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US ARMY CORPS OF ENGINEERS
New England District

Contract No. DACW33-01-D-0004
Delivery Order No. 01
September 2003

FINAL
DATA SUMMARY REPORT

Interim Data Collection Remedial Investigation and Feasibility Study

Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island

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Duxbury Operations
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September 5, 2003

Ms. Laureen Borochaner
U.S. Army Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

CONTRACT NO. DACW33-01-D-0004
DELIVERY ORDER: 01
SUBMITTAL OF DELIVERABLES – Final Data Summary Report, Interim Data Collection, Remedial Investigation And Feasibility Study, Centredale Manor Restoration Project Superfund Site

Dear Ms. Borochaner:

Enclosed please find three (3) copies of the Final Data Summary Report for the Centredale Manor Restoration Project Superfund Site. This report includes a summary of field, sample analysis, and data evaluation findings in support of the *Interim Data Collection, Remedial Investigation and Feasibility Study* (Task RI-5). If you have any questions regarding this report, please contact William Steinhauer at (781) 952-5319 or Ms. Patty White at (781) 952-5279.

Sincerely,

for,

William Steinhauer
Project Manager

KF

Karen Foster
Program Manager

encl.

cc: A. Krasko, USEPA (3 copies)
C. Rosiu, USEPA
C. Vu, USEPA
A. Beliveau, USEPA
P. Cook, USEPA/EERL Duluth
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Ms. Laureen Borochaner
U.S. Army Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

CONTRACT NO. DACW33-01-D-0004
DELIVERY ORDER: 01
SUBMITTAL OF DELIVERABLES – Response to Comments, Draft Data Summary Report, Interim Data Collection, Remedial Investigation And Feasibility Study, Centredale Manor Restoration Project Superfund Site

Dear Ms. Borochaner:

Enclosed please find three (3) copies of the Responses to Comments on the Draft Data Summary Report for the Centredale Manor Restoration Project Superfund Site. If you have any questions regarding these responses, please contact William Steinhauer at (781) 952-5319 or Ms. Patty White at (781) 952-5279.

Sincerely,

for,

William Steinhauer
Project Manager

for KF

Karen Foster
Program Manager

encl.

cc: A. Krasko, USEPA
A. Beliveau, USEPA
L. Maccarone, RIDEM

Comment Resolution: Final Data Summary Report
Centredale Manor Restoration Project Superfund Site
September 4, 2002

Comment #1 (Beverly Lawrence) - If possible, provide table similar to Table 4-1, except for Groundwater-comparisons of COPC concentration to standards.

Response: Table 4-2 (VOC Concentrations in Groundwater Samples Collected in 2001 and 2002) has been updated to include Rhode Island GB groundwater objectives, to allow direct comparison of detected VOC concentrations in the Centredale samples to applicable GB groundwater objectives provided in the State of Rhode Island Remediation Regulations.

Comment #1 (David Lubianez) - A lot of the HCX data was qualified "J" estimated for several different reasons. I'm not sure right now what impact that'll have. One of the reasons was that sample was <30% solids. The QAPP says that de-watering procedures would be performed. ***I'd like to know if some samples were just impossible to de-water or if some did not have that procedure performed.***

Response: The discussion of data usability (Section 3.2.2) has been updated to explain why HCX data were J flagged by the validator. For the most part, HCX data were J flagged due to noncompliant initial calibration and poor chromatography (i.e., broad peak shape) for HCX. HCX has proven to be a very problematic compound to analyze, as was found in previous Centredale studies as well as this current work.

Dioxin/furans and HCX data were also J flagged in four samples (CMS-SS-4106-1016-01, CMS-SS-4109-0010-01, CMS-SS-4104-0010-01, and CMS-DU-112202A-01) that had less than 30% solids. The laboratory did not attempt to remove the excess water from these samples. This was clearly a laboratory error, likely resulting from different requirements for handling highly wet samples between the original Quality Assurance Project Plan (QAPP) (Battelle, 2001) and the QAPP Addendum (Battelle, 2002) prepared for this study. The original QAPP (Battelle, 2001) had no requirement for dewatering highly wet samples, whereas the QAPP Addendum (Battelle, 2002) did require that samples with <30% solids be de-watered. The discussion of data usability (Section 3.2.2) has been updated to indicate that dioxin/furan and HCX data for samples with <30% solids were flagged by the validator.

Comment #1 (Rosemary Schmidt) – pg3-2/sctn 3.2.1 Field Based Quality Control. text indicates that field duplicate samples were collected and analyzed for grain size. Unless otherwise required, duplicate analysis for grain size is generally unnecessary, and need not be done in future work.

Response: This comment is noted. Duplicate analysis for grain size will not be conducted in future work.

