	26.5		31.7 J	
1,2,3,4,6,7,8-HpCDD	31.2		921		690 J	
OCDD	266 J		6970 $		522 J$	
2,3,7,8-TCDF	1.4		16.8		64.2 J	
1,2,3,7,8-PeCDF	U	0.07	3.3 J			5.0 *
2,3,4,7,8-PeCDF		0.25 *		4.7 *	18.7 J	
1,2,3,4,7,8-HxCDF	U	0.60 *	24.2		36.3 J	
1,2,3,6,7,8,-HxCDF	U	0.31	15.6		21.7 J	
2,3,4,6,7,8-HxCDF	0.44 J		16.9		26.3 J	
1,2,3,7,8,9-HxCDF		0.05 *	3.0 J			2.2 *
1,2,3,4,6,7,8-HpCDF	8.3		251		305 J	
1,2,3,4,7,8,9-HpCDF	0.22 J			13.6 *	6.9 J	
OCDF	8.4 J		545 J		302 J	
TOTAL TCDD	193 J	193 *	678 J$	689 *$	628 J$	
TOTAL PeCDD		1.2 *	8.0 J	34.0 *	101 J	165 *
TOTAL HxCDD	4.5 JEB	6.5 *	261 JEB	253 *	319 JEB	321 *
TOTAL HpCDD	65.2 J		1740 J		1320 J	
TOTAL TCDF	13.0 J	40.8 *	183 J	372 *	170 J$	408 *$
TOTAL PeCDF	8.7 J	24.4 *	257 J	394 *	1030 J	1520 *
TOTAL HxCDF	14.6 J	15.3 *	379 J	453 *	650 J	715 *
TOTAL HpCDF	16.5 J	16.8 *	580 J	618 *	577 J	
HCX^	70.4 J		254 J		1710 J	
TOXICITY EQUIVALENCY:	191 J		716 J		637 J	
% SOLIDS:	69.4		42.1		27.2	
DILUTION FACTOR:	1.0		1.0		1.0	
DATE SAMPLED:	09/21/00		09/21/00		09/21/00	
DATE OF RECEIPT:	09/22/00		09/22/00		09/22/00	
SAMPLE EXTRACTION DATE:	10/09/00		10/09/00		10/09/00	
ANALYSIS DATE:	10/13/00		10/13/00		10/13/00	
LAB SAMPLE ID:	S004605		S004606		S004607	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.
# = These values are reported on a dry weight basis.
$ = Concentration was take from a 1:100 dilution.
Note: Concentrations reported by the laboratory below the lowest calibration standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table 1.
^ = 124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound. No value is reported if HCX has not been identified.

Steve Parker File N0400-2.6

Steve Stodola
US EPA Approval Signature

12/11/00
Date
November 30, 2000
B-00-11-Z-01
Revised: December 6, 2000

Ms. Christine Clark
Regional Sample Control Custodian
Office of Environmental Measurement and Evaluation
U.S. EPA Region I
60 Westview Street
Lexington, Massachusetts 02421

Re: WA No. 01-00-4-02, Task No. 2, TDF No. 478
Case No. 0176H, SDG No. D02184
Triangle Laboratories, Inc. - Durham, NC
Woonasquatucket River/Centredale Manor - North Providence, RI

Dioxin/Furan & HCX: 1/Aqueous Equipment Blank/D02184

Dear Ms. Clark:

A Tier III data validation was performed on the Dioxin/Furan and 124578-hexachloro(9H) xanthene (HCX) analytical data for one aqueous equipment blank collected by Tetra Tech NUS, Inc. for the U.S. EPA at the Woonasquatucket River/Centredale Manor Site in North Providence, RI. This blank is associated with the field sediment samples reported in the same Case, SDG No. D02179. The sample was analyzed according to Tetra Tech NUS, Inc.'s Technical Specification for the Analysis of Aqueous, Soil, Sediment, Air, and Wipe Samples for Dioxin and Dibenzofuran by EPA Method 8290A, August 2000 and EPA Method 8290A Rev. 1, January 1998. The samples were validated using first the criteria in Tetra Tech NUS, Inc.'s Technical Specification referenced above as well as additional criteria in EPA Method 8290A Rev. 1, January 1998, defaulting next to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria, and finally to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (11/01/00). The data were evaluated based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues
- Data Completeness (CSF Audit - Tier I)
- * Preservation and Technical Holding Times
- NP PE Samples/Accuracy Check
- * Window Defining Mix
- * Initial and Continuing Calibrations
- * Chromatographic Resolution

*	•	Instrument Sensitivity Check
*	•	Blanks
NP	•	Matrix Spike/Matrix Spike Duplicate
NP	•	Laboratory and Field Duplicates
*	•	Internal/Clean-up Standards
*	•	Sample Analysis and Identification
*	•	Sample Quantitation
*	•	Estimated Detection Limits (EDL) and Estimated Maximum Possible Concentration (EMPC)
	•	Toxicity Equivalency Factor (TEF) and Isomer Specificity
*	•	Required Sample Reruns and Second Column Confirmation
*	•	System Performance

* - All criteria were met for this parameter.
NP - Not provided

The following information was used to generate the Data Validation Memorandum attachments:

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes site objectives and potential usability issues

Data Summary Tables - summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

The following is a summary of the site investigation/assessment objectives:

- To determine presence of contamination.
- To perform human health and ecological risk assessment.
- The data will be used for engineering evaluations of remedial actions.

All of the sampling and analytical quality control parameters met acceptance criteria and the sample data can be used for site objectives. This equipment blank exhibited low level contamination. Since the positive result reported in the equipment blank was non-detected in the method blank, the equipment blank is reported unqualified on the Data Summary Table. As a result, the positive result reported in the equipment blank can be used to evaluate potential sources of contamination for sediment field samples associated with this equipment blank and reported in Case No. 0176H, SDG No. D02179.

124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound in the HxCDD descriptor window using the mass ions of 390 and 392. Qualitative identification was determined from the window if the peaks met ion ratio criterion of 1.96 to 2.66. HCX was quantitated using the area of ^{13}C-123678-HxCDD as the internal standard and an RRF of 1.0. The reported concentrations of HCX are approximated values, since no independent HCX standard was analyzed. However, there were no positive results for HCX in this SDG (sample D02184).

Data Completeness (CSF Audit - Tier I)

The data validation revealed missing information and/or discrepancies in the data package submitted by the laboratory. The following missing information/discrepancy is noted:

1. The laboratory was asked to submit missing DC-2 form.

2. The laboratory was asked to submit the ending calibration standard S004395 for the TLI method blank, analyzed on 10/02/00.

3. The laboratory was asked to submit the TLI blank U153202 as the required instrument blank for sample number D02184.

4. On Form I for sample number: D02184, the laboratory incorrectly listed the date received as 11/22/00. According to the Chain of Custody records, the sample was received on 11/20/00. The laboratory was asked to submit Form I with the "Date Received" entry corrected.

Item #1 was requested via the WAM on October 30, 2000 and items 2 through 4 were requested on November 6, 2000. The response to items 3 & 4 was received from the laboratory on November 21, 2000 and to items 1 & 2 on November 27, 2000. The laboratory adequately responded to the requests. Please note that the laboratory used the data package number (51950B) instead of the SDG Number (D02184) for the DC-2 Form heading.

Toxicity Equivalency Factor (TEF) and Isomer Specificity

All TEQ values are calculated by the ESAT data validator using the validated data. The data validation process may alter the laboratory's reported TEQ values. Region I TEQ calculations include the data validation results for blanks, sample dilution, and reported EMPC values. These calculated values are reported on the Data Summary Tables. The TEF values are published in EPA/625/3-89/016, "Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs)" and 1989

Update, Part II, page 13. Since all the results for this sample (D02184) were "non-detects", the TEQ value is reported as "0.0U".

System Performance

There were no problems with the system performance.

Very truly yours,

LOCKHEED ENVIRONMENTAL

Maria E. Baca
Senior Scientist

Louis Macri
ESAT Team Manager

Attachments: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Data Summary Tables
Data Validation Worksheets
Analytical Method
Communication/Phone Logs
CSF Audit (DC-2 Form)
DQO Summary Form

Table I
Recommendation Summary Table for Dioxins/Furans
Woonasquatucket/Centredale Mannor - North Providence, RI
Case No. 0176H/SDG No. D02184

Sample Nos.	D02184
Compound	
2378-TCDD	A
12378-PeCDD	A
123478-HxCDD	A
123678-HxCDD	A
123789-HxCDD	A
1234678-HpCDD	A
OCDD	A
2378-TCDF	A
12378-PeCDF	A
23478-PeCDF	A
123478-HxCDF	A
123678-HxCDF	A
234678-HxCDF	A
123789-HxCDF	A
1234678-HpCDF	A
1234789-HpCDF	A
OCDF	A

Table I
Recommendation Summary Table for Dioxins/Furans

A - Accept all results.

EPA-NE - Data Validation Worksheet

Overall Evaluation of Data - Data Validation Memorandum - Table II

DIOXIN/FURAN ANALYSIS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability	Potential Usability Issues
		Analytical Error	Sampling Error*		
To determine presence of contamination. To perform human health and ecological risk assessment. The data will be used for engineering evaluations of remedial actions.	Yes, Sampling Method appropriate for all samples Yes, Analytical Method appropriate for all samples.	Refer to qualification in R/S Key on Table I: N/A	Refer to qualification in R/S Key on Table I: N/A	**	All of the sampling and analytical quality control parameters met acceptance criteria and the sample data can be used for site objectives. This equipment blank exhibited low level contamination. Since the positive result reported in the equipment blank was non-detected in the method blank, the equipment blank is reported unqualified on the Data Summary Table. As a result, the positive result reported in the equipment blank can be used to evaluate potential sources of contamination for sediment field samples associated with this equipment blank and reported in Case No. 1761H, SDG No. D02179. 124578-Hexachloro(9H)xanthene (HCX) was quantitated as a tentatively identified compound in the HxCDD descriptor window using the mass ions of 390 and 392. Qualitative identification was determined from the window if the peaks met ion ratio criterion of 1.96 to 2.66. HCX was quantitated using the area of ^{13}C-123678-HxCDD as the internal standard and an RRF of 1.0. The reported concentrations of HCX are approximated values, since no independent HCX standard was analyzed. However, there were no positive results for HCX in this SDG (sample D02184).

* The evaluation of "sampling error" cannot be completely assessed in the data validation.
** Sampling variability is not assessed in data validation.

Validator: M. Bare

Date: 12/6/00

Data Summary Table
Dioxin/Furan Analysis - Aqueous Samples

SITE: Woonasquatucket/Centredale Manner - North Providence, RI
CASE NO.: 0176H SDG NO.: D02184
LABORATORY: Triangle Laboratories, Inc. - Durham, N.C.

SAMPLE NUMBER:	D02184	
STATION LOCATION:	CMS-RS-091900A	
MATRIX:	AQUEOUS	
TCDD/TCDF CONC.:	pg/L	DL/EMPC*
2,3,7,8-TCDD	U	0.3
1,2,3,7,8-PeCDD	U	0.2
1,2,3,4,7,8-HxCDD	U	0.3
1,2,3,6,7,8-HxCDD	U	0.3
1,2,3,7,8,9-HxCDD	U	0.3
1,2,3,4,6,7,8-HpCDD	U	0.4
OCDD	U	0.6
2,3,7,8-TCDF	U	0.2
1,2,3,7,8-PeCDF	U	0.2
2,3,4,7,8-PeCDF	U	0.2
1,2,3,4,7,8-HxCDF	U	0.2
1,2,3,6,7,8-HxCDF	U	0.2
2,3,4,6,7,8-HxCDF	U	0.2
1,2,3,7,8,9-HxCDF	U	0.2
1,2,3,4,6,7,8-HpCDF	U	0.2
1,2,3,4,7,8,9-HpCDF	U	0.3
OCDF	U	0.5
TOTAL TCDD	UJ	0.3
TOTAL PeCDD	UJ	0.2
TOTAL HxCDD		2.2*
TOTAL HpCDD	UJ	0.4
TOTAL TCDF	UJ	0.2
TOTAL PeCDF	UJ	0.2
TOTAL HxCDF	UJ	0.2
TOTAL HpCDF	UJ	0.2
HCX^		
TOXICITY EQUIVALENCY:	0.0 U	
DILUTION FACTOR:	1.0	
DATE SAMPLED:	09/19/00	
DATE OF RECEIPT:	09/20/00	
SAMPLE EXTRACTION DATE:	09/30/00	
ANALYSIS DATE:	10/02/00	
LAB SAMPLE ID:	U153205	

* = These values are EMPCs (Estimated Maximum Possible Concentration); EMPC values are not qualified with an "J", Values without an "*" are the Detection Limits.

Note: Concentrations reported by the laboratory below the lowest standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table I.

^ = Hexachloro(5H)cyclopentadiene was quantitated as a tentatively identified compound. No value is reported if HCX has not been identified.

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RAC1-EPA-2723

Contract No. 68-W6-0045

December 12, 2000

Ms. Christine Clark
Regional Sample Control Coordinator
U.S. Environmental Protection Agency
Office of Environmental Measurement and Evaluation
60 Westview Street
Lexington, Massachusetts 02421

Subject: Tier II Organic Data Validation, W.A. No. 043-TATA-016P
DAS Case 0175H, SDG D02179-OA
Kathahdin Analytical
Centredale Manor Site, North Providence, Rhode Island

Semivolatiles/Pesticides/PCBs:

15/Sediments/ D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305 (Field Duplicate Pairs D02179/D02187 and D02191/D02192)

1/Aqueous Rinsate Blank/ D02184

1/Semivolatile Performance Evaluation Sample/ D02177

1/Pesticide/PCB Performance Evaluation Sample/ D02180

Dear Ms. Clark:

TetraTech NUS (TtNUS) performed a Tier II data validation on the semivolatile and pesticide/PCB analytical data for Case 0175H, SDG D02179-OA, from sediment samples collected by TtNUS at the Centredale Manor site. The samples were analyzed according to the CLP OLM04.2 Statement of Work modified by TtNUS Technical Specification S00-RAC1-0151 to account for the expected high percent moisture content of the samples. A Tier II data validation was performed according to the approved September 1999 Sampling and Analysis Plan. The semivolatile data validation was performed using the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria. The pesticide/PCB data validation was performed according to the Region I, EPA Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses, November 1988.

The data were evaluated based on the following parameters:

	• Overall Evaluation of Data and Potential Usability Issues
	• Data Completeness (CSF Audit - Tier I)
	• Preservation and Technical Holding Times
*	• GC/MS Instrument Performance Check (Tuning)
	• Initial and Continuing Calibrations
	• Blanks
*	• Surrogate Compounds
*	• Internal Standards
	• Matrix Spike/Matrix Spike Duplicate
	• Field Duplicates
*	• Sensitivity Check
	• PE Samples/Accuracy Check
NA	• Target Compound Identification
NA	• Compound Quantitation and Reported Quantitation Limits
*	• Tentatively Identified Compounds
*	• Semivolatile and Pesticide/PCB Cleanup
*	• System Performance

* - All criteria were met for this parameter.

Note: Worksheets, except for Worksheet XIII - Sample Quantitation, are not included for parameters that have met criteria or for criteria that are not applicable (NA) to the method.

<u>The following information was used to generate the Data Validation Memorandum attachments:</u>

Table I: Recommendation Summary Table - summarizes validation recommendations

Table II: Overall Evaluation of Data - summarizes site DQOs and potential usability issues

Table III: Tentatively Identified Compounds - summarizes the semivolatile compounds tentatively identified by GC/MS

Data Summary Tables : Summarize accepted, qualified, and rejected data

Overall Evaluation of Data and Potential Usability Issues

Following is a summary of the site DQOs:

- Data Use - Nature and Extent of Contamination, Human and/or Ecological Risk Assessment, Engineering Design, and Remediation Alternatives
- Determine the presence of contamination in the sediments of the study area.
- Generate human health and/or ecological risk assessments.
- Data will be used for selecting remediation alternatives and engineering design.

The semivolatile data required qualification resulting from an exceeded holding time, instrument calibration variability, laboratory and field blank contamination, exceeded matrix spike/matrix spike duplicate (MS/MSD) criteria, and poor field duplicate precision. The pesticide/PCB data did not require qualification and are accepted as reported by the laboratory.

Semivolatile

Semivolatile sample results were qualified as a result of both analytical error and field error, and it is important to distinguish between the two because the laboratory does not have control over the sampling error. The following list summarizes the measurement error associated with sampling: rinsate blank contamination.

- The positive sediment sample results for benzaldehyde and phenol are reported with an "EB" since these contaminants were reported in the rinsate blank. The "EB" qualifier indicates that an indeterminate amount of cross-contamination with these compounds has potentially affected the sample results.
- The positive results for benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene are estimated (J) in samples D02191 and D02192 due to poor field duplicate precision.

The following list summarizes the measurement error associated with analysis: an exceeded holding time, instrument calibration variability, laboratory blank contamination, exceeded MS/MSD criteria, and poor field duplicate precision.

- The positive and non-detected results for sample D02304 are estimated (J/UJ) due to a slightly exceeded extraction holding time. The data may be biased low.
- Positive and non-detected results for several compounds are estimated (J/UJ) due to instrument calibration variability.
- Blank actions were applied to the rinsate blank due to laboratory aqueous method blank contamination with bis(2-ethylhexyl)phthalate. The result may be false positive or biased high.

- The non-detected results for N-nitroso-di-n-propylamine and acenaphthene are estimated (UJ) in sample D02301 due to a low %recovery/high RPD value in the MS/MSD analysis.

Data Completeness

The semivolatile GPC data and the pesticide/PCB GC column identifications were requested from the laboratory on December 6, 2000. The information was received at TtNUS on December 7, 2000 and the package is complete.

Preservation and Technical Holding Times

Semivolatile sample D02304 required a re-extraction due to a problem experienced by the laboratory during the GPC clean-up procedure. The re-extraction occurred one day outside of holding time. The positive and non-detected semivolatile results for this sample are estimated (J/UJ).

Initial and Continuing Calibrations

The following table summarizes the semivolatile initial calibration (IC) and continuing calibration (CC) compounds which failed to meet the calibration criteria of %RSD < 30 and %D < 25:

Semivolatile

Instrument	5972-Z	5972-Z	Action		Affected Samples
Compound	CC 10/06/00	CC 10/13/00	(+)	NDs	
Butylbenzylphthalate	%D 57.9		J*	UJ	D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02304
3,3'-Dichlorobenzidine	%D 53.8			UJ	D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02304
bis(2-ethylhexyl)phthalate	%D 57.5		J		D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02304
Di-n-octylphthalate	%D 65.2			UJ	D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02304
Benzo(b)fluoranthene		%D 30.7	J		D02191

* Postive results are < CRQL and already estimated (J).

Blanks

The following table summarizes the level of blank contamination detected in the rinsate and laboratory method blanks affecting the sediment and aqueous (rinsate blank) samples:

Compound	Type of Blank	Maximum Concentration (ug/L)	Action Level (ug/L)	CRQL (ug/L)
bis(2-Ethylhexyl)-phthalate	Method	2	20	10
Benzaldehyde	Rinsate	6	RB	10
Phenol	Rinsate	7	RB	10

Bis(2-ethylhexyl)phthalate was detected in the laboratory's aqueous method blank. Since this is a common laboratory contaminant, the 10x rule applies. Sample contaminant results less than the CRQL are qualified (U). The result may be biased high or false positive. The positive result for this sample in the aqueous rinsate blank sample D02184 is qualified CRQL (U).

Benzaldehyde and phenol were detected in the rinsate blank associated with these samples. Positive results for these compounds are reported with an "EB" qualifier in the sediment samples to indicate to the user than an indeterminate amount of cross-contamination may have affected the sample results. The data may be biased high or false positive.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The following table summarizes the semivolatile matrix spiking compound recoveries that did not meet QC limits in the matrix spike and matrix spike duplicate analysis of sample D02301:

D02301							
Compound	MS %REC	MSD %REC	QC Limits	RPD	QC Limits	Action	
						(+)	ND
N-nitroso-di-n-propylamine	25	33	41-126				UJ
Acenahthene				28	19		UJ

Field Duplicate Precision

The positive results for benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene are estimated (J) in the field duplicate pair D02191/D02192 due to poor field duplicate precision.

Performance Evaluation (PE) Samples - Accuracy Check

Semivolatile

PE sample D02177 (ICCSV434) was provided by the EPA and used to evaluate the laboratory's ability to correctly identify and quantitate semivolatile compounds. All results are within limits, however 4-nitroaniline was reported as a PE contaminant. This compound was not detected in the field or laboratory blanks and is therefore specific to the PE sample. Action is not required.