Comment #2 (RS) - pg4-1/sctn 4.1.1 Soil Type & Dioxin Distribution. Para 2 discusses the sweet hydrocarbon odor observed in boring CMS-4111, in fill just beyond the southeast corner of the Centedale Manor building. This zone (1 - 2.8 ft bgs) also had an elevated dioxin concentration of 4 ppb. Given the PCE contamination detected historically elsewhere on site (MW-05S) and the monitoring wells just downgradient of this area (MW-02S, MW-02D), it may have been of interest to collect a sample from this interval for VOC analysis. Field crew should have communicated this observation for a potential modification to add this analysis. Analysis still may not have been done, because it's understood that contaminated source areas still likely exist randomly throughout much of the subsurface area, beneath the parking lots, etc., and characterizing this soil contamination was not within the scope of this program.

Response: On November 21, 2002, the COE was notified by email about the elevated PID readings from boring CMS-4111. However, no additional action was taken because, as noted above, additional characterization of VOC concentrations in subsurface soil were not an objective of the program.

Additional comments (RS): There are still two potential issues that Battelle should identify and discuss here in this write-up, as potentially needing further consideration:

(1) Indoor air pathway. The clean fill brought in during construction of the building may be impacted by contaminated groundwater in the shallow subsurface. Have indoor air samples been collected from Centredale Manor?

Response: Indoor air samples were collected by EPA in 1999, and no significant migration of VOCs into buildings was found.

(2) Dioxin Leaching. We've agreed that dioxin is generally not a leaching problem within the tailrace and pond. Given that we've seen dioxin with the PCE in the groundwater at MW-05S, it seems possible that where dioxin is collocated w/ a solvent (such as PCE), the dioxin could become mobilized in the groundwater. Given that the soil samples in the 1 - 2.8 ft bgs zone had elevated dioxin plus the sweet hydrocarbon odor (PCE?), it's possible that there are also elevated levels of dioxin the groundwater in this area.

Response: The text of the report (Section 4.1.1) has been revised to note the possibility that if solvents are present in soil, then dioxin could be more readily mobilized into groundwater.

Comment #3 (RS) – Figure 4-1. Generally, the data on the distribution of contamination needs to be addressed in the tailrace design, to ensure limits of cap are sufficient, and determine actions where not delineated to closure on the east side (east of 01-DEL-100 and CMS-4104, and 01-DEL-300) and may extend onto private property, and on the west side, where contamination exists west of the fence (CMS-098 had 28 ppb dioxin at surface, CMS-4111 had 4 ppb 1 - 2.8 ft bgs). Will the EPA provide this report/data to LEA? When LEA's tailrace design is submitted, reviewers need to verify that cap limits are sufficient.

Response: This comment is noted.

Comment #4 (RS) - pg4-1/sctn 4.1.1 Soil Type & Dioxin Distribution. Paragraphs 3 and 5. Recommend re-organizing write-up by areas, and tying results in each area with rationale for selecting the locations - i.e., did we answer the question we went in with, what have we learned, and how does that change our conceptual site model? Suggest starting with the "north end of the broad, low-lying part of the tailrace" (locations 01-DEL-05 and 01-DEL-100 are within this impoundment) and discuss sampling rationale:

- sampled locations within impoundments (low-lying areas) to see if contamination extended to greater depths (already aware of shallow surface contam). CMS-4105 in the north, and CMS-4110 to the south. Found that dioxin > 1 ppb did not extend below 1 ft depth at these locations, so not a deep area of contaminant deposition.

- sampled higher mounds within tailrace to determine whether less contaminated (CMS-4106, CMS-4109); found that areas consisted of 1 ft of organics over sandy gravel, and the organics had dioxin > 1 ppb. This suggests that the dioxin is very much associated with organics, and these higher mounds within the tailrace also received deposition of contaminated sediment at times. The tailrace discussions internally and w/ LEA have indicated that the tailrace is generally subject to fairly low velocity flows, and is often more of a backwater situation during heavy rains, and so even these higher areas within the tailrace, when flooded, are more depositional than erosional in nature, as suspended sediment re-settles out over the entire length of the flooded area. The thickness of organics is less in these areas, as they are inundated for a shorter duration of time than the other low-lying parts of the tailrace.

- sampled locations CMS-4103 and CMS-4104 along the east embankment to try to get closure on delineation. Location CMS-4103 closes the contamination at the north end, just north of 01-DEL-100, but we don't get closure at CMS-4104; eastern extent of contamination along eastern embankment is unknown, as we lack dioxin samples having < 1 ppb east of 01-DEL-100, CMS-4104, and 01-DEL-300. Further eastward delineation was not possible; lacked access to private property.