Pesticide/PCB

PE sample D02180 (TT05465) was provided by the EPA and used to evaluate the laboratory's ability to correctly identify and quantitate pesticide/PCB compounds. All results are within limits.

System Performance

The semivolatile and pesticide/PCB sample results do not indicate any major analytical data quality trends or problems.

Please contact L. Terzis at (978) 658-7899 if you have any questions regarding this information.

Sincerely,

Linda Terzis

Linda Terzis
Data Validator

Lucy Guzman
RAC Lead Chemist

PMO-@

Tables: Table I: Recommendation Summary Table
Table II: Overall Evaluation of Data
Table III: TIC Summary Table
Data Summary Tables

Enclosures: Data Validation Worksheets
PE Sample Score Reports
Laboratory Communications
Field Sampling Notes
Technical Specification S00-151-00
CSF Audit (DC-2 Form)
DQO Summary Form

c: A. Krasko (EPA) w/o enc.
S. Parker (TtNUS) w/o enc.
File N0400-2.6 w/ enc.

TABLE I
Recommendation Summary Table for Semivolatiles
Centredale Manor
Case 0175H SDG D02179

TABLE I: RECOMMENDATION SUMMARY TABLE		
Sample Number	Matrix	Qualifiers
D02179	Sediment	$J^{2,5}$
D02182	Sediment	$J^{2,5}$
D02183	Sediment	J^{2}
D02184	Aqueous	J^{4}
D02185	Sediment	J^{2}
D02186	Sediment	$J^{2,5}$
D02187	Sediment	J^{2}
D02188	Sediment	J^{2}
D02191	Sediment	$J^{3,7}$
D02192	Sediment	J^{7}
D02193	Sediment	A
D02301	Sediment	J^{6}
D02302	Sediment	J^{5}
D02303	Sediment	A
D02304	Sediment	$J^{1,2,5}$
D02305	Sediment	A

A - Accept the data.

J^1 - Holding time criteria: Estimate (J/UJ) results due to exceeded extraction holding time.

J^2 - %D criterion (%D > 25): Estimate (J/UJ) positive and non-detected butylbenzylphthalate, 3,3'-dichlorobenzidine, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate results due to instrument calibration variability.

J^3 - %D criterion (%D > 25): Estimate (J) positive result for benzo(b)fluoranthene due to instrument calibration variability.

TABLE I
Recommendation Summary Table for Semivolatiles
Centredale Manor
Case 0175H SDG D02179

J[4] - Laboratory blank contamination: replace the positive bis(2-ethylhexyl)phthalate result with the CRQL(U) due to laboratory blank contamination. The data may be biased high or false positive.

J[5] - Rinsate blank contamination: qualify positive phenol and benzaldehyde results "EB" due to rinsate blank contamination. The data may be biased high or false positive.

J[6] - MS/MSD criteria: estimate (UJ) non-detected results for N-nitroso-di-n-propylamine and acenaphthene due to a low MS/MSD recovery and a high RPD value.

J[7] - Field duplicate precision: (RPD > 50%): estimate (J) positive results for benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene due to poor field duplicate precision.

TABLE I
Recommendation Summary Table for Pesticides/PCBs
Centredale Manor
Case 0175H SDG D02179

TABLE I: RECOMMENDATION SUMMARY TABLE		
Sample Number	Matrix	Qualifiers
D02179	Sediment	A
D02182	Sediment	A
D02183	Sediment	A
D02184	Aqueous	A
D02185	Sediment	A
D02186	Sediment	A
D02187	Sediment	A
D02188	Sediment	A
D02191	Sediment	A
D02192	Sediment	A
D02193	Sediment	A
D02301	Sediment	A
D02302	Sediment	A
D02303	Sediment	A
D02304	Sediment	A
D02305	Sediment	A

A - Accept the data

TABLE II
Overall Evaluation of Semivolatile Data
Centredale Manor
Case 0175H SDG D02179

SEMIVOLATILE ORGANICS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
Nature and extent of contamination Engineering Design Human/Ecological Risk Assessment Remediation Alternatives	Yes, analytical method CLP SOW OLM04.2, and sampling procedures according to the requirements of the 9/99 approved SAP, are appropriate for all samples.	Refer to qualifications in R/S key: J[1,2,3,4,6,7]	Refer to qualifications in R/S key: J[5]		Various sample quantitation limits are estimated (J/UJ) due to instrument calibration variability. Positive and non-detected results are estimated (J/UJ) for sample D02314 due to exceeded holding time. Blank actions applied to D02184 due to aboratory blank contamination with bis(2-ethylhexyl)phthalate. Positive phenol and benzaldehyde results are reported with an "EB" in the sediment samples due to rinsate blank contamination. Non-detected N-nitroso-di-n-propylamine and acenaphthene results are estimated (UJ) in sample D02301 due to exceeded MS/MSD criteria. Positive results for benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene are estimated in D02191 and D02192 due to poor field duplicate precision.

* The evaluation of "sampling error" cannot be completely assessed in data validation.
** Sampling variability is not assessed in data validation.

Validator: LT Date: 12/6/00

TABLE II
Overall Evaluation of Pesticide/PCB Data
Centredale Manor
Case 0175H SDG D02179

PESTICIDES/PCBs					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
Nature and extent of contamination Engineering Design Human/Ecological Risk Assessment Remediation Alternatives	Yes, analytical method CLP SOW OLM04.2, and sampling procedures according to the requirements of the 9/99 approved SAP, are appropriate for all samples.	Refer to qualifications in R/S key: A	Refer to qualifications in R/S key: A		Data are accepted as reported by the laboratory. Qualifications are not required.

* The evaluation of "sampling error" cannot be completely assessed in data validation.
** Sampling variability is not assessed in data validation.

Validator: LT Date: 12/6/00

TABLE III
SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUND SUMMARY
Centredale Manor
Case 0175H SDG D02179

Classification/Isomer	D02179	D02182	D02183	D02184	D02185	D02186	D02187
3-Eicosene, (E)-	1600JN						1800JN
.gamma.-Sitosterol	1000JN	1600JN					270JN
Perylene		260JN					
Cholesterol		310JN					
Unknown PAH		270JN				480J	
Stigmast-4-en-3-one		380JN					
2,7-Octanedione		620JN	650JN				
Ethane, 1,1,2,2-tetrachloro-			410JN				
Methacrylamide					450JN		
.alpha.-Bisabolol						1000JN	
Hexadecanoic acid						410JN	
Vanillin				4JN			
.beta.-Amyrin						870JN	
Total Alkanes	4520	1400				860	1600

Classification/Isomer	D02188	D02191	D02192	D02193	D02301	D02302	D02303
.gamma.-Sitosterol		720JN	1300JN	11000JN	2100JN	4300JN	3100JN
Perylene			1900JN				
Cholesterol				1100JN		370JN	
Total Unknown PAH		840J_1	3340J_3				
Stigmast-4-en-3-one				2100JN	660JN	370JN	290JN
2,7-Octanedione	520JN						
Methacrylamide	410JN		1000JN				
.alpha.-Bisabolol				3700JN	440JN		1700JN
Hexadecanoic acid						2200JN	
.beta.-Amyrin				2200JN	640JN	1500JN	
Dimethylnaphthalene isomer		510J					
Benzene(1,2,4-cyclo-		490JN					
Dibenzofuran, 4-methyl-		510JN					
(6H0Cyclobuta(jk)phen-		210JN					
Naphthalene isomers		440J_2	630JN				
11HBenzo(b)fluorene		220JN					
7HBenz(de)anthracen-		220JN					
Cyclopenta(cd)pyrene		410JN					
Triphenylene, 2-methyl-		200JN					
1,2,7,8-Dibenzphenanthrene		670JN	650JN				
Dibenzo(def,mno)chrys-		600JN	870JN				
Anthracene isomers			1350JN_2				
Dimethylnaphthalene isomers			1000J_2				
1H-Indene, 1-phenyl-			350JN				
Dibenzothiophene			430JN				
Total alkanes				3100	640	1200	1600

J – Quantitation approximate; N – Tentatively identified

TABLE III
SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUND SUMMARY
Centredale Manor
Case 0175H SDG D02179

Classification/Isomer	D02304	D02305
Trichloro isomer	820J	
Phenol, 4-(2,2,3,3,-tetra-	1800JN	
PAH isomer	5400J	
.gamma.-Sitosterol		2800JN
.alpha.-Amyrin		1500JN
Total alkanes		1100

J – Quantitation approximate; N – Tentative identification

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02179		D02182		D02183		D02185		D02186	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00	
Date Extracted	9/28/00		9/28/00		9/28/00		9/28/00		9/28/00	
Date Analyzed	10/6/00		10/6/00		10/6/00		10/6/00		10/6/00	
Dilution Factor	1.5		1.5		1.3		1.2		1.4	
Percent Solids	59.0		56.0		77.0		84.0		47.0	
QC Identifier	Field Dup. WRM-SD-2066-01		None		None		None		None	
Benzaldehyde	34	JEB	31	JEB	430	U	400	U	86	J
Phenol	500	U	500	U	430	U	400	U	460	U
Bis(2-Chloroethyl)ether	500	U	500	U	430	U	400	U	460	U
2-Chlorophenol	500	U	500	U	430	U	400	U	460	U
2-Methylphenol	500	U	500	U	430	U	400	U	460	U
2,2'-oxybis(1-Chloropropane)	500	U	500	U	430	U	400	U	460	U
Acetophenone	500	U	500	U	430	U	400	U	460	U
4-Methylphenol	500	U	500	U	430	U	400	U	460	U
N-Nitroso-di-n-propylamine	500	U	500	U	430	U	400	U	460	U
Hexachloroethane	500	U	500	U	430	U	400	U	460	U
Nitrobenzene	500	U	500	U	430	U	400	U	460	U
Isophorone	500	U	500	U	430	U	400	U	460	U
2-Nitrophenol	500	U	500	U	430	U	400	U	460	U
2,4-Dimethylphenol	500	U	500	U	430	U	400	U	460	U
Bis(2-Chloroethoxy)methane	500	U	500	U	430	U	400	U	460	U
2,4-Dichlorophenol	500	U	500	U	430	U	400	U	460	U
Naphthalene	500	U	500	U	430	U	400	U	39	J
4-Chloroaniline	500	U	500	U	430	U	400	U	460	U
Hexachlorobutadiene	500	U	500	U	430	U	400	U	460	U
Caprolactam	500	U	500	U	430	U	400	U	460	U
4-Chloro-3-methylphenol	500	U	500	U	430	U	400	U	460	U
2-Methylnaphthalene	500	U	500	U	430	U	400	U	31	J
Hexachlorocyclopentadiene	500	U	500	U	430	U	400	U	460	U
2,4,6-Trichlorophenol	500	U	500	U	430	U	400	U	460	U
2,4,5-Trichlorophenol	1200	U	1200	U	1100	U	1000	U	1200	U
1,1'-Biphenyl	500	U	500	U	430	U	400	U	460	U
2-Chloronaphthalene	500	U	500	U	430	U	400	U	460	U
2-Nitroaniline	1200	U	1200	U	1100	U	1000	U	1200	U
Dimethylphthalate	500	U	500	U	430	U	400	U	460	U
2,6-Dinitrotoluene	500	U	500	U	430	U	400	U	460	U
Acenaphthylene	500	U	47	J	430	U	43	J	160	J
3-Nitroaniline	1200	U	1200	U	1100	U	1000	U	1200	U
Acenaphthene	500	U	500	U	430	U	400	U	140	J
2,4-Dinitrophenol	1200	U	1200	U	1100	U	1000	U	1200	U
4-Nitrophenol	1200	U	1200	U	1100	U	1000	U	1200	U
Dibenzofuran	500	U	500	U	430	U	400	U	100	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02179		D02182		D02183		D02185		D02186	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00	
Date Extracted	9/28/00		9/28/00		9/28/00		9/28/00		9/28/00	
Date Analyzed	10/6/00		10/6/00		10/6/00		10/6/00		10/6/00	
Dilution Factor	1.5		1.5		1.3		1.2		1.4	
Percent Solids	59.0		56.0		77.0		84.0		47.0	
QC Identifier	Field Dup. WRM-SD-2056-01		None		None		None		None	
2,4-Dinitrotoluene	500	U	500	U	430	U	400	U	460	U
Diethylphthalate	500	U	500	U	430	U	400	U	460	U
Fluorene	500	U	36	J	430	U	33	J	220	J
4-Chlorophenyl-phenylether	500	U	500	U	430	U	400	U	460	U
4-Nitroaniline	1200	U	1200	U	1100	U	1000	U	1200	U
4,6-Dinitro-2-methylphenol	1200	U	1200	U	1100	U	1000	U	1200	U
N-Nitroso-diphenylamine	500	U	500	U	430	U	400	U	460	U
4-Bromophenyl-phenylether	500	U	500	U	430	U	400	U	460	U
Hexachlorobenzene	500	U	500	U	430	U	400	U	460	U
Atrazine	500	U	500	U	430	U	400	U	73	J
Pentachlorophenol	1200	U	1200	U	1100	U	1000	U	1200	U
Phenanthrene	500	U	790		430	U	330	J	2900	
Anthracene	500	U	100	J	430	U	79	J	550	
Carbazole	500	U	82	J	430	U	37	J	410	J
Di-n-Butylphthalate	500	U	500	U	34	J	400	U	51	J
Fluoranthene	38	J	1700		23	J	600		*5400	
Pyrene	33	J	1600		430	U	600		*4200	
Butylbenzylphthalate	500	UJ	460	J	430	UJ	76	J	340	J
3,3'-Dichlorobenzidine	500	UJ	500	UJ	430	UJ	400	UJ	460	UJ
Benzo(a)anthracene	500	U	1000		430	U	380	J	2600	
Chrysene	500	U	1100		430	U	280	J	2400	
bis(2-Ethylhexyl)phthalate	60	J	1000	J	95	J	600	J	*1600	J
Di-n-octylphthalate	500	UJ	500	UJ	430	UJ	400	UJ	460	UJ
Benzo(b)fluoranthene	26	J	1400		22	J	590		*4000	
Benzo(k)fluoranthene	500	U	370	J	8	J	130	J	1100	
Benzo(a)pyrene	500	U	840		430	U	310	J	2200	
Indeno(1,2,3-cd)pyrene	500	U	850		430	U	280	J	2000	
Dibenzo(a,h)anthracene	500	U	130	J	430	U	38	J	320	J
Benzo(g,h,i)perylene	500	U	510		430	U	190	J	1600	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02187		D02188		D02191		D02192		D02193		D02301
Station Location	WRM-SD-2056-01		WRM-SD-2062-01		CMS-DU-092100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2060-01
Date Sampled	9/19/00		9/19/00		9/21/00		9/21/00		9/20/00		9/20/00
Date Extracted	9/28/00		9/28/00		9/28/00		9/28/00		9/28/00		9/28/00
Date Analyzed	10/6/00		10/7/00		10/9/00		10/9/00		10/9/00		10/9/00
Dilution Factor	1.5		1.2		2.8		3		3		1.4
Percent Solids	59.0		83.0		70.0		67.0		63.0		74.0
QC Identifier	Field Dup. WRM-SD-2056-01		None		Field Dup. MAP-SD-2061-01		Field Dup. MAP-SD-2061-01		None		None
Benzaldehyde	500	U	400	U	920	U	990	U	990	U	460
Phenol	500	U	400	U	920	U	990	U	990	U	460
Bis(2-Chloroethyl)ether	500	U	400	U	920	U	990	U	990	U	460
2-Chlorophenol	500	U	400	U	920	U	990	U	990	U	460
2-Methylphenol	500	U	400	U	920	U	990	U	990	U	460
2,2'-oxybis(1-Chloropropane)	500	U	400	U	920	U	990	U	990	U	460
Acetophenone	500	U	400	U	920	U	990	U	990	U	460
4-Methylphenol	500	U	400	U	920	U	990	U	990	U	460
N-Nitroso-di-n-propylamine	500	U	400	U	920	U	990	U	990	U	460
Hexachloroethane	500	U	400	U	920	U	990	U	990	U	460
Nitrobenzene	500	U	400	U	920	U	990	U	990	U	460
Isophorone	500	U	400	U	920	U	990	U	990	U	460
2-Nitrophenol	500	U	400	U	920	U	990	U	990	U	460
2,4-Dimethylphenol	500	U	400	U	920	U	990	U	990	U	460
Bis(2-Chloroethoxy)methane	500	U	400	U	920	U	990	U	990	U	460
2,4-Dichlorophenol	500	U	400	U	920	U	990	U	990	U	460
Naphthalene	500	U	400	U	880	J	250	J	990	U	460
4-Chloroaniline	500	U	400	U	920	U	990	U	990	U	460
Hexachlorobutadiene	500	U	400	U	920	U	990	U	990	U	460
Caprolactam	500	U	400	U	920	U	990	U	990	U	460
4-Chloro-3-methylphenol	500	U	400	U	920	U	990	U	990	U	460
2-Methylnaphthalene	500	U	400	U	490	J	240	J	990	U	460
Hexachlorocyclopentadiene	500	U	400	U	920	U	990	U	990	U	460
2,4,6-Trichlorophenol	500	U	400	U	920	U	990	U	990	U	460
2,4,5-Trichlorophenol	1200	U	1000	U	2300	U	2500	U	2500	U	1200
1,1'-Biphenyl	500	U	400	U	180	J	120	J	990	U	460
2-Chloronaphthalene	500	U	400	U	920	U	990	U	990	U	460
2-Nitroaniline	1200	U	1000	U	2300	U	2500	U	2500	U	1200
Dimethylphthalate	500	U	400	U	920	U	990	U	990	U	460
2,6-Dinitrotoluene	500	U	400	U	920	U	990	U	990	U	460
Acenaphthylene	500	U	400	U	210	J	420	J	990	U	460
3-Nitroaniline	1200	U	1000	U	2300	U	2500	U	2500	U	1200
Acenaphthene	500	U	48	J	2000		2300		990	U	460
2,4-Dinitrophenol	1200	U	1000	U	2300	U	2500	U	2500	U	1200
4-Nitrophenol	1200	U	1000	U	2300	U	2500	U	2500	U	1200
Dibenzofuran	500	U	27	J	1500		1400		990	U	460

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02187		D02188		D02191		D02192		D02193		D02301
Station Location	WRM-SD-2056-01		WRM-SD-2062-01		CMS-DU-092100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2060-01
Date Sampled	9/19/00		9/19/00		9/21/00		9/21/00		9/20/00		9/20/00
Date Extracted	9/28/00		9/28/00		9/28/00		9/28/00		9/28/00		9/28/00
Date Analyzed	10/6/00		10/7/00		10/9/00		10/9/00		10/9/00		10/9/00
Dilution Factor	1.5		1.2		2.8		3		3		1.4
Percent Solids	59.0		83.0		70.0		67.0		63.0		74.0
QC Identifier	Field Dup. WRM-SD-2056-01		None		Field Dup. MAP-SD-2061-01		Field Dup. MAP-SD-2061-01		None		None
2,4-Dinitrotoluene	500	U	400	U	920	U	990	U	990	U	460
Diethylphthalate	500	U	400	U	920	U	990	U	990	U	460
Fluorene	500	U	71	J	2000		2200		990	U	460
4-Chlorophenyl-phenylether	500	U	400	U	920	U	990	U	990	U	460
4-Nitroaniline	1200	U	1000	U	2300	U	2500	U	2500	U	1200
4,6-Dinitro-2-methylphenol	1200	U	1000	U	2300	U	2500	U	2500	U	1200
N-Nitroso-diphenylamine	500	U	400	U	920	U	990	U	990	U	460
4-Bromophenyl-phenylether	500	U	400	U	920	U	990	U	990	U	460
Hexachlorobenzene	500	U	400	U	920	U	990	U	990	U	460
Atrazine	500	U	400	U	920	U	990	U	990	U	460
Pentachlorophenol	1200	U	1000	U	2300	U	2500	U	2500	U	1200
Phenanthrene	500	U	1200		*40000		*35000		300	J	23
Anthracene	500	U	160	J	4000		5900		990	U	460
Carbazole	500	U	180	J	1300		1600		52	J	460
Di-n-Butylphthalate	500	U	400	U	920	U	990	U	990	U	460
Fluoranthene	39	J	2000		*51000		*46000		810	J	68
Pyrene	41	J	1900		*42000		*42000		600	J	51
Butylbenzylphthalate	500	U	64	J	920	U	990	U	990	U	460
3,3'-Dichlorobenzidine	500	U	400	U	920	U	990	U	990	U	460
Benzo(a)anthracene	20	J	980		*21000		*18000		300	J	25
Chrysene	24	J	950		*19000		*18000		460	J	42
bis(2-Ethylhexyl)phthalate	100	J	850		230	J	890	J	430	J	180
Di-n-octylphthalate	500	U	400	U	920	U	990	U	990	U	460
Benzo(b)fluoranthene	500	U	1500		*24000	J	*18000		640	J	55
Benzo(k)fluoranthene	500	U	470		2300	J	4600	J	200	J	460
Benzo(a)pyrene	190	J	820		6800	J	*15000	J	370	J	32
Indeno(1,2,3-cd)pyrene	500	U	720		4400	J	7700	J	290	J	28
Dibenzo(a,h)anthracene	500	U	110	J	780	J	1300		990	U	460
Benzo(g,h,i)perylene	500	U	520		3600	J	6300	J	220	J	23

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number		D02302		D02303		D02304		D02305	
Station Location		WRD-SD-2063-01		MAP-SD-2059-01		WRM-SD-2055-01		WRM-SD-2057-01	
Date Sampled		9/20/00		9/20/00		9/20/00		9/20/00	
Date Extracted		9/28/00		9/28/00		10/5/00		9/28/00	
Date Analyzed		10/9/00		10/9/00		10/8/00		10/9/00	
Dilution Factor		3		2.9		3		3	
Percent Solids		44.0		64.0		42.0		28.0	
QC Identifier		None		None		None		None	
Benzaldehyde	U	93	JEB	960	U	170	JEB	120	JEB
Phenol	U	990	U	960	U	1900	JEB	990	U
Bis(2-Chloroethyl)ether	U	990	U	960	U	990	UJ	990	U
2-Chlorophenol	U	990	U	960	U	1800	J	990	U
2-Methylphenol	U	990	U	960	U	990	UJ	990	U
2,2'-oxybis(1-Chloropropane)	U	990	U	960	U	990	UJ	990	U
Acetophenone	U	990	U	960	U	990	UJ	990	U
4-Methylphenol	U	990	U	960	U	990	UJ	990	U
N-Nitroso-di-n-propylamine	UJ	990	U	960	U	1400	J	990	U
Hexachloroethane	U	990	U	960	U	990	UJ	990	U
Nitrobenzene	U	990	U	960	U	990	UJ	990	U
Isophorone	U	990	U	960	U	990	UJ	990	U
2-Nitrophenol	U	990	U	960	U	990	UJ	990	U
2,4-Dimethylphenol	U	990	U	960	U	990	UJ	990	U
Bis(2-Chloroethoxy)methane	U	990	U	960	U	990	UJ	990	U
2,4-Dichlorophenol	U	990	U	960	U	990	UJ	990	U
Naphthalene	U	990	U	960	U	110	J	160	J
4-Chloroaniline	U	990	U	960	U	990	UJ	990	U
Hexachlorobutadiene	U	990	U	960	U	990	UJ	990	U
Caprolactam	U	990	U	960	U	990	UJ	990	U
4-Chloro-3-methylphenol	U	990	U	960	U	2200	J	990	U
2-Methylnaphthalene	U	990	U	960	U	990	UJ	100	J
Hexachlorocyclopentadiene	U	990	U	960	U	990	UJ	990	U
2,4,6-Trichlorophenol	U	990	U	960	U	990	UJ	990	U
2,4,5-Trichlorophenol	U	2500	U	2400	U	2500	UJ	2500	U
1,1'-Biphenyl	U	990	U	960	U	990	UJ	990	U
2-Chloronaphthalene	U	990	U	960	U	990	UJ	990	U
2-Nitroaniline	U	2500	U	2400	U	2500	UJ	2500	U
Dimethylphthalate	U	990	U	960	U	990	UJ	990	U
2,6-Dinitrotoluene	U	990	U	960	U	990	UJ	990	U
Acenaphthylene	U	62	J	960	U	180	J	240	J
3-Nitroaniline	U	2500	U	2400	U	2500	UJ	2500	U
Acenaphthene	UJ	110	J	960	U	1800	J	580	J
2,4-Dinitrophenol	U	2500	U	2400	U	2500	UJ	2500	U
4-Nitrophenol	U	2500	U	2400	U	2200	J	2500	U
Dibenzofuran	U	76	J	960	U	220	J	310	J

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Semivolatile Organic Analysis By Method OLM04.2BNA (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number		D02302		D02303		D02304		D02305	
Station Location		WRD-SD-2063-01		MAP-SD-2059-01		WRM-SD-2055-01		WRM-SD-2057-01	
Date Sampled		9/20/00		9/20/00		9/20/00		9/20/00	
Date Extracted		9/28/00		9/28/00		10/5/00		9/28/00	
Date Analyzed		10/9/00		10/9/00		10/6/00		10/9/00	
Dilution Factor		3		2.9		3		3	
Percent Solids		44.0		64.0		42.0		28.0	
QC Identifier		None		None		None		None	
2,4-Dinitrotoluene	U	990	U	960	U	1200	J	990	U
Diethylphthalate	U	990	U	960	U	990	UJ	990	U
Fluorene	U	140	J	960	U	470	J	660	J
4-Chlorophenyl-phenylether	U	990	U	960	U	990	UJ	990	U
4-Nitroaniline	U	2500	U	2400	U	2500	UJ	2500	U
4,6-Dinitro-2-methylphenol	U	2500	U	2400	U	2500	UJ	2500	U
N-Nitroso-diphenylamine	U	990	U	960	U	990	UJ	990	U
4-Bromophenyl-phenylether	U	990	U	960	U	990	UJ	990	U
Hexachlorobenzene	U	990	U	960	U	990	UJ	990	U
Atrazine	U	990	U	960	U	990	UJ	990	U
Pentachlorophenol	U	2500	U	2400	U	1400	J	2500	U
Phenanthrene	J	1600		99	J	4400	J	5600	
Anthracene	U	300	J	960	U	970	J	1400	
Carbazole	U	190	J	960	U	320	J	850	J
Di-n-Butylphthalate	U	990	U	960	U	1800	J	990	U
Fluoranthene	J	2600		290	J	3300	J	*9500	
Pyrene	J	2400		240	J	6500	J	*7100	
Butylbenzylphthalate	U	990	U	98	J	990	UJ	990	U
3,3'-Dichlorobenzidine	U	990	U	960	U	990	UJ	990	U
Benzo(a)anthracene	J	1100		110	J	5500	J	4900	
Chrysene	J	1200		180	J	4100	J	3500	
bis(2-Ethylhexyl)phthalate	J	930	J	310	J	*50000	J	4700	
Di-n-octylphthalate	U	990	U	960	U	990	UJ	990	U
Benzo(b)fluoranthene	J	1800		230	J	*13000	J	6500	
Benzo(k)fluoranthene	U	490	J	100	J	490	J	1800	
Benzo(a)pyrene	J	1100		130	J	3900	J	3500	
Indeno(1,2,3-cd)pyrene	J	800	J	120	J	3900	J	2700	
Dibenzo(a,h)anthracene	U	130	J	960	U	620	J	450	J
Benzo(g,h,i)perylene	J	650	J	100	J	3800	J	2100	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Aqueous Semivolatile Organic Analysis By Method OLM04.2BNA (ug/l)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02184	
Station Location	CMS-RB-091900A	
Date Sampled	9/19/00	
Date Extracted	9/21/00	
Date Analyzed	10/5/00	
Dilution Factor	1	
Percent Solids		
QC Identifier	Rinsate Blank	
Benzaldehyde	6	J
Phenol	7	J
Bis(2-Chloroethyl)ether	10	U
2-Chlorophenol	10	U
2-Methylphenol	10	U
2,2'-oxybis(1-Chloropropane)	10	U
Acetophenone	10	U
4-Methylphenol	10	U
N-Nitroso-di-n-propylamine	10	U
Hexachloroethane	10	U
Nitrobenzene	10	U
Isophorone	10	U
2-Nitrophenol	10	U
2,4-Dimethylphenol	10	U
Bis(2-Chloroethoxy)methane	10	U
2,4-Dichlorophenol	10	U
Naphthalene	10	U
4-Chloroaniline	10	U
Hexachlorobutadiene	10	U
Caprolactam	10	U
4-Chloro-3-methylphenol	10	U
2-Methylnaphthalene	10	U
Hexachlorocyclopentadiene	10	U
2,4,6-Trichlorophenol	10	U
2,4,5-Trichlorophenol	25	U
1,1'-Biphenyl	10	U
2-Chloronaphthalene	10	U
2-Nitroaniline	25	U
Dimethylphthalate	10	U
2,6-Dinitrotoluene	10	U
Acenaphthylene	10	U
3-Nitroaniline	25	U
Acenaphthene	10	U
2,4-Dinitrophenol	25	U
4-Nitrophenol	25	U
Dibenzofuran	10	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Aqueous Semivolatile Organic Analysis By Method OLM04.2BNA (ug/l)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02184	
Station Location	CMS-RB-091900A	
Date Sampled	9/19/00	
Date Extracted	9/21/00	
Date Analyzed	10/5/00	
Dilution Factor	1	
Percent Solids		
QC Identifier	Rinsate Blank	
2,4-Dinitrotoluene	10	U
Diethylphthalate	10	U
Fluorene	10	U
4-Chlorophenyl-phenylether	10	U
4-Nitroaniline	25	U
4,6-Dinitro-2-methylphenol	25	U
N-Nitroso-diphenylamine	10	U
4-Bromophenyl-phenylether	10	U
Hexachlorobenzene	10	U
Atrazine	10	U
Pentachlorophenol	25	U
Phenanthrene	10	U
Anthracene	10	U
Carbazole	10	U
Di-n-Butylphthalate	10	U
Fluoranthene	10	U
Pyrene	10	U
Butylbenzylphthalate	10	U
3,3'-Dichlorobenzidine	10	U
Benzo(a)anthracene	10	U
Chrysene	10	U
bis(2-Ethylhexyl)phthalate	10	U
Di-n-octylphthalate	10	U
Benzo(b)fluoranthene	10	U
Benzo(k)fluoranthene	10	U
Benzo(a)pyrene	10	U
Indeno(1,2,3-cd)pyrene	10	U
Dibenzo(a,h)anthracene	10	U
Benzo(g,h,i)perylene	10	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Pesticide/PCB Analysis By Method OLM04.2P (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02179		D02182		D02183		D02185		D02186		D02187	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01		WRM-SD-2056-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00		9/19/00	
Date Extracted	9/27/00		9/27/00		9/27/00		9/27/00		9/27/00		9/27/00	
Date Analyzed	10/12/00		10/12/00		10/12/00		10/12/00		10/12/00		10/12/00	
Dilution Factor	1		1		1		1		1		1	
Percent Solids	59.0		56.0		77.0		84.0		47.0		59.0	
QC Identifier	Field Dup. WRM-SD-2056-01		None		None		None		None		Field Dup. WRM-SD-2056-01	
alpha-BHC	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
beta-BHC	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
delta-BHC	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
gamma-BHC	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Heptachlor	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Aldrin	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Heptachlor Epoxide	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Endosulfan I	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Dieldrin	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
4,4'-DDE	5.0	U	5.0	U	4.0	U	4.0	U	7.0		5.0	U
Endrin	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
Endosulfan II	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
4,4'-DDD	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
Endosulfan Sulfate	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
4,4'-DDT	5.0	U	9.0		4.0	U	4.0	U	5.0	U	5.0	U
Methoxychlor	25	U	25	U	22	U	20	U	24	U	25	U
Endrin Ketone	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
Endrin Aldehyde	5.0	U	5.0	U	4.0	U	4.0	U	5.0	U	5.0	U
alpha-Chlordane	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
gamma-Chlordane	3.0	U	3.0	U	2.0	U	2.0	U	2.0	U	3.0	U
Toxaphene	250	U	250	U	220	U	200	U	240	U	250	U
Aroclor-1016	49	U	50	U	43	U	40	U	48	U	50	U
Aroclor-1221	98	U	100	U	87	U	79	U	97	U	100	U
Aroclor-1232	49	U	50	U	43	U	40	U	48	U	50	U
Aroclor-1242	49	U	50	U	43	U	40	U	48	U	50	U
Aroclor-1248	49	U	50	U	43	U	40	U	48	U	50	U
Aroclor-1254	49	U	50	U	43	U	150		48	U	50	U
Aroclor-1260	49	U	50	U	43	U	40	U	48	U	50	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Pesticide/PCB Analysis By Method OLM04.2P (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02188		D02191		D02192		D02193		D02301		D02302	
Station Location	WRM-SD-2062-01		CMS-DU-092100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2060-01		WRD-SD-2063-01	
Date Sampled	9/19/00		9/21/00		9/21/00		9/20/00		9/20/00		9/20/00	
Date Extracted	9/27/00		9/27/00		9/27/00		9/27/00		9/27/00		9/27/00	
Date Analyzed	10/12/00		10/16/00		10/16/00		10/16/00		10/16/00		10/16/00	
Dilution Factor	1		1		1		1		1		1	
Percent Solids	83.0		70.0		67.0		63.0		74.0		44.0	
QC Identifier	None		Field Dup. MAP-SD-2061-01		Field Dup. MAP-SD-2061-01		None		None		None	
alpha-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
beta-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
delta-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
gamma-BHC	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Heptachlor	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Aldrin	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Heptachlor Epoxide	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Endosulfan I	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Dieldrin	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4,4'-DDE	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Endrin	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Endosulfan II	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4,4'-DDD	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	*92	
Endosulfan Sulfate	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4,4'-DDT	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	*520	
Methoxychlor	20	U	23	U	23	U	25	U	23	U	25	U
Endrin Ketone	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Endrin Aldehyde	4.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
alpha-Chlordane	2.0	U	2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
gamma-Chlordane	4.0		2.0	U	2.0	U	3.0	U	2.0	U	3.0	U
Toxaphene	200	U	230	U	230	U	250	U	230	U	250	U
Aroclor-1016	40	U	47	U	47	U	50	U	45	U	50	U
Aroclor-1221	80	U	94	U	93	U	99	U	90	U	100	U
Aroclor-1232	40	U	47	U	47	U	50	U	45	U	50	U
Aroclor-1242	40	U	47	U	47	U	50	U	45	U	50	U
Aroclor-1248	40	U	47	U	47	U	50	U	45	U	50	U
Aroclor-1254	40	U	47	U	47	U	50	U	45	U	50	U
Aroclor-1260	40	U	47	U	47	U	50	U	45	U	50	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Pesticide/PCB Analysis By Method OLM04.2P (ug/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02303		D02304		D02305	
Station Location	MAP-SD-2056-01		WRM-SD-2055-01		WRM-SD-2057-01	
Date Sampled	9/20/00		9/20/00		9/20/00	
Date Extracted	9/27/00		9/27/00		9/27/00	
Date Analyzed	10/16/00		10/17/00		10/17/00	
Dilution Factor	1		1		1	
Percent Solids	64.0		42.0		28.0	
QC Identifier	None		None		None	
alpha-BHC	2.0	U	3.0	U	3.0	U
beta-BHC	2.0	U	3.0	U	3.0	U
delta-BHC	2.0	U	3.0	U	3.0	U
gamma-BHC	2.0	U	3.0	U	3.0	U
Heptachlor	2.0	U	3.0	U	3.0	U
Aldrin	2.0	U	3.0	U	3.0	U
Heptachlor Epoxide	2.0	U	3.0	U	3.0	U
Endosulfan I	2.0	U	3.0	U	3.0	U
Dieldrin	5.0	U	5.0	U	5.0	U
4,4'-DDE	5.0	U	11		48	
Endrin	5.0	U	5.0	U	5.0	U
Endosulfan II	5.0	U	5.0	U	5.0	U
4,4'-DDD	5.0	U	5.0	U	52	
Endosulfan Sulfate	5.0	U	5.0	U	5.0	U
4,4'-DDT	5.0	U	5.0	U	5.0	U
Methoxychlor	24	U	25	U	25	U
Endrin Ketone	5.0	U	5.0	U	5.0	U
Endrin Aldehyde	5.0	U	5.0	U	5.0	U
alpha-Chlordane	4.0		3.0	U	3.0	U
gamma-Chlordane	5.0		3.0	U	3.0	U
Toxaphene	240	U	250	U	250	U
Aroclor-1016	49	U	50	U	50	U
Aroclor-1221	98	U	100	U	100	U
Aroclor-1232	49	U	50	U	50	U
Aroclor-1242	49	U	50	U	50	U
Aroclor-1248	49	U	50	U	50	U
Aroclor-1254	49	U	50	U	*2200	
Aroclor-1260	49	U	50	U	50	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Aqueous Pesticide/PCB Analysis By Method OLM04.2P (ug/l)
Site: Centredale Manor
Case: 0175H; SDG: D02179-OA

EPA Sample Number	D02184	
Station Location	CMS-RB-091900A	
Date Sampled	9/19/00	
Date Extracted	9/21/00	
Date Analyzed	10/5/00	
Dilution Factor	1	
Percent Solids		
QC Identifier	Rinsate Blank	
alpha-BHC	0.05	U
beta-BHC	0.05	U
delta-BHC	0.05	U
gamma-BHC	0.05	U
Heptachlor	0.05	U
Aldrin	0.05	U
Heptachlor Epoxide	0.05	U
Endosulfan I	0.05	U
Dieldrin	0.10	U
4,4'-DDE	0.10	U
Endrin	0.10	U
Endosulfan II	0.10	U
4,4'-DDD	0.10	U
Endosulfan Sulfate	0.10	U
4,4'-DDT	0.10	U
Methoxychlor	0.50	U
Endrin Ketone	0.10	U
Endrin Aldehyde	0.10	U
alpha-Chlordane	0.05	U
gamma-Chlordane	0.05	U
Toxaphene	5.0	U
Aroclor-1016	1.0	U
Aroclor-1221	2.0	U
Aroclor-1232	1.0	U
Aroclor-1242	1.0	U
Aroclor-1248	1.0	U
Aroclor-1254	1.0	U
Aroclor-1260	1.0	U

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

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RAC1-EPA-2728

Contract No. 68-W6-0045

December 13, 2000

Ms. Christine Clark
Regional Sample Control Coordinator
U.S. Environmental Protection Agency
Office of Environmental Measurement and Evaluation
60 Westview Street
Lexington, Massachusetts 02421

Subject: Tier II Inorganic Data Validation, W.A. No. 043-TATA-016P
DAS Case 0175H, SDG D02179-IA
Katahdin Analytical Services
Centredale Manor Site, North Providence, Rhode Island

TAL Metals/ Acid Volatile Sulfide/Simultaneously Extractable Metals (AVS/SEM):
15/Sediments/ D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305 (Field Duplicate Pairs: D02179/D02187, D02191/D02192)

1/Aqueous Rinsate Blank/ D02184

1/Soil Performance Evaluation Sample/ D02181

Dear Ms. Clark:

Tetratech NUS, Inc. (TtNUS) performed a Tier II data validation for the target analyte list (TAL) metals analytical data and acid volatile sulfide/simultaneously extractable metals (AVS/SEM) analytical data for DAS Case 0175H, SDG D02179-IA, from sediment samples collected by TtNUS at the Centredale Manor site. The TAL metals analysis was performed according to the CLP ILM04.0 Statement of Work, and the AVS/SEM analysis by the Allen, H. E. et al Method (December 1991), as modified by the TtNUS Technical Specification No. S00-RAC1-151. The Tier II data validation was performed as required in the approved September 1999 Sampling and Analysis Plan. The data were validated according to the Region I, EPA-NE Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, modified February 1989.

The data were evaluated based on the following parameters:

- Data Completeness
- Holding Times
- Calibration Verification
- Field and Laboratory Blank Analyses

	• ICP Interference Check Sample Results
	• Matrix Spike Recoveries
*	• Laboratory Control Sample Results
	• Laboratory Duplicate Results
	• Field Duplicate Precision
NA	• Furnace Atomic Absorption Results
*	• ICP Serial Dilution Results
*	• Detection Limits
	• Sample Quantitation
*	• Performance Evaluation Sample Results

* All quality control criteria were met for this parameter.

Table I summarizes the validation recommendations, which were based on the following information:

Data Completeness

The laboratory was contacted on November 27, 2000 about missing entries for some instrument calibrations in the Form XIV (Analysis Run Log). The laboratory responded on November 28, 2000 that the calibrations were performed. The corrected forms were received on December 1, 2000. The laboratory was contacted on December 6, 2000 about a missing pH for the rinsate blank sample and about the limits for the solid laboratory control samples (LCS) in the Form VII, which were reported as percents instead of mg/kg. The laboratory responded on December 6, 2000 that if the pH was not noted on the Sample Receipt Condition Report, then the sample was properly preserved. A list of the LCS limits in mg/kg was received on December 11, 2000. The laboratory was also contacted on December 6, 2000, about some apparent dilutions in the AVS raw data that were not reported in the AVS reporting forms. The laboratory responded on December 11, 2000 that there was a dilution for the analysis of sample D02192. The corrected AVS reporting form for D02192 was received on December 11, 2000. No post-digestion spikes were performed for analytes that did not meet required criteria for the matrix spike pairs; no action is required.