- sampled locations CMS-4107, 4108, and 4111, to delineate western extent of contamination, and determine whether or not deeper contamination was present. Locations CMS-4107 and 4108 showed

no deeper contamination, despite shallow contamination at CMS-098 (28 ppb dioxin), but CMS-4111 indicates dioxin contamination in the subsurface to depth of 2.8 ft, and possibly collocated w/ PCE.

- area north of the broad, low-lying part of tailrace" - additional sampling here intended to verify limits of dioxin > 1 ppb: CMS-4101 and CMS-4102, within the centerline of swale, had dioxin < 1 ppb.

Response: As suggested above, Section 4.1.1 of the report has been revised to present and discuss the tailrace sampling results in terms of the sampling rationale presented in the Interim Data Collection Work Plan.

Comment #5 (RS) - pg4-2/sctn 4.2 Groundwater. Recommend adding a figure showing PCE concentrations at the various wells.

Response: A new figure (Figure 4-3) has been prepared that shows PCE concentrations detected in 2002 groundwater samples.

Comment #6 (RS) - pg5-1/sctn 5.0 Conclusions. Tailrace Soils. Recommend adding to 2nd bullet, to clarify that contamination was also found in the higher areas of the tailrace (within the organic material within the first foot).

Response: The text in the second bullet has been revised to clarify that contamination is found in the surface organic material throughout the tailrace.

Comment #7 (RS) - pg5-1/sctn 5.0 Conclusions. Groundwater. Recommend adding a bullet, relating the groundwater contamination at MW-02S/D to the soil contamination at boring CMS-4111 (observed odor, detected dioxin 4 ppb).

Response: The fourth bullet under tailrace soils has been revised to state that the sweet odor detected in artificial fill from boring CMS-4111 may indicate the presence of solvents, which could increase the solubility and mobility of dioxin.

Comment #8 (RS) - Figure 2-1. Please label a few of the topographic contour lines, and add a note to state the contour interval.

Response: Figure 2-1 has been updated to include topographic contour line labels and a definition of the contour interval in the legend.

Comment #9 (RS) - Appendix A - Field Summary Report

- pg2/Global Positioning System - Text here details numerous difficulties in using the mobile Trimble GPS unit (tree canopy in tailrace, building shielding signal, corrupted files, etc.), but these are not mentioned in the main report. The main report simply states that locations were staked, and coordinates obtained by a professional surveyor in March, 2003. Text of main report should have a separate discussion within section 2.0 (Field Summary) of the issues that confronted use of the GPS, as this may be of interest to future field efforts in this area.

In the future, when field GPS methods do not work, as a back-up, sample locations should be determined using the old-fashioned method, i.e., measuring the distance between the stake and two other fixed locations, as a back-up, if it's unclear when the land surveyors will be able to get to the site. Precise locations of these points may not be critical to this program, but generally, assuming that stakes will not be pulled up or moved over a 4-month period (Nov - March) is unreasonably optimistic.

Please elaborate on GPS issues, etc., in a subsection of section 2 of the main report.

Response: Section 2.0 of the report has been revised to include additional discussion on the difficulties associated with the use of field GPS methods. In the future, sample locations will be determined by alternate methods at the time of sampling to prevent the possible loss of coordinate data.

- pg3/Site-wide Groundwater Monitoring - The number of the new keyed-alike locks put on the wells is stated here in the text. If this report may see public distribution, recommend removing this number, as it is inappropriate to have it in the public domain.

Response: The key code for the well locks has been removed from Appendix A of the report.

- *pg9/Soil Sampling Activities - The depth interval of the individual spoon drives cannot be determined from the boring logs, and are not stated in the text here, or in the main report. Please elaborate on what depth intervals the split spoons were driven over. Blows per 6-inch penetration are listed for each foot, but there is no way of knowing if spoons were driven two feet total, 1.5 feet, or 1 ft. This should be stated here in the text, and made clear on each boring log.*

Response: The depth interval of each individual spoon drive was not recorded during the field effort. Each spoon was driven over the planned sample interval (i.e., 0-1 ft, 1-3 ft), and the main text has been revised to include this information. The boring logs were not revised because the information was not recorded during the field effort.

Also, the summary table on page 10 does not indicate ground surface elevation at each sampling location, nor is this information provided in Table 2-1 of the main report, or on the boring logs themselves. Did the land surveyor also obtain ground surface elevations in March 2003? If so, then these should be provided. If not, then approximate elevations should be stated, based on topographic mapping of the area. However, since the services of a professional land surveyor were obtained, it would seem reasonable to have also obtained the ground surface elevations while at the site.

Response: The ground surface elevation at each soil sampling location has been added to Tables 2-1 and 2-2.

Data Summary Report

Interim Data Collection
Remedial Investigation and Feasibility Study
Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

CONTRACT NO. DACW33-01-D-0004
DELIVERY ORDER NO. 01

Submitted to:

Department of the Army
U.S. Army Corps of Engineers
New England Division

September 2003

Prepared by:

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ABBREVIATIONS AND ACRONYMS

BHHRA	Baseline human health risk assessment
COPC	Chemical of potential concern
CSM	Conceptual site model
FS	Feasibility Study
GPS	Global positioning system
HCX	Hexachloroxanthene
ICS	Instrument control sample
LEA	Loureiro Engineering Associates
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
MS	Matrix spike sample
MSD	Matrix spike sample duplicate
NPL	National Priorities List
NTCRA	Non-time critical removal action
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PID	Photoionization detector
ppb	parts per billion
QA	Quality assurance
QC	Quality control
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RPD	Relative percent difference
SRM	Standard reference material
SVOC	Semi volatile organic compound
TCDD	Tetrachlorodibenzodioxin
TCE	Trichloroethene
TCRA	Time-critical removal action
TEQ	Toxic Equivalency Quotient
TOC	Total organic carbon
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) Region I and U.S. Army Corps of Engineers (USACE) New England District are conducting a Remedial Investigation and Feasibility Study (RI/FS) for the Centredale Manor Restoration Project Site located in North Providence, Rhode Island. This Interim Data Collection Data Summary Report presents data that were collected to fill data gaps associated with the RI/FS for the terrestrial part of the site. The scope of work is described in the Interim Data Collection Work Plan (Battelle, 2002a). Complete analytical results for the interim data collection effort were presented in the Task RI-3 Data Chemistry Report (Battelle, 2003a).

1.1 Project Objectives

The purpose of the Centredale Manor Restoration Project Site RI is to determine the sources, nature, and extent of contamination at the site; characterize the fate and transport of contaminants; and evaluate potential human health and ecological risks resulting from exposure to site-related contaminants. The RI will evaluate areas of the Centredale Manor Restoration Project Site that have not already been addressed by time-critical removal actions (TCRA) and non-time critical removal actions (NTCRA) completed at the site. The specific objectives of the interim data collection effort were as follows:

- Collect and analyze soil samples from the tailrace on the east side of the source area to refine the conceptual site model (CSM), better define the distribution and extent of dioxin contamination, and screen for the presence of other site-related contaminants;
- Collect and analyze soil samples from the John E. Fogarty Center property on the southeast shore of Lyman Mill Pond to evaluate potential human health risks to site users; and
- Collect and analyze groundwater samples from all existing monitoring wells to evaluate temporal trends in contaminant concentrations.

Additional data collection to complete the RI for the aquatic part of the site is in progress. The overall approach for addressing environmental contamination at the site is described in the RI/FS Work Plan (Battelle, 2003b).

1.2 Site Description and History

The main part of the site (i.e., the source area) is located at 2072 and 2074 Smith Street (Figure 1-1) in North Providence, Rhode Island. The site is currently occupied by the Brook Village and Centredale Manor apartment complexes, and is privately owned. The main part of the site comprises parking lots, roadways, lawn areas, and two residential buildings, Centredale Manor and Brook Village (Figure 1-2). Brook Village is on the northern part of the property and Centredale Manor is located to the south. The site also consists of reaches of the Woonasquatucket River associated with Allendale and Lyman Mill Ponds. The site consists of all contaminated areas within this area as well as any other location to which contamination from that area has come to be located, or from which that contamination came. Two interim protective soil caps (Interim Cap #1 and Interim Cap #2) are located to the south and west of Centredale Manor, respectively.

Prior to 1936, Centredale Worsted Mills, a woolens manufacturing plant, occupied the main part of the site. In approximately 1940, Metro Atlantic Chemical Corporation began manufacturing chemicals on the site. The mill complex buildings were located at north end of site, north of the existing Centredale Manor building and north parking lot. Trichlorphenols were shipped to the site, where it is believed that Metro Atlantic manufactured hexachlorophene (of which hexachloroxanthene [HCX] and dioxin are by-products). Operations at Metro Atlantic Chemical Corporation ceased during the late 1960s or early 1970s. Between 1952 and 1971, New England Container Company operated a drum reconditioning

facility at the south end of the mill complex (immediately north of the Centredale Manor north parking lot). Chemical residues were dumped or burned prior to drum reconditioning. Residues associated with drum reconditioning operations may also be a source of dioxin to the site. In 1972, fire destroyed most property structures. Brook Village was constructed in 1977 and Centredale Manor was constructed in 1982. The site was listed on the National Priorities List (NPL) in 2000.

Evidence of improper historical waste disposal was discovered during construction of the apartment complexes, and approximately 400 drums and 6,000 cubic yards of contaminated soil were removed from the Centredale Manor site. Chemicals that were potentially used onsite were identified based on drum labels and included caustics, halogenated solvents, polychlorinated biphenyls (PCBs), and inks. An analysis of historical aerial photographs and geophysical data suggests that some waste material (e.g., metallic fill and debris) may still be present in the source area (TTNUS, 2002).