Holding Times

The holding time quality control limit of 28 days for mercury was exceeded in the SEM analysis for the sediment samples. The positive and non-detected mercury results in the SEM analysis are qualified as estimated (J, UJ).

Calibration Verification

TAL Metals

The percent recoveries for cadmium, chromium, and selenium in the TAL metals analysis were outside the 80%-120% quality control (QC) criteria in the CRDL standard analysis. The positive results < 3x CRDL and the non-detected results for selenium are qualified as estimated (J, UJ) in all samples since the recovery was below the criteria; the results may be biased low. The positive cadmium results < 3x CRDL are estimated (J) in affected samples since the recovery was above the criteria; the results may be biased high. The positive chromium results < 3x

CRDL are estimated (J) in affected samples since the recoveries were below and above the criteria. These results are uncertain due to poor linearity near the CRDL.

Simultaneously Extracted Metals

The percent recoveries for cadmium and nickel in the SEM analysis were above the 120% QC criterion in the CRDL standard analysis. The positive results < 3x CRDL are qualified as estimated (J). The results may be biased high.

Field and Laboratory Blank Analyses

TAL Metals

The laboratory and field blank analyses were used to calculate the maximum concentrations of the following contaminants affecting the sediment samples for the TAL metals analysis:

Analyte	Maximum Concentration (µg/L)	Action Level (mg/kg)
Mercury	0.17	0.43
Nickel	12.1	12.1
Potassium	637	637
Silver	3.5	3.5
Sodium	56.7	56.7

Blank actions were applied to affected samples for mercury, nickel, potassium, silver, and sodium.

The laboratory blank analyses were used to calculate the maximum concentrations of the following contaminants affecting the aqueous rinsate blank sample, D02184, for the TAL metals analysis:

Analyte	Maximum Concentration (µg/L)	Action Level (µg/L)
Calcium	148	740
Iron	55.1	276
Sodium	56.7	284

Blank actions were applied to the rinsate blank sample for calcium, iron, and sodium.

Simultaneously Extracted Metals

The laboratory blank and field blank analyses were used to calculate the maximum concentrations of the following contaminants affecting the sediment samples for the SEM analysis:

Analyte	Maximum Concentration (µg/L)	Action Level (µg/L)	Action Level (µmol/g)
Nickel	10.75	53.75	0.0769
Zinc	104.8	524	0.671

Blank actions were applied to affected sediment samples for nickel and zinc.

The following actions apply for blank contamination in the TAL metals and SEM analyses:

- Accept values > Action Level.
- Report as (U) values > 2x IDL and < Action Level. The reporting limit is the associated value.
- Report as (UJ) values < 2x IDL and < Action Level. The reporting limit is the associated estimated value.

ICP Interference Check Sample Results

The following analytes were detected in the ICSA solution for the TAL metals analysis at an absolute level greater than 2x IDL when these analytes were not supposed to be present in the solution: selenium, barium, cadmium, potassium, and zinc. Estimate (J) positive results and (UJ) non-detected results for the analytes with levels of interferents of 50% or more of that in the ICSA solution and reject (R) positive results if the reported concentration is due entirely (≥ 80%) to the interfering analyte. The samples listed in the table below have iron at levels greater than 50% of their respective levels in the ICSA solution. Therefore, the following actions were taken:

Sample	Analyte Affected	Sample Concentration (µg/L)	Sample Interferent-Fe (µg/L)	Estimated Interference (µg/L)	Action
D02192	Selenium	2.6	184210	4.7	Reject
	Barium	311	184210	1.9	Accept
	Cadmium	10.6	184210	5.6	J
	Potassium	1763	184210	733	J
	Zinc	857	184210	-5.6	Accept
D02302	Selenium	ND	112670	2.9	Accept
	Barium	1156	112670	1.2	Accept
	Cadmium	482	112670	3.5	Accept
	Potassium	1932	112670	448	J
	Zinc	4126	112670	-3.5	Accept
D02305	Selenium	ND	104330	2.7	Accept
	Barium	534	104330	1.1	Accept
	Cadmium	18.8	104330	3.2	J
	Potassium	4308	104330	415	J
	Zinc	2497	104330	-3.2	Accept

The positive sample results for cadmium and potassium in the TAL metals analysis are estimated (J) in the samples indicated above due to positive ICP interference attributed to iron; results may be biased high. The positive selenium result in D02192 is rejected (R) since the reported concentration might be due entirely (≥ 80%) to the iron interference. The non-detected selenium results in D02302 and D02305 are not affected by positive interference and are therefore accepted without qualification. The positive results for barium, cadmium, and zinc are accepted without qualification in the samples indicated above since the estimated interference accounted for less than 1% of the reported sample concentration.

Matrix Spike Recoveries

TAL Metals

Results of the matrix spike analysis for TAL metals were outside the 75%-125% QC criteria for antimony, manganese, and selenium, and lead. The positive and non-detected results for antimony, manganese, and selenium are estimated (J, UJ) since the percent recoveries were below the limits. The results may be biased low. The positive lead results are estimated (J) since the percent recovery was above the limits. These results may be biased high.

Acid Volatile Sulfide/ Simultaneously Extracted Metals

Results of the matrix spike analysis for AVS/SEM were below the 75% QC criterion for copper, mercury, and AVS. The positive results for copper and mercury are estimated (J), and the non-detected results for mercury are rejected (R), since the percent recoveries were below 30%. The positive results may be biased low, and the non-detected mercury results may be false negatives. The positive and non-detected AVS results are estimated (J, UJ) since the results are below 75%. These results may be biased low.

Laboratory Duplicate Results

TAL Metals

The relative percent difference (RPD) for lead was greater than the 35% QC criterion for sediment samples in the laboratory duplicate analysis of TAL metals for sample D02185. The positive lead results are estimated (J) due to poor laboratory duplicate precision.

Simultaneously Extracted Metals

The relative percent difference (RPD) for lead was greater than the 35% QC criterion for sediment samples in the laboratory duplicate analysis of SEM for sample D02193. The positive lead results are estimated (J) due to poor laboratory duplicate precision.

Field Duplicate Precision

TAL Metals

The relative percent difference (RPD) for manganese was greater than the 50% QC criterion for sediment samples in the TAL metals analysis for the field duplicate pair D02179/D02187. The RPDs for chromium, iron, lead, and manganese were greater than the 50% quality control

criterion, and the absolute differences for arsenic and nickel were greater than the 4x CRDL QC criterion for sediment samples for the field duplicate pair D02191/D02192. The positive results for chromium, iron, lead, and manganese are estimated (J) due to poor field duplicate precision; and the positive and non-detected arsenic and nickel results are estimated (J, UJ) due to poor field duplicate precision.

Simultaneously Extracted Metals

The RPD for copper and lead were greater than the 50% QC criterion for sediment samples in the SEM analysis for the field duplicate pair D02191/D02192. The positive copper and lead results are estimated (J) due to poor field duplicate precision.

Sample Quantitation

The percent solids content for sample D02305 was below 30%, and the sample weight for mercury in the TAL metals analysis was insufficient to compensate for the low % solids. The positive mercury result for D02305 in the TAL metals analysis is estimated (J).

Performance Evaluation Sample Results

Performance evaluation sample D02181 (ICC00850) was provided by the EPA and used to evaluate the laboratory's ability to correctly identify and quantitate TAL metals. All results were within limits.

Overall Assessment of the Data

TAL Metals

The TAL metals data are acceptable for use as qualified. The positive results < 3x CRDL and non-detected results for selenium are estimated (J, UJ); and the positive cadmium and chromium results < 3x CRDL are estimated (J) due to poor or high CRDL standard recoveries. Reporting limits for mercury, nickel, potassium, silver, and sodium are raised in the sediment samples due to laboratory and/or rinsate blank contamination. Reporting limits for calcium, iron, and sodium are raised in the rinsate blank sample due to laboratory blank contamination. The positive results for cadmium and potassium are estimated (J) in several samples due to positive ICP interference attributed to iron; and the positive selenium result in D02192 is rejected (R) since the reported concentration might be due entirely to the iron interference. The positive and non-detected results for antimony, manganese, selenium, and lead are estimated (J, UJ) due to poor or high matrix spike recoveries. The positive lead results are estimated (J) due to poor laboratory duplicate precision. The positive and non-detected results for arsenic, nickel, chromium, iron, lead, and manganese are estimated (J, UJ) due to poor field duplicate precision. The positive mercury result in D02305 is estimated (J) due to the low % solids content.

Acid Volatile Sulfide/Simultaneously Extractable Metals

The AVS/SEM data are acceptable for use as qualified. The positive mercury results are qualified as estimated (J) due to exceeded holding time. The positive cadmium and nickel results < 3x CRDL are qualified as estimated (J) due to high CRDL standard recoveries.

Reporting limits for nickel and zinc are raised in the sediment samples due to laboratory blank contamination. The positive copper and mercury results are estimated (J), and the positive and non-detected AVS results are estimated (J, UJ), due to poor matrix spike recoveries. The non-detected mercury results are rejected (R) due to matrix spike recoveries below 30%. The positive lead results are estimated (J) due to poor laboratory duplicate precision. The positive copper and lead results are estimated (J) due to poor field duplicate precision.

NOTE: TAL metals and SEM sample results less than 2x IDL and less than the CRDL are estimated (J) due to uncertainty in values near the instrument detection limit.

Sincerely,

Ann L. Franke
Data Validator

Lucy Guzman
RAC I Lead Chemist

PMO - @

Tables: Table I: Recommendation Summary Tables
Data Summary Tables

Enclosures: Data Validation Worksheets
PE Sample Score Report
Communication/Phone Logs
Field Notes (in SDG D02179-OA)
Technical Specification No. S00-RAC1-151 (in SDG D02179-OA)
CSF Audit (DC-2 Form)
DQO Summary Form

c: Anna Krasko (EPA) w/o enc.
S. Parker (TtNUS) w/o enc.
File N0400-2.6 w/ enc.

CENTREDALE MANOR
DAS Case 0175H, SDG D02179-IA

Table I - Recommendation Summary for TAL Metals Sediment Samples

Aluminum		Magnesium	
Antimony	J^{6}	Manganese	$J^{6,8}$
Arsenic	J^{9}	Mercury	J^{10}
Barium		Nickel	J^{9}
Beryllium		Potassium	J^{4}
Cadmium	$J^{1,4}$	Selenium	$J^{2,6}$, R^{1}
Calcium		Silver	A^{1}
Chromium	$J^{3,8}$	Sodium	A^{1}
Cobalt		Thallium	
Copper		Vanadium	
Iron	J^{8}	Zinc	
Lead	$J^{5,7,8}$		

If the field is blank, the qualifier is A - Accept the data.

A^{1}- Accept the data but raise the reporting limits due to blank contamination.

J^{1}- Estimate (J) positive results <3x CRDL due to high CRDL standard recovery. Results may be biased high.

J^{2}- Estimate (J, UJ) positive results < 3x CRDL and non-detected results due to poor CRDL standard recovery. Results may be biased low.

J^{3}- Estimate (J, UJ) positive results < 3x CRDL and non-detected results due to poor linearity near the CRDL.

J^{4}- Estimate (J) positive results in samples indicated in data validation letter due to positive ICP interference attributed to iron. Results may be biased high. Also, raise the reporting limit for potassium due to blank contamination.

J^{5}- Estimate (J) positive results due to high matrix spike recovery. Results may be biased high.

J^{6}- Estimate (J, UJ) positive and non-detected results due to poor matrix spike recoveries. Results may be biased low.

J^{7}- Estimate (J) positive results due to poor laboratory duplicate precision.

J^{8} - Estimate (J) positive results due to poor field duplicate precision.

J^9- Estimate (J, UJ) positive and non-detected results due to poor field duplicate precision. Also, raise the reporting limit for nickel due to blank contamination.

J^{10}- Estimate (J) positive result in sample D02305 due to low % solids content. Also, raise the reporting limit in the sediment samples due to blank contamination.

R^1- Reject (R) positive result in D02192 since the reported concentration might be due entirely to iron ICP interference. The result may be a false positive.

CENTREDALE MANOR
DAS Case 0175H, SDG D02179-IA

Table I - Recommendation Summary for TAL Metals Aqueous Sample

Aluminum		Magnesium	
Antimony		Manganese	
Arsenic		Mercury	
Barium		Nickel	
Beryllium		Potassium	
Cadmium		Selenium	J^1
Calcium	A^1	Silver	
Chromium		Sodium	A^1
Cobalt		Thallium	
Copper		Vanadium	
Iron	A^1	Zinc	
Lead			

If the field is blank, the qualifier is A - Accept the data.

A^1- Accept the data but raise the reporting limits due to blank contamination.

J^1- Estimate (UJ) non-detected result due to poor CRDL standard recovery. Result may be biased low.

CENTREDALE MANOR
DAS Case 0175H, SDG D02179-IA

Table I - Recommendation Summary for AVS/SEM Sediment Samples

Aluminum		Magnesium	
Antimony		Manganese	
Arsenic		Mercury	$J^{1,3}$, R^1
Barium		Nickel	J^2
Beryllium		Potassium	
Cadmium	J^2	Selenium	
Calcium		Silver	
Chromium		Sodium	
Cobalt		Thallium	
Copper	$J^{3,6}$	Vanadium	
Iron		Zinc	A^1
Lead	$J^{5,6}$	AVS	J^4

If the field is blank, the qualifier is A - Accept the data.

A^1- Accept the data but raise the reporting limits due to blank contamination.

J^1- Estimate (J, UJ) positive and non-detected results due to exceeded holding times.

J^2- Estimate (J) positive results <3x CRDL due to high CRDL standard recoveries. Results may be biased high. Also, raise the reporting limit for nickel due to blank contamination.

J^3- Estimate (J) positive results due to poor matrix spike recoveries. Results may be biased low.

J^4- Estimate (J, UJ) positive and non-detected results due to poor matrix spike recoveries. Results may be biased low.

J^5- Estimate (J) positive results due to poor laboratory duplicate precision.

J^6- Estimate (J) positive results due to poor field duplicate precision.

R^1- Reject (R) non-detected results due to matrix spike recoveries below 30%. Results may be false negatives.

Sediment TAL Metal Analysis (mg/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02179		D02182		D02183		D02185		D02186		D02187	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01		WRM-SD-2056-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00		9/19/00	
Date Extracted												
Date Analyzed												
Dilution Factor	1		1		1		1		1		1	
Percent Solids	59.0		56.0		77.3		83.6		46.7		59.2	
QC Identifier	Field Dup. WRM-SD-2056-01		None		None		None		None		Field Dup. WRM-SD-2056-01	
Aluminum	4750		2980		3120		3000		3190		4390	
Antimony	0.59	UJ	0.57	UJ	0.58	UJ	0.64	UJ	0.60	UJ	0.60	UJ
Arsenic	1.6	J	0.84	J	0.48	UJ	1.2	J	2.1	J	1.1	J
Barium	29.5		26.4		30.3		31.7		55.8		30.0	
Beryllium	0.99		0.42		0.41		0.26		0.65		1.0	
Cadmium	0.52	UJ	0.51	UJ	0.51	UJ	0.57	UJ	0.73	J	0.53	UJ
Calcium	851		1110		710		789		1590		795	
Chromium	6.5	J	5.9	J	3.7	J	10.7	J	70.8	J	5.3	J
Cobalt	2.8		3.8		2.1		3.4		5.0		2.5	
Copper	2.4		7.9		11.7		12.5		48.9		1.5	
Iron	6010	J	6780	J	5230	J	8070	J	7960	J	4770	J
Lead	10.2	J	34.6	J	8.5	J	39.8	J	132	J	8.9	J
Magnesium	707		1060		1000		1410		932		600	
Manganese	260	J	161	J	99.9	J	184	J	214	J	155	J
Mercury	0.04	U	0.04	U	0.02	UJ	0.03	U	0.22	U	0.04	U
Nickel	3.2	UJ	6.7	UJ	6.6	UJ	9.9	UJ	17.0	J	3.1	UJ
Potassium	269	U	368	U	412	U	252	U	400	U	198	U
Selenium	0.48	UJ	0.46	UJ	0.46	UJ	0.52	UJ	0.48	UJ	0.49	UJ
Silver	0.55	U	0.53	U	0.53	U	0.60	U	0.74	UJ	0.58	U
Sodium	98.0		74.9		57.4		51.9	U	110		90.5	
Thallium	1.02	U	0.99	U	1.0	U	1.11	U	1.03	U	1.04	U
Vanadium	8.6		7.4		5.8		8.9		10.8		7.2	
Zinc	19.2		46.4		28.0		55.9		172		14.2	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment TAL Metal Analysis (mg/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02186		D02191		D02192		D02193		D02301		D02302	
Station Location	WRM-SD-2062-01		CMS-DU-092100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2060-01		WRD-SD-2063-01	
Date Sampled	9/19/00		9/21/00		9/21/00		9/20/00		9/20/00		9/20/00	
Date Extracted												
Date Analyzed												
Dilution Factor	1		1		1		1		1		1	
Percent Solids	62.7		70.9		66.5		63.4		73.7		44.3	
QC Identifier	None		Field Dup. MAP-SD-2061-01		Field Dup. MAP-SD-2061-01		None		None		None	
Aluminum	2580		2000		2400		2470		2390		3240	
Antimony	0.56	UJ	1.3	J	2.5	J	0.57	UJ	0.59	UJ	3.4	J
Arsenic	1.2	J	2.6	J	13.7	J	0.97	J	0.60	J	6.3	J
Barium	21.9		45.1		64.1		38.1		16.3		228	
Beryllium	0.31		0.33		0.47		0.43		0.23		0.68	
Cadmium	0.51	U	1.5	J	2.2	J	0.96	J	0.52	UJ	95.1	
Calcium	560		899		1390		1390		621		2290	
Chromium	17.5	J	21.6	J	40.8	J	17.5	J	4.2	J	45.6	J
Cobalt	3.1		2.0		6.0		3.5		1.6		5.1	
Copper	6.6		108		119		63.5		4.0		146	
Iron	9970	J	8500	J	37900	J	4770	J	3900	J	22200	J
Lead	26.4	J	1230	J	278	J	91.0	J	12.7	J	553	J
Magnesium	1320		363		457		523		513		835	
Manganese	232	J	78.5	J	241	J	219	J	98.8	J	319	J
Mercury	0.02	UJ	0.27	U	0.11	U	0.04	UJ	0.02	UJ	0.40	U
Nickel	7.0	UJ	12.8	J	92.2	J	11.0	UJ	3.3	UJ	30.5	J
Potassium	672		544	U	363	UJ	347	U	372	U	381	UJ
Selenium	0.47	UJ	0.56	UJ		R	0.46	UJ	0.47	UJ	0.47	UJ
Silver	0.63	UJ	0.84	UJ	0.70	UJ	0.58	UJ	0.54	U	1.6	U
Sodium	42.4	U	77.0		117		77.4		47.8	U	132	
Thallium	1.01	U	1.19	U	1.05	U	0.99	U	1.01	U	1.01	U
Vanadium	7.9		6.6		8.6		7.1		4.8		12.6	
Zinc	42.3		106		176		161		23.0		814	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment TAL Metal Analysis (mg/kg)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02303		D02304		D02305	
Station Location	MAP-SD-2059-01		WRM-SD-2055-01		WRM-SD-2057-01	
Date Sampled	9/20/00		9/20/00		9/20/00	
Date Extracted						
Date Analyzed						
Dilution Factor	1		1		1	
Percent Solids	64.5		42.1		28.1	
QC Identifier	None		None		None	
Aluminum	1800		8140		7380	
Antimony	0.61	UJ	5.3	J	0.66	J
Arsenic	0.75	J	5.1	J	8.5	J
Barium	18.7		155		105	
Beryllium	0.26		0.71		1.4	
Cadmium	0.83	J	23.9		3.7	J
Calcium	662		1810		3260	
Chromium	18.6	J	80.0	J	310	J
Cobalt	1.9		9.3		17.3	
Copper	21.0		1110		164	
Iron	3370	J	11500	J	20500	J
Lead	34.0	J	721	J	446	J
Magnesium	431		1960		1620	
Manganese	67.6	J	484	J	414	J
Mercury	0.05	U	0.28	U	0.27	UJ
Nickel	5.9	UJ	187	J	141	J
Potassium	371	U	1110		848	J
Selenium	0.49	UJ	0.48	UJ	0.47	UJ
Silver	0.56	U	4.6		1.6	U
Sodium	48.6	U	137		207	
Thallium	1.05	U	1.02	U	1.01	U
Vanadium	5.2		32.5		38.2	
Zinc	51.5		1050		491	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Aqueous TAL Metal Analysis (ug/l)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02184	
Station Location	CMS-RB-091900A	
Date Sampled	9/19/00	
Date Extracted		
Date Analyzed		
Dilution Factor	1	
Percent Solids		
QC Identifier	Rinsate Blank	
Aluminum	16.44	U
Antimony	2.96	U
Arsenic	2.46	U
Barium	0.48	U
Beryllium	0.56	U
Cadmium	2.61	U
Calcium	18.6	UJ
Chromium	4.02	U
Cobalt	2.96	U
Copper	1.93	U
Iron	4.2	UJ
Lead	1.86	U
Magnesium	12.96	U
Manganese	1.34	U
Mercury	0.02	U
Nickel	11.9	U
Potassium	338.02	U
Selenium	2.39	UJ
Silver	2.74	U
Sodium	52.5	U
Thallium	5.12	U
Vanadium	4.01	U
Zinc	3.9	