The Allendale Dam was partially breached in 1991, reducing the surface water level in Allendale Pond. The dam breached completely in 2001, exposing most of the pond bottom adjacent to residential properties along the eastern bank of Allendale Pond from 1991-2002. Allendale Dam was reconstructed and the Allendale Pond was restored to its pre-1991 elevation in early 2002 as part of a NTCRA for the site.

1.3 Conceptual Site Model

The CSM identifies potential sources of contamination, release mechanisms, contaminated media and contaminant transport mechanisms, exposure pathways and potential receptors. The CSM provides a framework for characterizing the movement of contaminants at the site and evaluating potential human health and ecological risks from exposure to contamination.

Potential historical sources of contamination at the Centredale Manor site include improper storage and disposal of chemicals in drums, stockpiles and surface impoundments. Direct infiltration of chemicals and leaching of the ground surface led to the contamination of surface and subsurface soils, primarily in the areas that are currently beneath Interim Caps #1 and #2. Localized groundwater contamination has also occurred. The erosion and transport of contaminated soils by surface runoff and periodic flooding of the river resulted in sediment contamination in the adjacent river and ponds and tailrace on the east side of the site. Direct discharge of chemicals to the river and possibly the tailrace during site operations may also have contributed to sediment contamination. The breach of the Allendale Dam in 1991 and again in 2001 apparently resulted in the downstream transport of contaminated sediment from Allendale Pond to Lyman Mill Pond and possibly downstream of the Lyman Mill dam, and left the pond bottom sediments exposed as floodplain soils. Allendale Pond was restored to its original level in early 2002. It is presumed that contaminated sediments have accumulated in depositional areas of the Woonasquatucket River. Additionally, sediments may have been remobilized by high river flows and deposited on the river banks and in the adjacent floodplain during storm events. The nature and extent of sediment contamination is currently being investigated.

The CSM for the tailrace east of the source area is described in more detail below because it was the primary focus of the interim data collection effort. Examination of historical aerial photos and maps indicated that prior to about 1940, the Woonasquatucket River flowed along the east side of the site (in the current location of the tailrace) (LEA, 2002). After about 1940, the majority of the river flow was diverted to the west side of the site, although some flow remained through the tailrace. Between 1939 and 1951, the north end of tailrace was filled and it no longer flowed continuously, although surface water was present throughout the tailrace. During 1960s and 70s, the tailrace was vegetated and appeared to receive some surface drainage from the site. The west side of the tailrace was modified

during redevelopment and landscaping of the site (i.e., during the construction of Centredale Manor), although the east side remained vegetated and relatively unchanged.

The presence of moderate to heavy vegetation and ponded water in the tailrace throughout the period when the Metro Atlantic Chemical Corporation operated suggests that it was not actively or frequently disturbed by site operations or used as a waste disposal area. It appears likely, however, that the tailrace received drainage from site impoundments and/or surface water at various times in the past. Aerial photos from the 1950s show a waste disposal area south of the drum recycling building (in the current location of the Centredale Manor north parking lot), with drainage from the waste piles east into the tailrace. A 1970 photo shows an impoundment in the current location of the Centredale Manor building and southeast corner of the north parking lot. It appears that a drainage feature from this impoundment entered the tailrace. A 1979 photo shows surface flow paths from west to east towards the tailrace near the former drum recycling facility and impoundment. Contaminants in surface runoff could have accumulated in low-lying areas in the tailrace, with post-depositional reworking by flood waters and episodic flow. The western edge of the tailrace was apparently modified during construction of the Centredale Manor apartment complex and parking lot; however, the nature of these modifications and materials used are unknown.

1.4 Organization of Report

This Data Summary Report is organized as follows:

Section 1.0: Introduction.

Section 2.0: Field summary; including a summary of field activities, conditions encountered, and samples collected.

Section 3.0: Summary of analytical results for all samples, and assessment of data usability based on an evaluation of field and laboratory quality control (QC) data.

Section 4.0: Data evaluation and interpretation.

Section 5.0: Conclusions.

Section 6.0. References.

The Field Summary Report is provided in Appendix A.

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2.0 FIELD SUMMARY

This section summarizes the interim data collection field effort conducted in the fall of 2002 at the Centredale Manor Restoration Project site.

2.1 Soil Sampling

Soil sampling was conducted in the tailrace east of the source area and at the John E. Fogarty Center property at the south end of Lyman Mill Pond.

2.1.1 Tailrace Soils

Nine soil borings were installed to a depth of 9 ft in the tailrace from November 18 through 22, 2002. Two surface locations were sampled on November 21, 2002. Table 2-1 provides a summary of the boring locations, soil samples collected, and analyses completed. Sample locations are shown in Figure 2-1. An attempt was made to measure all sample location coordinates prior to sample collection using a backpack-mounted global positioning system (GPS); however, coordinates were not obtained for all locations because of poor reception. The poor GPS reception was apparently due to the close proximity of the Centredale Manor apartment building and the presence of heavy vegetation in the tailrace. Consequently, all sample locations were staked, and station coordinates were obtained by a professional surveyor on March 26, 2003.

Twenty nine soil samples were analyzed for dioxin/HCX, and two samples were analyzed for a full suite of chemicals of potential concern (COPCs). The full suite of COPCs included conventional parameters (grain size and total organic carbon [TOC]), metals, semivolatile organic compounds (SVOCs), chlorinated pesticides, and PCBs.

Soil samples were collected from the borings using stainless steel split spoon samplers, and from the surface locations using a hand auger. Individual split spoons were driven over the targeted sample interval, and soil retained in the spoon was sampled. Soil characteristics were recorded on boring logs, which are provided in Appendix A. A photoionization detector (PID) was used to measure headspace volatile organic compound (VOC) concentrations in soil. Headspace values are reported on the soil boring logs in Appendix A. Additional details regarding the field effort are provided in the Field Summary Report in Appendix A.

Four of the borings (CMS-4105, CMS-4106, CMS-4109, and CMS-4110) were drilled through 6 to 12 inches of standing water using a barge-mounted hollow stem auger rig. The remaining borings were drilled on dry land using a conventional truck-mounted rig (CMS-4107, CMS-4108, and CMS-4111) or a portable tripod rig (CMS-4101 and CMS-4102).

2.1.2 John E. Fogarty Center Soils

Surface soil samples were collected from the fenced yard behind the John E. Fogarty Center at the south end of Lyman Mill Pond on November 22, 2002 using a hand auger. A sample summary is provided in Table 2-2 and sample locations are shown in Figure 2-2. Station coordinates were obtained by a backpack-mounted GPS unit; however, the data files were apparently corrupted during the downloading process. Consequently, station coordinates were obtained by a professional surveyor on March 26, 2003. Four surface soil samples were analyzed for dioxin/HCX and a full suite of COPCs.

2.2 Groundwater Sampling

Groundwater samples for VOC analysis were collected from the 33 existing monitoring wells from October 22 through 24, 2002, except for the sample from Well MW-03S, which was collected on November 21, 2002. Well MW-03S was not sampled in October because it could not be located in the dense vegetation. Well MW-05S was sampled for dioxin analysis on November 21, 2002; this sample was not collected in October because the well contained insufficient water for dioxin sampling and was extremely slow to recharge.

All samples were collected following the procedures outlined in the USEPA Region I document *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (July 30, 1996, Revision 2). A sample summary is provided in Table 2-3. Monitoring well locations are shown in Figure 2-3. Thirty seven groundwater samples were analyzed for VOCs and two were analyzed for dioxin.

Water levels in all accessible monitoring wells, piezometers, and surface water staff gauges were measured on October 21, 2002 (the water level in well MW-03S was measured on November 21, 2002). Monitoring well, piezometer, and staff gauge locations are shown in Figure 2-3. The well headspace was monitored with a PID when each well was opened. Water level data are presented in Section 4.0. Additional information regarding the groundwater sampling field effort is provided in the Field Summary Report in Appendix A.

3.0 DATA SUMMARY

This section summarizes the analytical results for samples collected in the fall of 2002, and evaluates data usability. Complete analytical and data validation results for all samples are provided in the Task RI-3 Data Chemistry Report (Battelle, 2003a). Data are discussed and evaluated in Section 4.0.

3.1 Sample Results

Samples collected include tailrace soils, John E. Fogarty center soils, and groundwater.

3.1.1 Tailrace Soils

Table 3-1 presents 2,3,7,8-TCDD and total TEQ concentrations on a dry weight basis in tailrace surface and subsurface soil samples. Table 3-2 summarizes the results for two surface soil samples that were analyzed for a broad range of COPCs to screen for the presence of site-related contaminants; including conventional parameters, metals, SVOCs, chlorinated pesticides, and PCBs.

3.1.2 Commercial Use Soils

Table 3-3 summarizes the results for three surface soil samples that were collected and analyzed for a full suite of COPCs (conventional parameters, metals, SVOCs, chlorinated pesticides, and PCBs). These results will be evaluated in an addendum to the baseline human health risk assessment (BHHRA) report to determine whether exposure to soils poses a potential risk to site users.

3.1.3 Groundwater

Table 3-4 summarizes detected VOC data for all samples and 2,3,7,8-TCDD and total TEQ results for samples from Well MW-05S.