U - Not detected; UJ - Detection limit approximate; J - Quantitation approximate;
* - From dilution analysis; R - Rejected; EB/TB - Equipment/Trip Blank contamination

Sediment Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (umol/g)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02179		D02182		D02183		D02185		D02186		D02187	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01		WRM-SD-2056-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00		9/19/00	
Date Extracted												
Date Analyzed												
Dilution Factor	1		1		1		1		1		1	
Percent Solids	55.7		54.0		79.4		62.2		42.2		63.1	
QC Identifier	Field Dup. WRM-SD-2056-01		None		None		None		None		Field Dup. WRM-SD-2056-01	
Cadmium	0.0014	J	0.0028	J	0.00018	U	0.0011	J	0.0074	J	0.00071	J
Copper	0.028	J	0.12	J	0.14	J	0.46	J	0.61	J	0.015	J
Lead	0.044	J	0.21	J	0.029	J	0.22	J	0.59	J	0.031	J
Mercury	0.00005	J		R		R	0.0001	J		R		R
Nickel	0.039	UJ	0.11	J	0.051	UJ	0.27		0.22		0.027	UJ
Zinc	0.25	U	0.94		0.35	U	1.4		2.5		0.17	U
Acid Volatile Sulfide	1	UJ	1	UJ	1	UJ	1	UJ	2	J	1	UJ

U - Not detected; UJ - Detection limit approximate;
J - Quantitation approximate; R - Rejected

Sediment Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (umol/g)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02188		D02191		D02192		D02193		D02301		D02302	
Station Location	WRM-SD-2062-01		CMS-DU-092100A		MAP-SD-2061-01		MAP-SD-2058-01		MAP-SD-2060-01		WRD-SD-2063-01	
Date Sampled	9/19/00		9/21/00		9/21/00		9/20/00		9/20/00		9/20/00	
Date Extracted												
Date Analyzed												
Dilution Factor	1		1		1		1		1		1	
Percent Solids	81.3		59.0		75.2		49.0		71.6		36.0	
QC Identifier	None		Field Dup. MAP-SD-2061-01		Field Dup. MAP-SD-2061-01		None		None		None	
Cadmium	0.00089	J	0.012		0.0089		0.0075	J	0.002	U	0.052	
Copper	0.076	J	0.91	J	0.51	J	0.41	J	0.035	J	1.8	J
Lead	0.086	J	0.46	J	0.83	J	0.67	J	0.039	J	1.2	J
Mercury		R	0.00005	J		R		R		R	0.0001	J
Nickel	0.051	UJ	0.15	J	0.14		0.15	J	0.029	UJ	0.52	
Zinc	0.61	U	1.9		2.9		2.4		0.27	U	13.6	
Acid Volatile Sulfide	1	UJ	2	J	4	J	4	J	1	UJ	1	J

U - Not detected; UJ - Detection limit approximate;
J - Quantitation approximate; R - Rejected

Sediment Acid Volatile Sulfides/Simultaneously Extracted Metals Analysis (umol/g)
Site: Centredale Manor
Case: 0175H; SDG: D02179-IA

EPA Sample Number	D02303		D02304		D02305	
Station Location	MAP-SD-2059-01		WRM-SD-2055-01		WRM-SD-2057-01	
Date Sampled	9/20/00		9/20/00		9/20/00	
Date Extracted						
Date Analyzed						
Dilution Factor	1		1		1	
Percent Solids	67.1		39.6		25.6	
QC Identifier	None		None		None	
Cadmium	0.0052	J	0.16		0.027	
Copper	0.14	J	15.3	J	2	J
Lead	0.096	J	2.7	J	2.1	J
Mercury		R	0.0001	J		R
Nickel	0.099	J	1.4		1.2	
Zinc	0.5	U	14.3		7.8	
Acid Volatile Sulfide	1	UJ	4	J	4	J

U - Not detected; UJ - Detection limit approximate;
J - Quantitation approximate; R - Rejected

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RAC1-EPA-2722

Contract No. 68-W6-0045

December 12, 2000

Ms. Christine Clark
Regional Sample Control Coordinator
U.S. Environmental Protection Agency
Office of Environmental Measurement and Evaluation
60 Westview Street
Lexington, Massachusetts 02421

Subject: Tier I Data Validation, W.A. No. 043-TATA-016P
DAS Case 0175H, SDG D02179-IB
Katahdin Analytical
Centredale Manor Site, North Providence, Rhode Island

Total Organic Carbon/Grain Size Distribution:
15/Sediment/ D02179, D02182, D02183, D02185, D02186, D02187, D02188, D02191, D02192, D02193, D02301, D02302, D02303, D02304, D02305 (Field Duplicate Pairs D02179/D02187 and D02191/D02192)

Dear Ms. Clark:

Tetra Tech NUS (TtNUS) performed a Tier I data validation on the total organic carbon (TOC) and grain size distribution analytical data for DAS Case 0175H, SDG D02179, from sediment samples collected by TtNUS at the Centredale Manor site. The TOC analysis was performed by the Lloyd Kahn method and the grain size analysis was performed by the ASTM D422-63, both according to the TtNUS technical specification S00-RAC1-0151. The Tier I data validation was performed according to the September 1999 approved Sampling and Analysis Plan. The data validation was performed using the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996 criteria.

A Tier I data validation is based only on the following parameter:

* • Data Completeness (CSF Audit – Tier I)

* - All criteria were met for this parameter.

Data Completeness

The data package is complete and action is not required.

The data presented in the Data Summary Tables are unqualified for data validation parameters.

Please contact L. Terzis at (978) 658-7899 should you have any questions or comments regarding this information.

Sincerely,

Linda Terzis

Linda Terzis
Data Validator

Lucy Guzman
RAC Lead Chemist

PMO – @

Tables: Data Summary Tables and Grain Size Graphs – Unvalidated

Enclosures: Field Sampling Notes (in SVOC/Pest/PCB SDG D02179-OA)
Technical Specification (in SVOC/Pest/PCB SDG D02179-OA)
CSF Audit (DC-2 Form)
DQO Summary Form

c: A. Krasko (EPA) w/o enc.
S. Parker (TtNUS) w/o enc.
File N0400-2.6 w/ enc.

Sediment Total Organic Carbon Analysis (mg/kg) UNVALIDATED DATA
Site: Centredale Manor
Case: 0175H; SDG: D02179-IB

EPA Sample Number	D02179		D02182		D02183		D02185		D02186	
Station Location	CMS-DU-091900A		RAB-SD-2069-01		RAB-SD-2070-01		DYP-SD-2065-01		DYP-SD-2066-01	
Date Sampled	9/19/00		9/18/00		9/18/00		9/19/00		9/19/00	
Date Extracted										
Date Analyzed	9/27/00		9/27/00		9/27/00		9/27/00		9/27/00	
Dilution Factor	1		1		1		1		1	
Percent Solids	60.5		50.1		77.9		80.4		41.9	
QC Identifier	Field Dup. WRM-SD-2066-01		None		None		None		None	
Total Organic Carbon	13200		6640		128	U	1350		20400	

Sediment Total Organic Carbon Analysis (mg/kg) UNVALIDATED DATA
Site: Centredale Manor
Case: 0175H; SDG: D02179-IB

EPA Sample Number	D02187	D02188	D02191	D02192	D02193	D02301
Station Location	WRM-SD-2056-01	WRM-SD-2062-01	CMS-DU-092100A	MAP-SD-2061-01	MAP-SD-2058-01	MAP-SD-2060-01
Date Sampled	9/19/00	9/19/00	9/21/00	9/21/00	9/20/00	9/20/00
Date Extracted						
Date Analyzed	9/27/00	9/27/00	9/27/00	9/27/00	9/27/00	9/27/00
Dilution Factor	1	1	1	1	1	1
Percent Solids	57.9	61.4	61.9	57.9	49.4	76.4
QC Identifier	Field Dup. WRM-SD-2056-01	None	Field Dup. MAP-SD-2061-01	Field Dup. MAP-SD-2061-01	None	None
Total Organic Carbon	11500	1980	54200	39800	41800	4050

Sediment Total Organic Carbon Analysis (mg/kg) UNVALIDATED DATA
Site: Centredale Manor
Case: 0175H; SDG: D02179-IB

EPA Sample Number	D02302	D02303	D02304	D02305
Station Location	WRD-SD-2063-01	MAP-SD-2059-01	WRM-SD-2055-01	WRM-SD-2057-01
Date Sampled	9/20/00	9/20/00	9/20/00	9/20/00
Date Extracted				
Date Analyzed	9/27/00	9/27/00	9/28/00	9/28/00
Dilution Factor	1	1	1	1
Percent Solids	45.6	43.4	35.5	28.7
QC Identifier	None	None	None	None
Total Organic Carbon	44500	11400	79700	76600

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

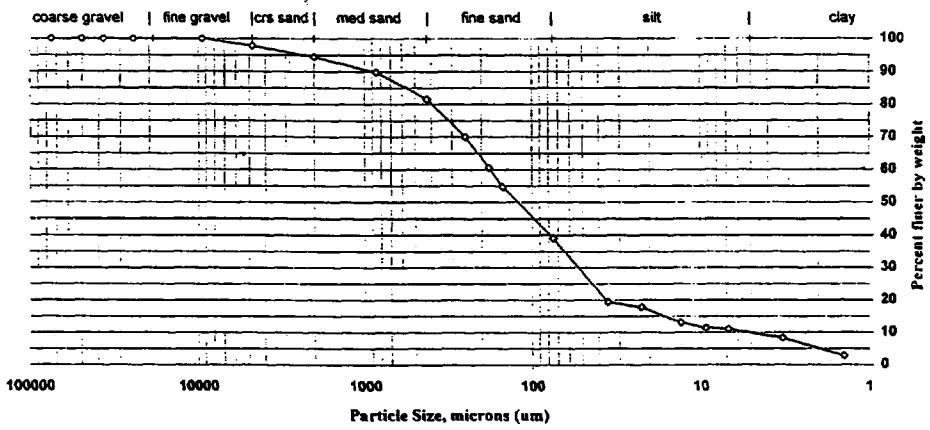
Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829
Client Code:	KATANA	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	10-Oct-00

Lab ID: 430726 Sample ID: D02179

Percent Solids: 62.3% Maximum Particle Size: 9.5 mm

Specific Gravity: 2.65 Shape (> #10): Subrounded

Hardness (> #10): Hard



CMS-DU-091900A

Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	97.8	2.2
#10	2000	94.4	3.4
#20	850	89.8	4.6
#40	425	81.6	8.2
#60	250	70.1	11.6
#80	180	60.6	9.5
#100	150	54.8	5.8
#200	75	39.0	15.8
Hydrometer	35.2	19.3	19.7
I	22.4	17.8	1.6
I	13.1	13.0	4.7
I	9.3	11.4	1.6
I	6.8	11.1	0.4
I	3.3	8.3	2.8
V	1.4	2.8	5.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle. operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: [signature] Date: 10/19/00

STL - Burlington 79829ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s)#: 79829

Client Code: KATANA | Job No.: 20000 | SDG(s): 79829

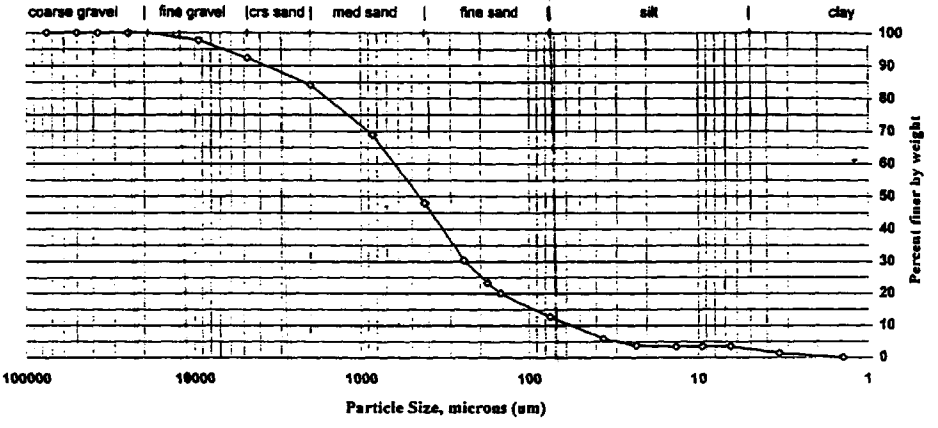
Date Received: 21-Sep-00 | Start Date: 26-Sep-00 | End Date: 10-Oct-00

Lab ID: 430727 | Sample ID: D02182

Percent Solids: 66.7% | Maximum Particle Size: 19 mm

Specific Gravity: 2.65 | Shape (> #10): Subrounded

Hardness (> #10): Hard



RAB-SD-2069-01

Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	97.7	2.3
#4	4750	92.4	5.3
#10	2000	84.2	8.2
#20	850	69.0	15.2
#40	425	48.0	21.0
#60	250	30.5	17.5
#80	180	23.2	7.3
#100	150	20.0	3.2
#200	75	12.7	7.3
Hydrometer	36.1	5.9	6.8
I	23.0	3.8	2.2
I	13.4	3.5	0.3
I	9.5	3.5	0.0
I	6.5	3.5	0.0
I	3.4	1.3	2.2
V	1.4	0.0	1.3

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79829ps::Report

Particle Size of Soils by ASTM D422

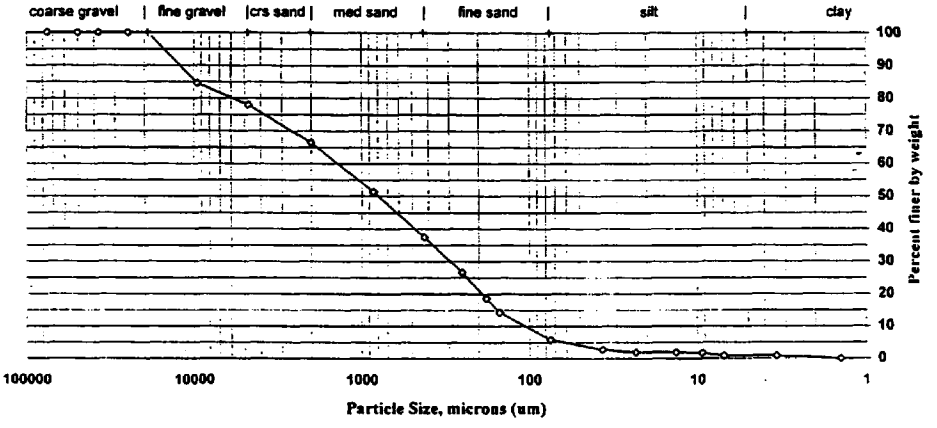
Sample preparation by: D2217

Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829
Client Code:	KATANA	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	10-Oct-00

Lab ID: 430728 Sample ID: D02183

Percent Solids: 81.7%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): Subrounded
Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	84.6	15.4
#4	4750	77.9	6.7
#10	2000	66.4	11.5
#20	850	51.4	15.1
#40	425	37.5	13.9
#60	250	26.7	10.8
#80	180	18.6	8.1
#100	150	14.3	4.2
#200	75	5.8	8.5
Hydrometer	36.7	2.7	3.1
I	23.3	1.9	0.8
I	13.4	1.9	0.0
I	9.4	1.7	0.2
I	7.0	0.8	0.8
I	3.4	0.8	0.0
V	1.4	0.0	0.8

RAB-SD-2070-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle. operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79829ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s) #: 79829,79862

Client Code: Katana | Job No.: 20000 | SDG(s): 79829

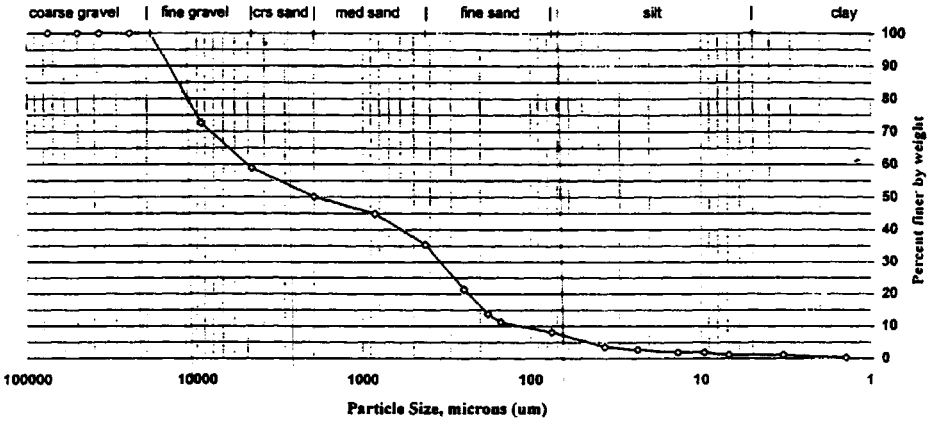
Date Received: 21-Sep-00 | Start Date: 26-Sep-00 | End Date: 17-Oct-00

Lab ID: 430729 | Sample ID: D02185

Percent Solids: 81.7% | Maximum Particle Size: 19 mm

Specific Gravity: 2.65 | Shape (> #10): Subangular

Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	72.6	27.4
#4	4750	58.8	13.8
#10	2000	50.1	8.7
#20	850	44.9	5.2
#40	425	35.4	9.6
#60	250	21.4	13.9
#80	180	13.8	7.6
#100	150	11.2	2.6
#200	75	8.1	3.1
Hydrometer	36.7	3.6	4.6
I	23.3	2.7	0.8
I	13.5	1.9	0.8
I	9.6	1.9	0.0
I	6.9	1.1	0.8
I	3.3	1.1	0.0
V	1.4	0.3	0.8

DYP-SD-2065-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle. operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s) #: 79829,79862

Client Code: Katana | Job No.: 20000 | SDG(s): 79829

Date Received: 21-Sep-00 | Start Date: 26-Sep-00 | End Date: 17-Oct-00

Lab ID: 430730 | Sample ID: D02186

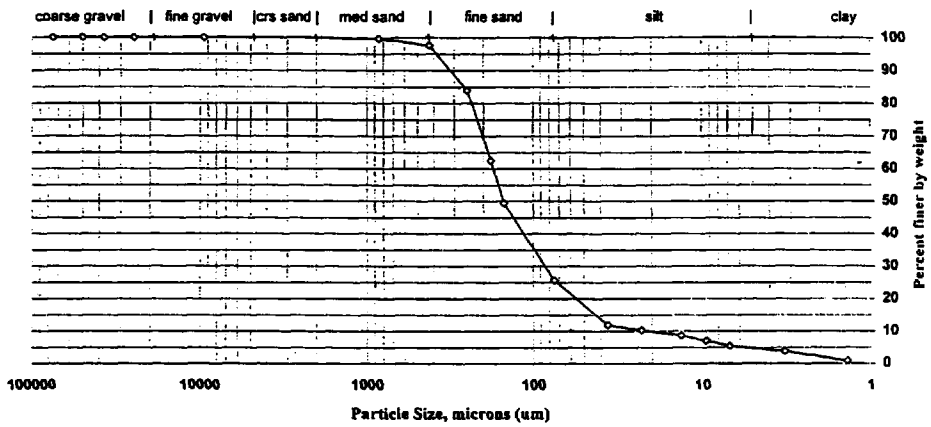
Percent Solids: 54.2%

Specific Gravity: 2.65

Maximum Particle Size: Med sand

Shape (> #10): N/A

Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.7	0.3
#40	425	97.6	2.1
#60	250	83.9	13.7
#80	180	62.5	21.4
#100	150	49.4	13.1
#200	75	25.7	23.7
Hydrometer	36.2	11.9	13.8
I	23.0	10.3	1.6
I	13.4	8.6	1.6
I	9.5	7.0	1.6
I	6.9	5.4	1.6
I	3.3	3.8	1.6
V	1.4	0.8	3.0

DYP-SD-2066-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/12/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

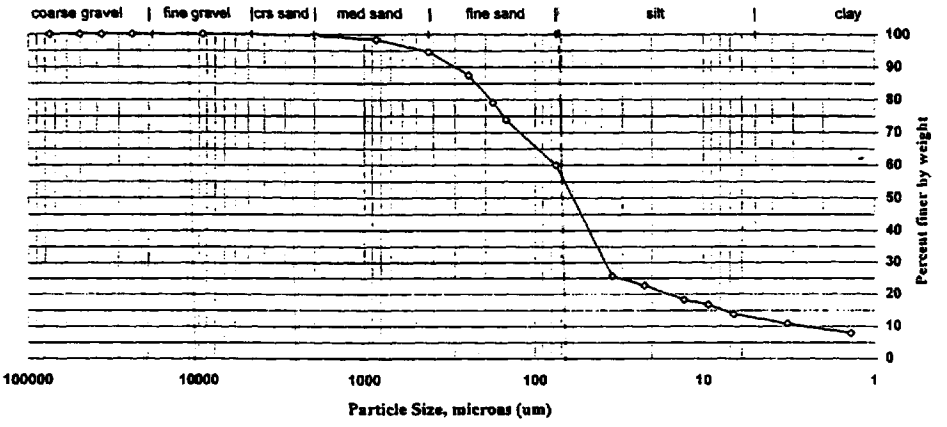
Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 430731 Sample ID: D02187

Percent Solids: 68.6% Maximum Particle Size: Crs sand

Specific Gravity: 2.65 Shape (> #10): Subrounded

Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.6	0.4
#20	850	98.4	1.2
#40	425	94.7	3.7
#60	250	87.5	7.2
#80	180	79.2	8.3
#100	150	73.8	5.3
#200	75	60.0	13.9
Hydrometer	34.5	25.7	34.3
I	22.1	22.7	3.0
I	12.9	18.3	4.4
I	9.3	16.8	1.5
I	6.7	13.8	3.0
I	3.2	10.9	3.0
V	1.4	7.9	3.0

wem-SD-2056-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00 92502

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

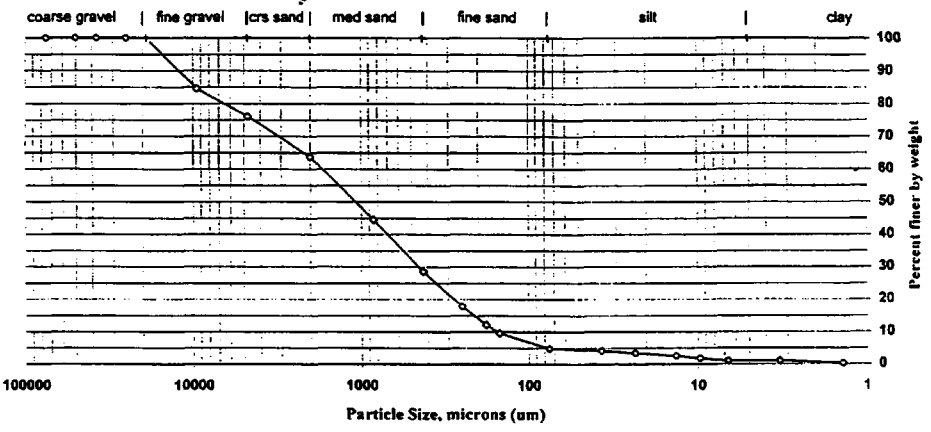
Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 430732 Sample ID: D02188

Percent Solids: 83.8% Maximum Particle Size: 19 mm

Specific Gravity: 2.65 Shape (> #10): Subrounded

Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	84.6	15.4
#4	4750	76.1	8.4
#10	2000	63.8	12.4
#20	850	44.5	19.2
#40	425	28.6	15.9
#60	250	17.9	10.7
#80	180	12.2	5.7
#100	150	9.6	2.6
#200	75	4.8	4.8
Hydrometer	36.6	4.1	0.7
I	23.2	3.4	0.8
I	13.5	2.6	0.8
I	9.7	1.8	0.8
I	6.6	1.0	0.8
I	3.3	1.0	0.0
V	1.4	0.3	0.8

WRM-SD-2062-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

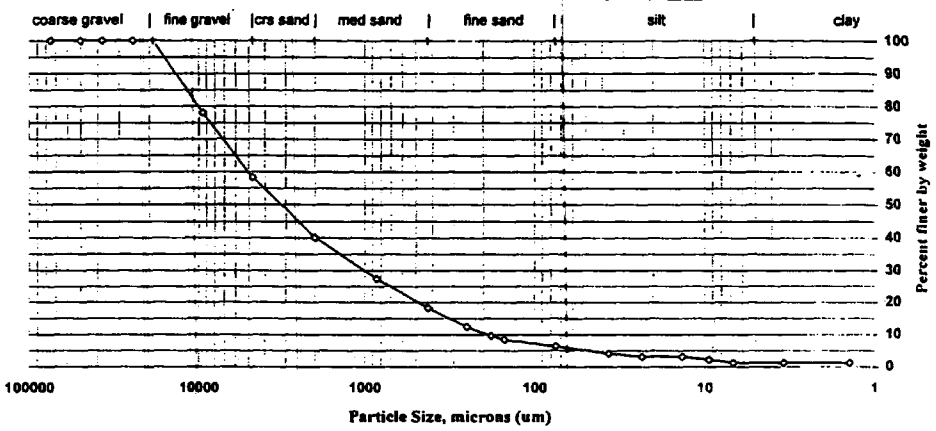
Sample preparation by: D2217

Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 431059 Sample ID: D02191

Percent Solids: 71.7%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): Subangular
Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	78.1	21.9
#4	4750	58.2	19.8
#10	2000	40.1	18.1
#20	850	27.5	12.6
#40	425	18.3	9.2
#60	250	12.4	5.9
#80	180	9.6	2.8
#100	150	8.5	1.1
#200	75	6.4	2.1
Hydrometer	36.7	4.1	2.3
I	23.3	3.1	0.9
I	13.5	3.1	0.0
I	9.4	2.2	0.9
I	6.8	1.2	0.9
I	3.4	1.2	0.0
V	1.4	1.2	0.0

CMS - DU - 092100A

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

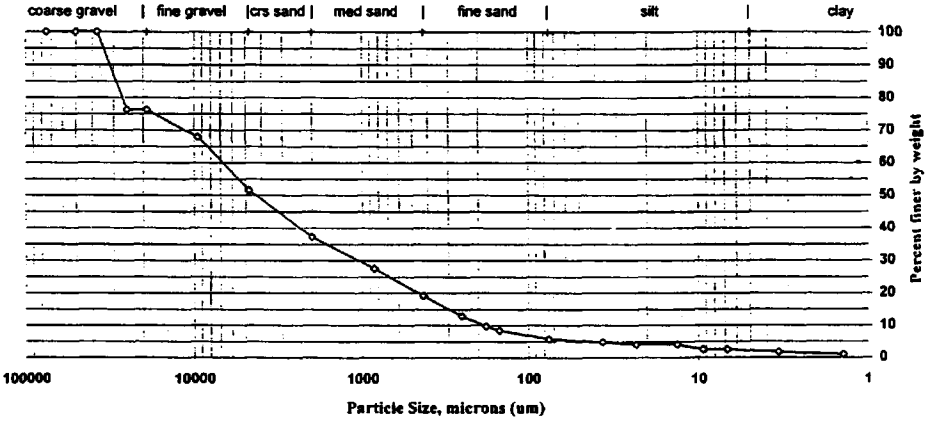
Sample preparation by: D2217

Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 431060 Sample ID: D02192

Percent Solids: 69.9%
Specific Gravity: 2.65

Maximum Particle Size: 37.5 mm
Shape (> #10): Subangular
Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	76.3	23.7
3/4 inch	19000	76.3	0.0
3/8 inch	9500	67.9	8.3
#4	4750	51.5	16.4
#10	2000	37.3	14.2
#20	850	27.5	9.8
#40	425	19.1	8.4
#60	250	12.9	6.2
#80	180	9.8	3.2
#100	150	8.4	1.4
#200	75	5.7	2.7
Hydrometer	36.4	4.8	0.9
I	23.1	4.0	0.8
I	13.4	4.0	0.0
I	9.4	2.5	1.5
I	6.8	2.5	0.0
I	3.4	1.8	0.8
V	1.4	1.0	0.8

MAP-SD-2061-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: [signature] Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s) #: 79829,79862

Client Code: Katana | Job No.: 20000 | SDG(s): 79829

Date Received: 21-Sep-00 | Start Date: 26-Sep-00 | End Date: 17-Oct-00

Lab ID: 431061 | Sample ID: D02193

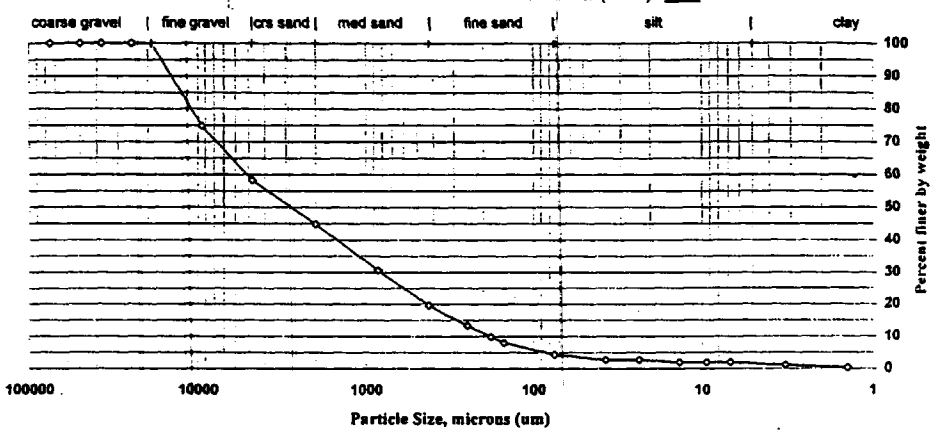
Percent Solids: 75.7%

Specific Gravity: 2.65

Maximum Particle Size: 19 mm

Shape (> #10): Subrounded

Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	74.8	25.2
#4	4750	58.2	16.5
#10	2000	44.8	13.4
#20	850	30.7	14.2
#40	425	19.6	11.1
#60	250	13.3	6.2
#80	180	9.8	3.5
#100	150	8.0	1.8
#200	75	4.3	3.7
Hydrometer	36.9	2.7	1.6
I	23.3	2.7	0.0
I	13.5	1.9	0.8
I	9.4	1.9	0.0
I	6.8	1.9	0.0
I	3.2	1.1	0.8
V	1.4	0.3	0.8

MAP-SP-2058-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle. operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: [signature] Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

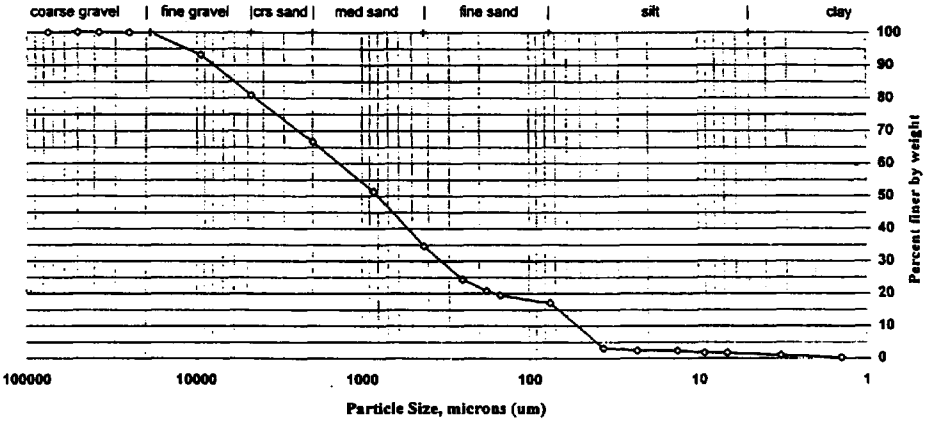
Sample preparation by: D2217

Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 431062 Sample ID: D02301

Percent Solids: 85.7%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): Subrounded
Hardness (> #10): Hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	93.2	6.8
#4	4750	80.8	12.4
#10	2000	66.7	14.1
#20	850	51.4	15.3
#40	425	34.6	16.8
#60	250	24.3	10.2
#80	180	20.8	3.6
#100	150	19.4	1.3
#200	75	17.1	2.4
Hydrometer	36.7	3.1	14.0
	23.3	2.4	0.7
	13.5	2.4	0.0
	9.3	1.7	0.7
	6.8	1.7	0.0
	3.3	0.9	0.7
V	1.4	0.2	0.7

MAP-SO-2060-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

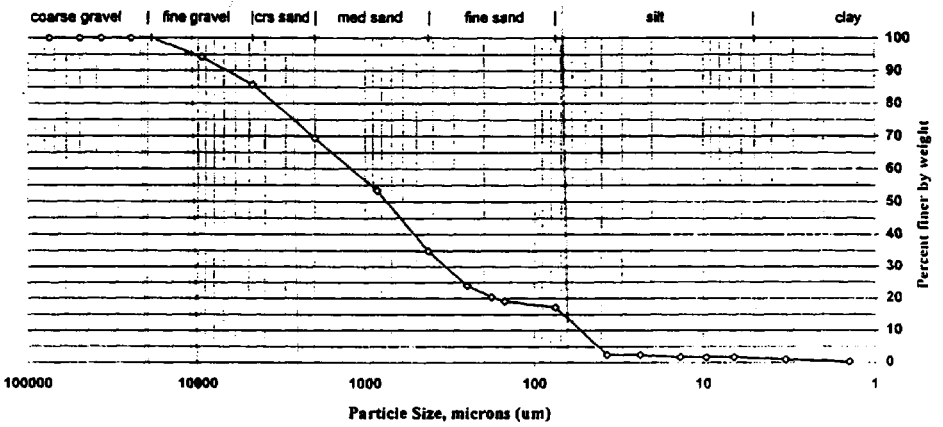
STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

		Sample preparation by:	D2217		
Client:	Katahdin Analytical	Project No.:	20000	ETR(s) #:	79829,79862
Client Code:	Katana	Job No.:	20000	SDG(s):	79829
Date Received:	21-Sep-00	Start Date:	26-Sep-00	End Date:	17-Oct-00

Lab ID: 431062DP Sample ID: D02301REP

Percent Solids: 84.3% Maximum Particle Size: 19 mm
Specific Gravity: 2.65 Shape (> #10): Subrounded
Hardness (> #10): Hard



MAP-SD-2060-01

Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	94.1	5.9
#4	4750	85.7	8.4
#10	2000	69.3	16.4
#20	850	53.4	15.9
#40	425	34.8	18.6
#60	250	23.9	10.9
#80	180	20.4	3.5
#100	150	19.2	1.2
#200	75	17.2	2.0
Hydrometer	36.9	2.4	14.8
	23.3	2.4	0.0
	13.5	1.7	0.7
	9.6	1.7	0.0
	6.6	1.7	0.0
	3.3	1.0	0.7
V	1.4	0.2	0.7

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical Project No.: 20000 ETR(s) #: 79829,79862

Client Code: Katana Job No.: 20000 SDG(s): 79829

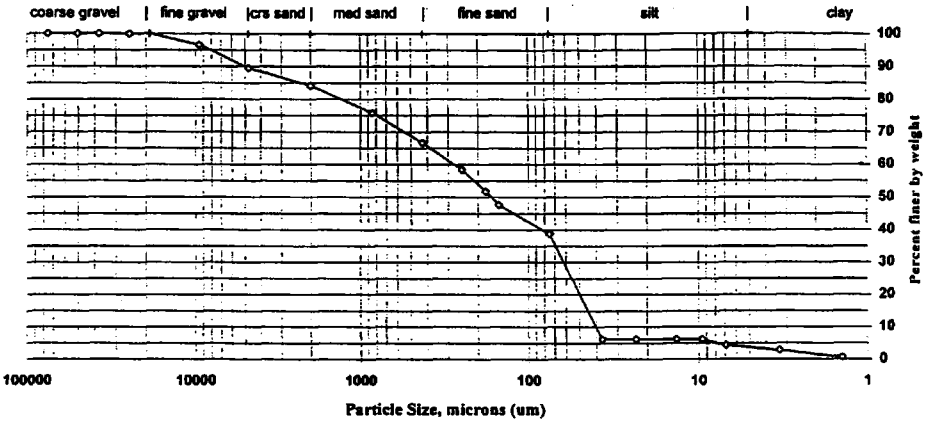
Date Received: 21-Sep-00 Start Date: 26-Sep-00 End Date: 17-Oct-00

Lab ID: 431063 Sample ID: D02302

Percent Solids: 44.1% Maximum Particle Size: 19 mm

Specific Gravity: 2.65 Shape (> #10): Subrounded

Hardness (> #10): Hard



WRD-SD-2063-01

Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	96.6	3.4
#4	4750	89.5	7.1
#10	2000	84.1	5.3
#20	850	75.8	8.3
#40	425	66.7	9.1
#60	250	58.4	8.3
#80	180	51.8	6.6
#100	150	47.7	4.1
#200	75	38.8	8.9
Hydrometer	36.9	6.2	32.6
I	23.3	6.2	0.0
I	13.5	6.2	0.0
I	9.5	6.2	0.0
I	6.9	4.3	1.9
I	3.3	2.8	1.5
V	1.4	0.6	2.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00 0289

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s) #: 79829,79862

Client Code: Katana | Job No.: 20000 | SDG(s): 79829

Date Received: 21-Sep-00 | Start Date: 26-Sep-00 | End Date: 17-Oct-00

Lab ID: 431064 | Sample ID: D02303

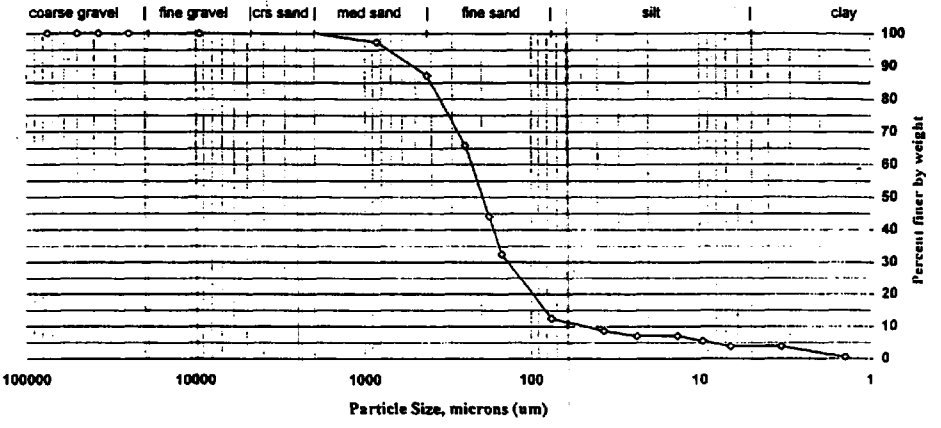
Percent Solids: 59.9%

Specific Gravity: 2.65

Maximum Particle Size: Crs sand

Shape (> #10): Subangular

Hardness (> #10): Brittle



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.9	0.1
#20	850	97.4	2.6
#40	425	87.2	10.2
#60	250	65.8	21.3
#80	180	44.1	21.7
#100	150	32.5	11.6
#200	75	12.4	20.1
Hydrometer	36.6	8.7	3.8
	23.2	7.0	1.6
	13.4	7.0	0.0
	9.5	5.4	1.6
	6.6	3.8	1.6
	3.4	3.8	0.0
V	1.4	0.5	3.2

MAP-SD-2059-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle. operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: [signature] Date: 10/19/00 0290