3.2 Data Usability

Laboratory data generated for this study received internal verification and validation by the Quality Assurance (QA) officers from each participating laboratory. Data submitted by each laboratory were then finalized through third party validation, which was conducted by USEPA Region 1 and Environmental Standards of Valley Forge, PA.

The samples for dioxin/furan and HCX analyses were validated by USEPA Region 1 at a Tier III level using first the criteria in the Centredale Manor Tasks 19-22 QAPP (Battelle, 2001), including the QAPP Addendum (Battelle, 2002b), the QAPP Errata Sheet (Battelle, 2002c), and the criteria in EPA Method 1613B, September 15, 1997; defaulting next to *Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses*, December 1996 criteria, and to EPA Region I's Environmental Services Assistance Team Dioxin Data Validation SOP ESAT-01-0007 (01/08/2003).

The samples for all other testing parameters (e.g., PCB Aroclor) were validated by Environmental Standards of Valley Forge, PA at a Tier II level in accordance with the *Region I, EPA New England Data Validation Functional Guidelines for Evaluating Environmental Analyses* (US EPA, 12/1996), the *Centredale Manor Restoration Project Site Final Quality Assurance Project Plan (QAPP) – Addendum to Tasks 19-22 QAPP* (Battelle, 2002b), and the *Errata to Centredale Manor Tasks 19-22 Quality Assurance Project Plan – Addendum* (Battelle, 2002c).

Complete details of the validation findings are presented in Section 8 of the *Task RI-3 Chemistry Data Report, Interim Data Collection Remedial Investigation And Feasibility Study, Centredale Manor Restoration Project Site, North Providence, Rhode Island* (Battelle, 2003a).

3.2.1 Field-Based Quality Control

Field QC samples collected for the soil sampling event included rinsate blank and field duplicate samples, at a frequency of 1 per 20 study samples. Field QC samples collected for the groundwater sampling event included trip blanks (for VOC analysis only) at a minimum frequency of 1 per sampling event and field duplicates at a frequency of 1 per 20 study samples. Rinsate blanks were not collected for the groundwater-sampling event because dedicated sampling equipment was used for the sample collections.

Results from the third party validation showed several cases where sample results for one or more analyte within each parameter class (e.g., dioxin, PAHs) did not meet the field duplicate criterion of relative percent difference (RPD) less than 50%. Wherever the RPD criteria were not met, data were J flagged by the validators to indicate that sample results were estimated (Battelle, 2003a). The RPD exceedances between field duplicates suggest that the sediment material collected is naturally heterogeneous, and contaminant data may vary as a result, even within a sampling location. Additional details regarding validation findings for field-based QC samples are summarized below; complete details are provided with the chemistry data report (Battelle, 2003a).

Data validation for dioxin/furan and HCX indicated two relative percent difference (RPD) exceedances in one field duplicate pair and eight RPD exceedances in the second field duplicate pair. These exceedances did not significantly impact the usability of the dioxin/furan data according to the EPA validator. The final validated data were qualified accordingly by the validators to indicate that selected sample results were estimated (Battelle, 2003a).

Data validation for pesticide/PCB and PAHs indicated minor RPD exceedances in field duplicate data (pesticide and PAHs), and some low level contamination (PAHs) for the rinsate blank. Overall, the data quality is satisfactory and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validators (Battelle, 2003a).

Data validation for metals, TOC and grain size analysis indicated minor RPD exceedances for field duplicates. Overall, the data quality is satisfactory and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validators (Battelle, 2003a).

Data validation for SVOC analysis by Method 8270C and volatile VOC analysis by Method 8260B indicated low level rinsate blank contamination (SVOC), low level trip blank contamination (VOC) and field duplicate RPD exceedances. Overall, the data quality is good and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validators (Battelle, 2003a).

3.2.2 Laboratory-Based Quality Control

A routine set of laboratory-based QC samples were prepared with the study samples to monitor data quality in terms of accuracy and precision. In general, laboratory-based QC included one method blank, one laboratory control sample (LCS), one matrix spike/spike duplicate (MS/MSD) pair, one laboratory duplicate, and one standard reference material (SRM), where available. Laboratory QC samples were prepared at a frequency of 1 per 20 study samples.

Results from the third party validation indicated minor data quality problems, which do not significantly impact the usability of these sample data. Data quality issues addressed by the validators are also discussed in laboratory prepared QA/QC narratives, which are reported with the chemistry data (Battelle, 2003a). The QA/QC narratives include a discussion of the laboratory QC results and a description of

MPC exceedances and the impact, if any, the exceedances may have on the overall field sample data. Additional details regarding validation findings for laboratory-based QC samples are summarized below; complete details are provided with the chemistry data report (Battelle, 2003a).