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by ASTM D2217

Client: Katahdin Analytical Project No.: 20000 ETR(s): 79829,79862

Client Code: Katana Job No.: 20000 SDG(s): 79829,

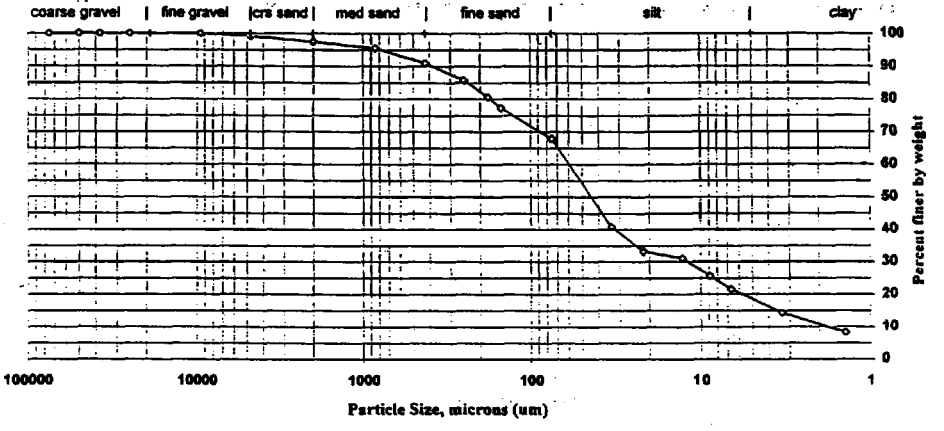
Date Received: 21-Sep-00 Start Date: 26-Sep-00 End Date: 17-Oct-00

Lab ID: 431065 Sample ID: D02304

Percent Solids: 31.3% Maximum Particle Size: 9.5 mm

Specific Gravity: 2.65 Shape (> #10): Subrounded

Hardness (> #10): Brittle, hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.2	0.8
#10	2000	97.5	1.7
#20	850	95.6	1.9
#40	425	91.0	4.6
#60	250	85.8	5.2
#80	180	80.7	5.1
#100	150	77.3	3.4
#200	75	67.9	9.4
Hydrometer	33.6	40.8	27.0
|	21.7	33.2	7.6
|	12.7	31.0	2.2
|	8.9	25.6	5.4
|	6.7	21.5	4.1
|	3.3	14.2	7.3
V	1.4	8.2	6.0

WRM-SD-2055-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: Date: 10/19/00

0291

STL - Burlington 79862ps::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client: Katahdin Analytical | Project No.: 20000 | ETR(s) #: 79862

Client Code: KATANA | Job No.: 20000 | SDG(s): 79829

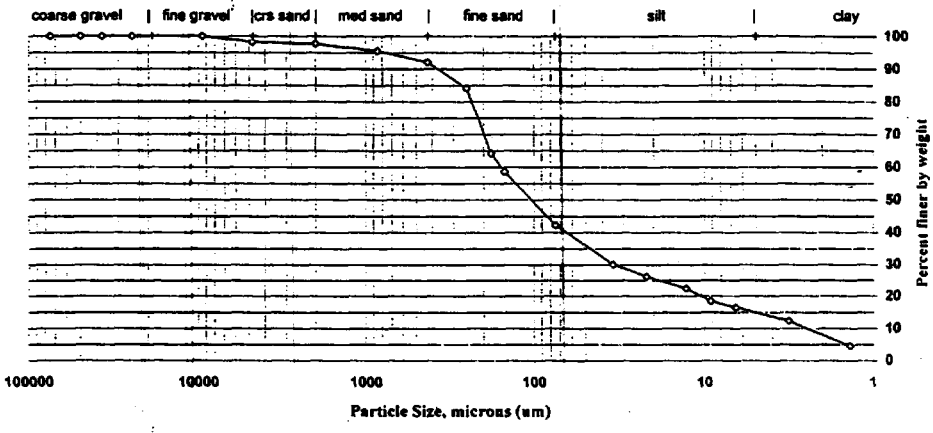
Date Received: 23-Sep-00 | Start Date: 02-Oct-00 | End Date: 17-Oct-00

Lab ID: 431066 | Sample ID: D02305

Percent Solids: 31.7% | Maximum Particle Size: 9.5 mm

Specific Gravity: 2.65 | Shape (> #10): Subangular

Hardness (> #10): Brittle



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.2	1.8
#10	2000	97.7	0.5
#20	850	95.5	2.2
#40	425	92.0	3.5
#60	250	84.0	8.0
#80	180	64.2	19.8
#100	150	58.6	5.6
#200	75	42.3	16.3
Hydrometer	34.5	30.1	12.2
I	22.0	26.2	3.9
I	12.8	22.4	3.9
I	9.2	18.5	3.9
I	6.6	16.5	1.9
I	3.2	12.3	4.2
V	1.4	4.5	7.8

WRM-SD-2057-01

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ Date: 10/19/00

STL - Burlington 79890ps::Report

APPENDIX C

FIELD DOCUMENTATION

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: RAB-SD-2069-01

Tetra Tech, NUS Job No./PMS 0400 - 0241
QC Information: N/A (if applicable)

Sample Method: ~~RAB-SD-2069~~ Eckman Sampler
Depth Sampled: 0.0 - 0.5 feet
Sample Date & Time: 9/18/00 1525 hours Dup N/A hours
Sampler(s): J Daniels / S Vetere / D Masse

Data Recorded By: J Daniels
Signature

PID/OVA Monitor Reading: 0.0 ppm

TYPE OF SAMPLE: (Check all that apply)

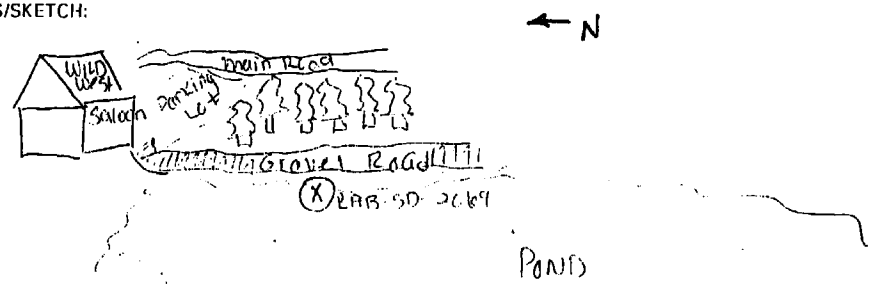
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Black, wet, mud, w/ organics (roots + leaves)

SAMPLE DATA/REMARKS: ~1.0 ft of surface water over sediment sample location. Photo #1 - Taken Background location

ANALYSIS	BOTTLE LOT NO.
DIWA	
TOC	
Pest/PCB	
SVOC	
Total Metals	
Grain Size	
AVS/SEM	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: RAB - SD - 2070 - 01

Tetra Tech, NUS Job No./PMS 0400 - C 241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler
Depth Sampled: 0.0 - 0.5 feet
Sample Date & Time: 9/18/00 1552 hours Dup N/A hours
Sampler(s): J. Danieli / S. Vetere / D. Masse

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: 0.0 ppm

TYPE OF SAMPLE: (Check all that apply)

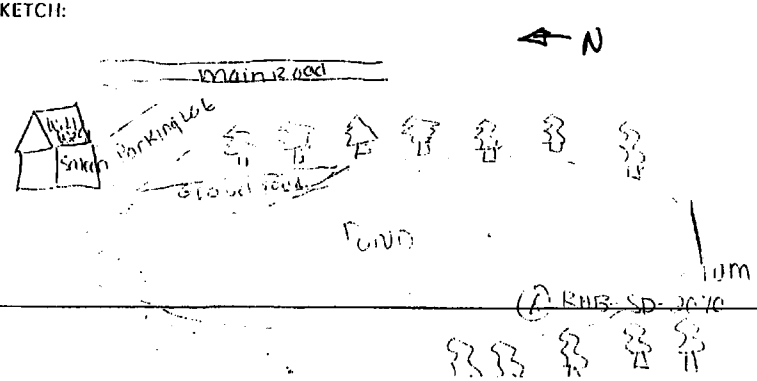
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Wet, Olive-Gray, Silty Sand (F-C) w/ Gravels.

SAMPLE DATA/REMARKS: Background Sample
~1.0 ft of surface water over sediment sample location.
Photo #2 taken

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TCL	
MS/SIM	
SVOC	
Pest/PCB	
Total Metals	
Grain Size	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: CENTREDALE MANOR
Sample ID: CMS-RB-091900A

Tetra Tech, NUS Job No./PMS N0400-0241
QC Information: RINSATE BLANK (if applicable)

Sample Method: POUR THROUGH S/S BOWL
Depth Sampled: — feet
Sample Date & Time: 9/19/00 0830 hours Dup ___ hours
Sampler(s): S. VETERE
D. MASSE

Data Recorded By: Stephen Vetere
Signature

PID/OVA Monitor Reading: NA ppm

TYPE OF SAMPLE: (Check all that apply)

- ___ Soil
- ___ Sediment
- ___ Lagoon/Pond
- ___ Grab
- ___ Trip Blank*
- X Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.)

SAMPLE DATA/REMARKS:

ANALYSIS	BOTTLE LOT NO.	NOTES/SKETCH:
Svoc		
P/PCB		
metals		
dioxin		

Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: DYP- SD- ~~2060~~ 2065 SV 9/9/00

Tetra Tech, NUS Job No./PMS 0400 - C041
QC Information: N/A (if applicable)

Sample Method: Eckman / Shovel
Depth Sampled: 0.0 - 0.5 feet
Sample Date & Time: 9/9/00 1100 hours Dup N/A hours
Sampler(s): J. Danieli, S. Vetere, D. Masse

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

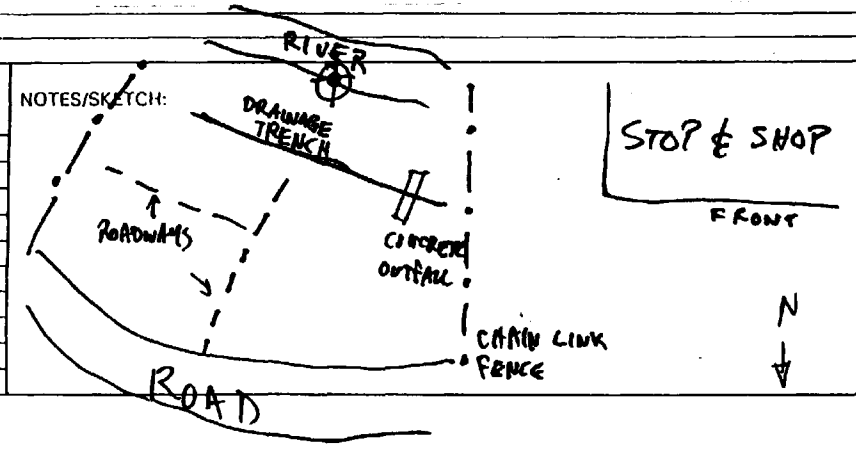
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet Etc.) wet, Olive, silty SAND, w/ gravels.

SAMPLE DATA/REMARKS: ~1.0 ft under Surface water

ANALYSIS	BOTTLE LOT NO.
All SIEM	
~~B~~ Dioxin	
TOC	
Grain Size	
SVOC	
Pest/PCB	
Total Metals	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: DYP - SD - 2066

Tetra Tech, NUS Job No./PMS: 0400-0241
QC Information: N/A (if applicable)

Sample Method: Eckman sampler / small shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/19/00 1130 hours Dup N/A hours
Sampler(s): J. Danieli, S. Vetere, D. Masse

Data Recorded By: J Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

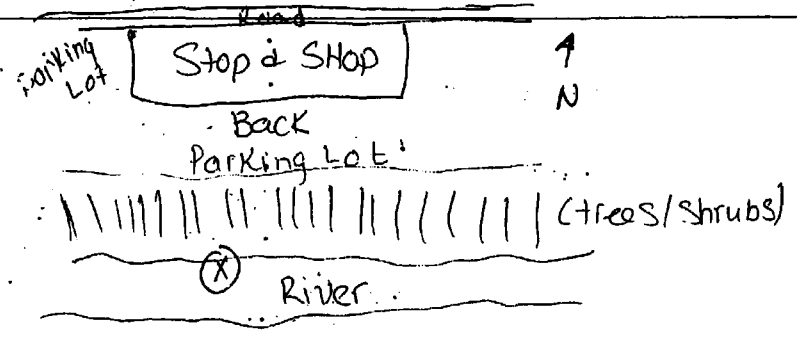
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet Etc.) Black, wet, muck-mud, w/ organic (leaves, twigs, roots)

SAMPLE DATA/REMARKS: Photo #3 Taken
~1.0ft of surface water over sample location

ANALYSIS	BOTTLE LOT NO.
AVS/SEM	
Total metals	
TOC	
Grain size	
SVOC	
Pest/PCB	
Dioxin	

NOTES/SKETCH:



Tt NUS Form 0005A

DUPLICATE SAMPLE COLLECTED

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: WRM - SD - 2056

Tetra Tech, NUS Job No./PMS 0400 - 0241
QC Information: ~~DUPO~~ SV 9/19/00 (if applicable)
CMS-DU-091900 A

Sample Method: Eckman Sampler / Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9 / 19 / 00 1320 hours Dup 1340 hours
Sampler(s): J. Danieli / D. Masse / S. Vetere

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

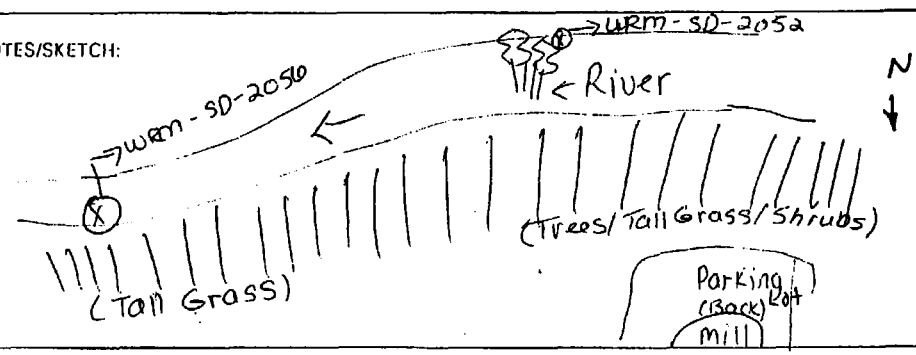
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- X Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.)

SAMPLE DATA/REMARKS: ~1.0 ft under surface water

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOL	
SVOC	
AVS/SEM	
Pest/PCB	
Total Metals	
Grain Size	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: WRM - SD - 2062

Tetra Tech, NUS Job No./PMS 0400 - 0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler / Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/19/00 1400 hours Dup N/A hours
Sampler(s): J. Daniell / S. Vetere / D. Masse

Data Recorded By: J. Daniell
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

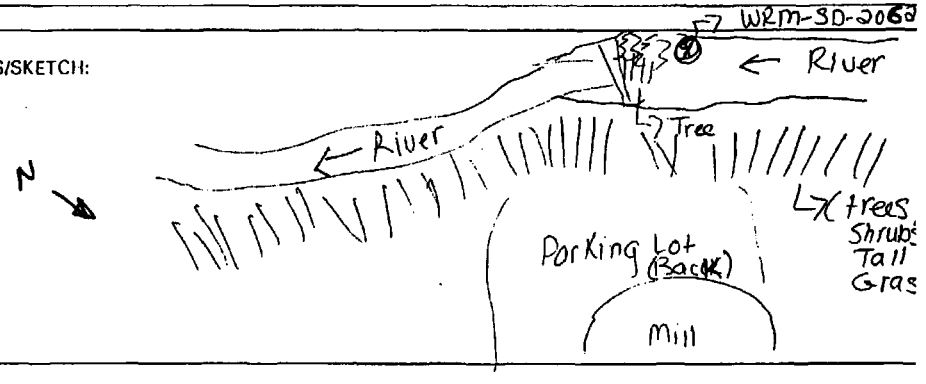
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collecte
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, We Etc.) F-C SAND w/ gravels & minor silt Wet.

SAMPLE DATA/REMARKS: ~0.5ft under surface water

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOC	
SVOC	
~~Pest~~ AVS/SEM	
Pest/PCB	
Total Metals	
Grain Size	

NOTES/SKETCH:



Tt NUS Form 0005A

DUPLICATE SAMPLE COLLECTED

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centreville Manor Site
Sample ID: MAP-SD-20161-01

Tetra Tech, NUS Job No./PMS 0400-0241
QC Information: ~~DUP~~-CMS-DU- C92100A (if applicable)

Sample Method: Erkman Sampler / Hand Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/21/00 0930 hours Dup 0945 hours
Sampler(s): J. Daniels, D. Masse, S. Vetere

Data Recorded By: J. Daniels
Signature

PID/OVA Monitor Reading: NA ppm

TYPE OF SAMPLE: (Check all that apply)

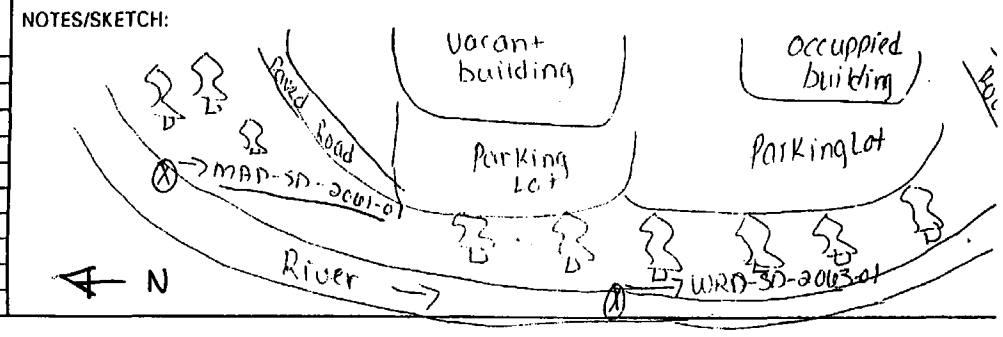
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- X Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet Etc.) Wet, DK. Gray, Gravelly SILT, w/ minor Organics (twigs+leav

SAMPLE DATA/REMARKS: ~1.0ft of Surface water over sediment sample location

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOC	
Grain Size	
SVOC	
Pest/PCB	
AVS/SEM	
Total Metals	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: MAP-SD-2058-01

Tetra Tech, NUS Job No./PMS: 0400-0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler / Hand Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 1345 hours Dup N/A hours
Sampler(s): J Danieli, S. Vetere, D. Masse

Data Recorded By: J Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

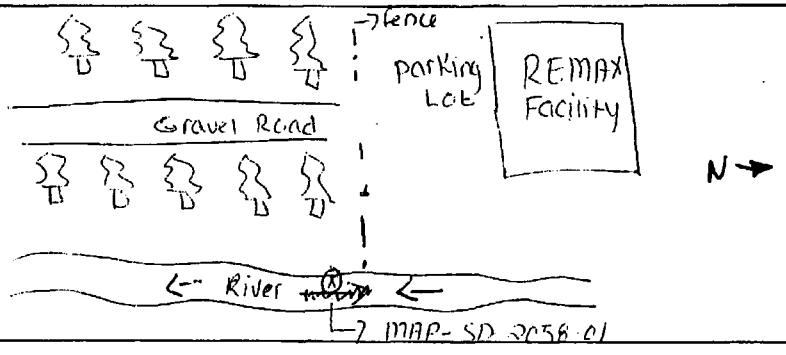
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Wet, DK. Gray, F-C Silty SAND w/ ~~minor~~ gravels and organics (twigs and leaves)

SAMPLE DATA/REMARKS: ~0.5 ft of surface water over sediment sample location

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOC	
Pest/PCB	
SVOC	
Grain Size	
Total metals	
AVS / SEM	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Carlisdale Manor Site
Sample ID: MAP- SD- 2000-01

Tetra Tech, NUS Job No./PMS 0400 - 0241
QC Information: MS/MSD (if applicable)
(DOUBLE VOLUME COLLECTED)

Sample Method: Eckman Sampler / Hand Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 1315 hours Dup N/A hours
Sampler(s): J. Danielli, S. Vetere, D. Masse

Data Recorded By: J. Danielli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

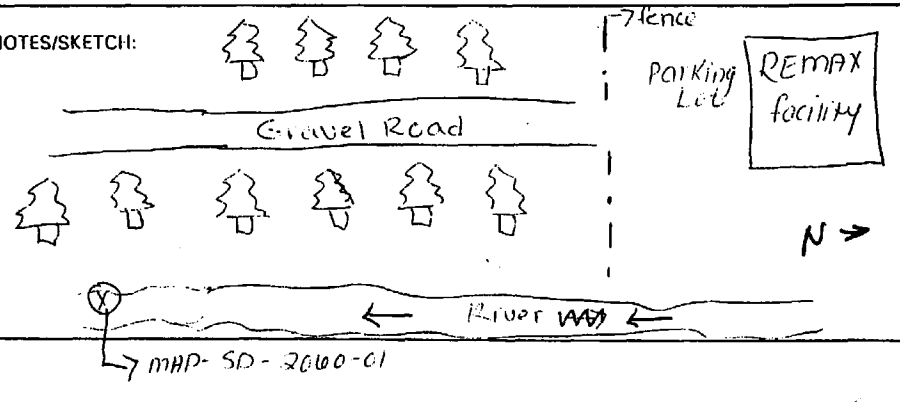
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet Etc.) wet, DK. Gray, F-C Silty SAND w/ minor gravels and organics (twigs and leaves

SAMPLE DATA/REMARKS: ~1.0 ft of surface water over sediment sample location

ANALYSIS	BOTTLE LOT NO.
Digestion	
TOC	
Grain Size	
SVOC	
Pest/PCB	
Total Metals	
AVS/SEM	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: WRD - SD - 2063 - 01

Tetra Tech, NUS Job No./PMS 0400-0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler / Hand Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 1130 hours Dup N/A hours
Sampler(s): J. Danieli, D. Masse, S. Vetrer

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

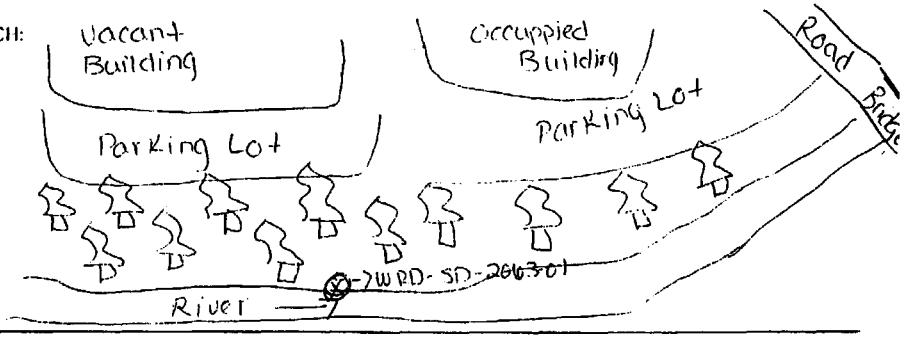
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Wet, mixture of Black muck w/ abundant organics and F-C SAND w/ silt (Red-Brown in color)

SAMPLE DATA/REMARKS: ~ 1.0 ft of surface water over sediment sample location.

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOC	
Grain Size	
SVOC	
Pest/PCB	
AVS/SEM	
Total metals	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: MAP-SD-2059-01

Tetra Tech, NUS Job No./PMS 0400-0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler / Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 1045 hours Dup N/A hours
Sampler(s): J. Daniell, S. Vetere, D. Masse.

Data Recorded By: J. Daniell
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

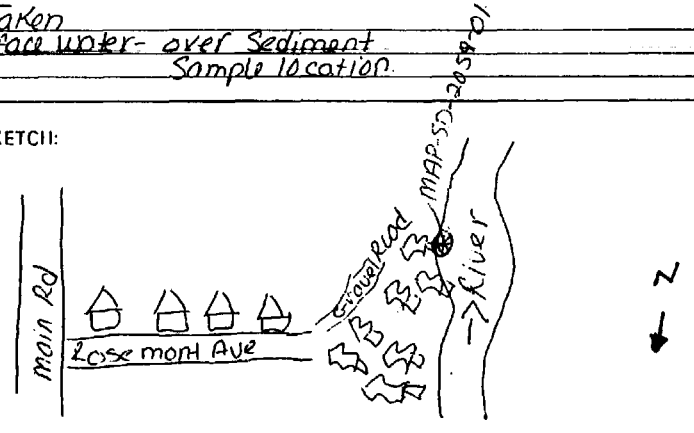
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Wet, DK Gray-Gray SILT w/ abundant organics.

SAMPLE DATA/REMARKS: Photo #4 Taken
~1.0 ft surface water - over Sediment Sample location.

ANALYSIS	BOTTLE LOT NO.
Dioxin	
TOC	
Grain Size	
SVOC	
Pest/PCB	
Total Metals	
AVS/SEM	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale Manor Site
Sample ID: WRM - SD - ~~2057~~ - 01
2055 SD-1/20/00

Tetra Tech, NUS Job No./PMS 0400 - 0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler/ Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 0945 hours Dup N/A hours
Sampler(s): D. Masse, S. Vetere, J. Danieli

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

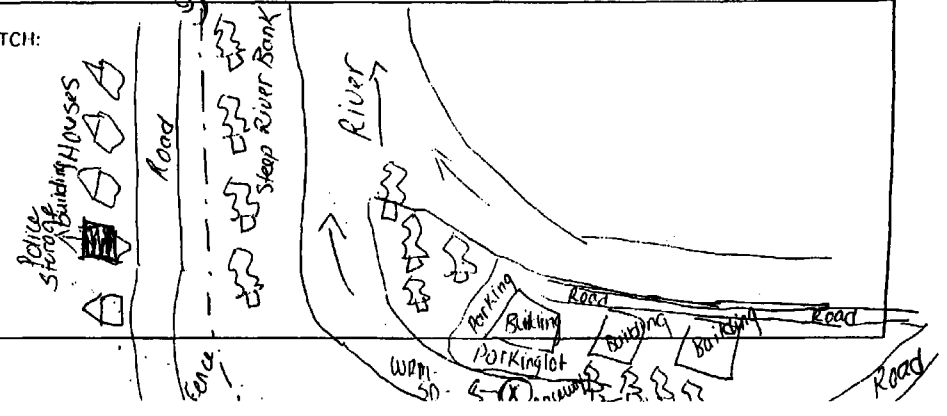
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) wet, Black, Muck-MUD, w/ abundant organics (leaves twigs), oil sheen noted, odor

SAMPLE DATA/REMARKS: ~2.0 ft under surface water - sediment sample location
Sample location - abandoned raceway - no longer in use - overgrown w/ vegetation
*OIL SHEEN NOTED IN SURFACE WATER DURING SAMPLING

ANALYSIS	BOTTLE LOT NO.
TOC	
Grain Size	
Dioxin	
AVS/SEM	
Total Metals	
Pest/PCB	
SVOC	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - SOLID PHASE

Site Name: Centredale manor Site
Sample ID: WRM- SD -~~2055~~ - 01
2057 SV 9/26/00

Tetra Tech, NUS Job No./PMS 0400-0241
QC Information: N/A (if applicable)

Sample Method: Eckman Sampler / Shovel
Depth Sampled: 0.5 feet
Sample Date & Time: 9/20/00 0915 hours Dup N/A hours
Sampler(s): J. Danieli, D. Masse, S. Vetere

Data Recorded By: J. Danieli
Signature

PID/OVA Monitor Reading: N/A ppm

TYPE OF SAMPLE: (Check all that apply)

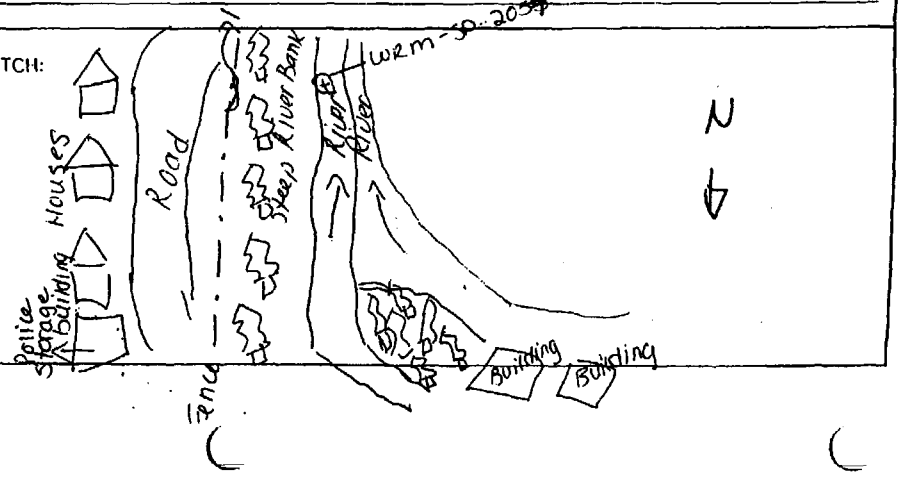
- ___ Soil
- X Sediment
- ___ Lagoon/Pond
- X Grab
- ___ Trip Blank*
- ___ Rinsate Blank*
- ___ Field Duplicate collected
- ___ Other (Specify): ___

Description: (Sand, Clay, Muck, Peat, Dry, Moist, Wet, Etc.) Wet, Brick, Muck / Mud w/ abundant organics (leaves, twigs)

SAMPLE DATA/REMARKS: ~ 20 ft under Surface water - Sediment sample location

ANALYSIS	BOTTLE LOT NO.
TOC	
Grain Size	
Total Metals	
SVOC	
Pest/PCB	
Dioxin	
AVS/SEM	

NOTES/SKETCH:



Tt NUS Form 0005A

TETRA TECH NUS, INC.

PHOTOIONIZATION DETECTOR FIELD CALIBRATION LOG

Serial No.: ED JH 338 Model No.: Photovac 2020 Decal No.: _____

Site Name/Location: Centredale Manor Tetra Tech NUS Job No./PMS: 0400 - 0241

CALIBRATION DATE	STANDARD GAS-ISOBUTYLENE	CALIBRATION READING Isobutylene Equiv. (ppm)	Pm check CALIBRATION CHECK Isobutylene Equiv. (ppm)	SIGNATURE	COMMENTS
9/18/00	Lot # 43900 Conc. = 100 ppm	0.0 / 100.0	96.5	JD	
9/19/00	Lot # 43900 Conc. = 100 ppm	0.0 / 100.0	100.0	JD	
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				
	Lot # _____ Conc. = _____ ppm				

Tt NUS Form 0006

TETRA TECH NUS, INC.

SAMPLE COLLECTION SUMMARY RECORD

PROJECT NAME: CENTREDALE MANOR

TETRA TECH NUS JOB NO./PMS: N0400-0241

SAMPLING EVENT: SEDIMENTS DOWNSTREAM OF LYMANSVILLE DAM

CASE NO.:

DAS NO.:

DATE 2000	TIME	SAMPLE LOCATION	FIELD QC	Dioxin/HCB	P/PCB	SVOC	Metals	TOC	Grain Size	AVS SEM	COMMENTS
9/18	1525	RAB-SD-2069-01		1	1	1	1	1	1	1	D02182 ✓
9/18	1552	RAB-SD-2070-01		1	1	1	1	1	1	1	D02183 ✓
9/19	0830	CMS-RB-091900A	B(E)	2	1	1	1				D02184 ✓
9/19	1100	DYP-SD-2065-01		1	1	1	1	1	1	1	D02185 ✓
9/19	1130	DYP-SD-2066-01		1	1	1	1	1	1	1	D02186 ✓
9/19	1320	WRM-SD-2056-01	DI	1	1	1	1	1	1	1	D02187 ✓
9/19	1340	CMS-DU-091900A WRM	DI	1	1	1	1	1	1	1	D02179 ✓
9/19	1400	WRM-SD-2062-01		1	1	1	1	1	1	1	D02188 ✓
9/19	1500	TT 05465	PE		1						D02180
9/19	1510	ICC 00850	PE				1				D02181
9/20	0915	WRM-SD-2057-01		1	1	1	1	1	1	1	D02305 ✓
9/20	0945	WRM-SD-2055-01		1	1	1	1	1	1	1	D02304 ✓
9/20	1045	MAP-SD-2061-01		1	1	1	1	1	1	1	D02303 ✓
9/20	1130	WRD-SD-2063-01		1	1	1	1	1	1	1	D02302 ✓
9/20	1315	MAP-SD-2060-01		2	2	2	2	2	2	2	D02301 ✓

Tt NUS Form 0012

TETRA TECH NUS, INC.

SAMPLE COLLECTION SUMMARY RECORD

PROJECT NAME: CENTREDALE MANOR

TETRA TECH NUS JOB NO./PMS: N0400-0241

SAMPLING EVENT:

CASE NO.:

DAS NO.:

DATE 2000	TIME ~~2000~~	SAMPLE LOCATION	FIELD QC	Dioxin/Hex	P/RB	SVOC	Metals	TOC	grain size	Aroclor	COMMENTS
9/20	1345	MAP-SD-2058-01		1	1	1	1	1	1	1	D02193 ✓
9/21	0930	MAP-SD-2061-01	D_2	1	1	1	1	1	1	1	D02192 ✓
9/21	0945	CMS-DU-0821001 ~~MAP-SD-2061-01~~	D_2	1	1	1	1	1	1	1	D02191 ✓

Tt NUS Form 0012

TETRA TECH NUS, INC.

ANALYTICAL SERVICE
Packing List/Chain-of-Custody

Case No. 0176H
Subcontract No. S00-RAC1-0150
Page 1 of 1

Project No. N0400-0241
Laboratory Name: TRIANGLE LABS
Sampler Signatures: S. VETERE, J. DANIELI, D. MASSE
Date Shipped: 9/19/00
Airbill No. 8221 1172 0379
Carrier: FedEx
No. of Coolers: 1

Container Type	Container Type	Container Type	Container Type	Container Type
8 oz. amber	1 L amber	Paint can		
Analysis	Analysis	Analysis	Analysis	Analysis
dioxins	dioxins	dioxins		

Sample Number	Matrix	Date/Time (2000)	Sample Location (SAV 9/19/00)	Tag Number(s)	QC	Preservative: ice	Preservative: ice	Preservative: ice	Preservative	Preservative
D02179	Sed	9/19/1340	CMS-DU-091900A		DI	1				
D02189	PE	9/19/1600	PC 01018		PE			1		
D02190	PE	9/19/1600	PC 00793		PE			1		
D02182	Sed.	9/18/1525	RAB-SD-2069-01			1				
D02183	Sed	9/18/1552	RAB-SD-2070-01			1				
D02184	aq	9/19/0830	CMS-RB-091900A		B(E)		2.			
D02185	Sed.	9/19/1100	DIP-SD-2065-01			1				
D02186	Sed	9/19/1130	DIP-SD-2066-01			1				
D02187	Sed.	9/19/1300	WRM-SD-2058-01		DI	1				
D02188	Sed.	9/19/1410	WRM-SD-2062-01			1				
Le 9/19/00										

SAV 9/19/00

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Shipment for Case Complete?	Remarks
Stephen Vetere	9/19/00 11:30	FEDEX	YES (NO)	
Relinquished By: (Signature)	**Date/Time**	**Received for Laboratory By:**	**Date/Time**	

Tt NUS Form 0022

01125

TETRA TECH NUS, INC.

ANALYTICAL SERVICE
Packing List/Chain-of-Custody

Case No. 01774

Subcontract No. S00-RAC1-0151

Page 1 of 1

Project No. N0400-0041

Laboratory Name: KATAHDIN ANALYTICAL

Sampler Signatures: J. VETERE, J. DANIELI, M. MASSE

Date Shipped: 9/19/00

Carrier: FedEx

Airbill No. 8221 1122 0368

No. of Coolers: 2

Sample Number	Matrix	Date/Time (2000)	Sample Location	Tag Number(s)	QC	Container Type: 8 oz. amber	Container Type: 8 oz.	Container Type: 2 oz.	Container Type: 16 oz.	Container Type: 8 oz.
						Analysis: SVOC	Analysis: Pest/PCB metals	Analysis: TOC	Analysis: grain size	Analysis: AVS/SEM
						Preservative: ice	Preservative: ice	Preservative: ice	Preservative: ice	Preservative: ice
D02179	Sed.	9/19/1340	CMS-DU-091900A		DI	1	2	1	1	1
D02180	PE	9/19/1500	TTD5465		PE		1(P/PCB)			
D02181	PE	9/19/1510	TCC 00850		PE		1(metals)			
D02182	Sed.	9/18/1525	RAB-SD-2069-01			1	2	1	1	1
D02183	Sed.	9/18/1552	RAB-SD-2070-01			1	2	1	1	1
D02184	aq.	9/19/0830	CMS-RB-091900A	SAU	B(E)	1**	2***			
D02185	Sed.	9/19/1100	DYP-SD-2065-01			1	2	1	1	1
D02186	Sed.	9/19/1130	DYP-SD-2066-01			1	2	1	1	1
D02187	Sed.	9/19/1320	WRM-SD-2056-01		DI	1	2	1	1	1
D02188	Sed.	9/19/1400	WRM-SD-2062-01			1	2	1	1	1
	SAU	9/19/00								

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Shipment for Case Complete?	Remarks
Stephen Vetere	9/19/00 1630	FEDEX	YES NO	*SVOC PE sample for this SDG will be sent directly from EA ** 8 oz. amber jar (aq.) *** 1 8 oz. amber jar (P/PCB) & 1 L poly (metals)
Relinquished By: (Signature)	Date/Time	Received for Laboratory By:	Date/Time	

Tt NUS Form 0022

01124

TETRA TECH NUS, INC.

ANALYTICAL SERVICE
Packing List/Chain-of-Custody

Case No. 0176H

Page 1 of 1

Subcontract No. S00-RAC1-0150

Project No. N0400-0241

Laboratory Name: Triangle Labs

Sampler Signatures: S. Vetere, J. Danieli, D. Messe

Date Shipped: 9/21/00

Carrier: Fed Ex

Airbill No. 8221-1122-0162 (0330)

No. of Coolers: 1

Container Type	Container Type	Container Type	Container Type	Container Type
8oz Amber	~~1L Amber~~			

Analysis	Analysis	Analysis	Analysis	Analysis
dioxins	~~dioxins~~			

Sample Number	Matrix	2000 Date/Time	Sample Location	Tag Number(s)	QC	Preservative: ice	~~Preservative: ice~~	Preservative	Preservative	Preservative
D02191	sed	9/21/00 9:45	CMS-DU-092100A		D2	1	SAV 9/21/00			
D02192	sed	9:30	MAP-SD-2061-01		D2	1				
D02193	sed	1345	MAP-SD-2058-01			1				SAV 9/21/00
D02301*	sed	1315	MAP-SD-2060-01			2				
D02302	sed	1130	WRD-SD-2063-01	DAM		1				
D02303	sed	1045	MAP-SD-2059-01			1				
D02304	sed	9:45	WRM-SD-2055-01			1				
D02305	sed	9:15	WRM-SD-2057-01			1				

SAV 9/21/00

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Shipment for Case Complete?	Remarks
[signature]	9/21/00 12 Noon	FEDEX	YES / ~~NO~~ SAV 9/21/00	MAP-SD-2060-01 = Lab QC *SAMPLE NUMBER D02301 TO BE USED FOR LAB QC
Relinquished By: (Signature)	Date/Time	Received for Laboratory By:	Date/Time	

Tt NUS Form 0022

01128

TETRA TECH NUS, INC.

ANALYTICAL SERVICE
Packing List/Chain-of-Custody

Case No. 0177H

Page 1 of 1

Subcontract No. S00-RAC1-0151

Project No. N0400-0241

Laboratory Name: Katahdin Analytical Service

Sampler Signatures: J. Dornieli, S. Vetere, D. Mase

Date Shipped: 09/21/00

Carrier: Fed EX

Airbill No. 8221-1122-0151

No. of Coolers: 1

Sample Number	Matrix	9/1/2000 Date/Time	Sample Location	Tag Number(s)	QC	Container Type: 8oz Amber	Container Type: 8oz	Container Type: 2oz	Container Type: 16oz	Container Type: 8oz
						Analysis: SVOC	Analysis: Pest/PCB Metals	Analysis: TOC	Analysis: Grain Size	Analysis: AVS/SEM
						Preservative: ice	Preservative: ice	Preservative: ice	Preservative: ice	Preservative: ice
D02191	Sed	09/21/0940	CMS-DU-092100A		D_2	1	2	1	1	1
D02192	Sed	09/21/0930	MDP-SD-2061-01		D_2	1	2	1	1	1
D02193	Sed	09/20/1345	MAP-SD-2058-01			1	2	1	1	1
D02301	Sed	09/20/1315	MAP-SD-2060-01			2	4	2	2	2
D02302	Sed	09/20/1130	WRD-SD-2063-01			1	2	1	1	1
D02303	Sed	09/20/1015	MAP-SD-2059-01			1	2	1	1	1
D02304	Sed	09/20/0945	WRM-SD-2055-01			1	2	1	1	1
D02305	Sed	09/20/0915	WRM-SD-2057-01			1	2	1	1	1

SM 9/21/00

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Shipment for Case Complete?	Remarks
J. Dornieli	9/21/00/1200	Fed EX	YES NO	MAP-SD-2060-01: lab QC *SAMPLE NUMBER D02301 TO BE USED FOR LAB QC
Relinquished By: (Signature)	**Date/Time**	**Received for Laboratory By:**	**Date/Time**	

Tt NUS Form 0022

01127