Data validation for dioxin/furan and HCX indicated the minor data quality problems, which do not significantly impact the usability of the dioxin/furan data according to the EPA validator. For example, low-level blank contamination was observed in the soil and ground water sample analysis, however, the low level blank contamination does not have an impact on the usability of the dioxin/furan data according to the validator. In addition, analysis for HCX continued to be problematic (consistent with previous studies at the Centredale Manor site). The initial calibration criterion was not met for HCX in selected soil samples. Furthermore, the HCX peaks exhibited poor chromatography (i.e., a broad shape). While HCX data are considered estimates due to the observed analytical variability and poor chromatography, soil HCX concentrations corresponded well ($R^2 = 0.749$) with dioxin data (2,3,7,8-TCDD), which suggests that the HCX data are useable for the intended purpose (i.e., to support the RI).

Four samples (CMS-SS-4106-1016-01, CMS-SS-4109-0010-01, CMS-SS-4104-0010-01, and CMS-DU-112202A-01) had less than 30% solids content, yet the samples were inadvertently not treated at the laboratory to remove excess water. The final validated data were qualified accordingly by the validator (Battelle, 2003a).

Data validation for pesticide/PCB and PAH analysis indicated the blank contamination (PAHs), an exceeded holding time (rinsate blank), high instrument control sample (ICS) percent differences, a high laboratory control sample recovery, and a high MS recovery (pesticide) issues. Overall, the data quality is satisfactory and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validator (Battelle, 2003a).

Data validation for metals, TOC and grain size analysis indicated the blank contamination (metals), low MS/MSD, SRM, and blank spike recoveries (metals), and laboratory duplicate precision (grain size) issues. Overall, the data quality is satisfactory and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validator (Battelle, 2003a).

Data validation for SVOC analysis by Method 8270C and VOC analysis by Method 8260B indicated an exceeded holding time (rinsate blank), low MS/MSD and LCS and/or LCS Duplicate (LCSD) recoveries issues. Overall, the data quality is good and the data are acceptable for use according to the validator. The final validated data were qualified accordingly by the validator (Battelle, 2003a).

4.0 DATA EVALUATION

4.1 Tailrace Soils

The objectives of the tailrace soil sampling were to refine the CSM, better define the distribution and extent of dioxin contamination, and screen for the presence of other site-related contaminants.

4.1.1 Soil Type and Dioxin Distribution

Cross sections of the soil types observed in the year 2002 tailrace borings are provided in Figure 4-1. Surface soils consisted of silty sand near the north end of the tailrace, and a 1-2 ft thick, dark brown to black, organic rich layer in the underwater portion of the tailrace. Subsurface soils consisted of sandy gravel and medium to coarse sand, which presumably represent historic river channel sediments. Silt was encountered in one boring (CMS-4110) from a depth of 7 ft to the bottom of the boring at 9 ft. Artificial fill was encountered in the three borings (CMS-4107, CMS-4108, and CMS-4111) on the west side of the tailrace adjacent to the access road behind the Centredale Manor building. The fill layer was 3 ft thick and was composed of silty sand, gravel, clinker material, friable coal-like material and ash, and wood fibers.

No visible evidence of contamination was noted in any of the borings except for a slight sheen on several samples and anthropogenic material in the artificial fill on the west side of the tailrace. A slight hydrocarbon odor was noted in several borings, and a strong, sweet hydrocarbon odor was noted in boring CMS-4111 from 2 ft to 7 ft below the surface. It should be noted that the presence of solvents, as suggested by the sweet hydrocarbon odor, may increase the solubility and mobility of dioxin in groundwater.

Dioxin data collected in 2002 were combined with data from previous investigations to better define the distribution of dioxin in the tailrace (Figure 4-2). Dioxin data from previous investigations are tabulated in the Interim Data Collection Work Plan (Battelle, 2002a). In this Interim Data Collection effort, soil samples were collected from borings CMS-4101 and CMS-4102 to define the northern extent of elevated dioxin levels. In addition, a composite surface sediment sample (CMS-4103) was collected immediately north of 01-DEL-100, where a dioxin TEQ concentration of 40 ppb was previously measured. Dioxin TEQ concentrations were below 1 ppb in the samples from CMS-4101, CMS-4102, and CMS-4103, indicating that the northern extent of contamination is the north end of the broad, low-lying part of the tailrace. Dioxin concentrations are highest in the vicinity of sample locations 01-DEL-05 and 01-DEL-100. North of this area, the tailrace narrows and is dry. Dioxin concentrations in the comparatively narrow, dry part of the tailrace are below 1 ppb, with the exception of a 2-3 ft sample from MW-01S (TEQ of 1.1 ppb).

Soil samples were collected from the center of the tailrace downstream of the area of highest contamination to evaluate whether concentrations in low-lying pools (CMS-4105 and CMS-4110) were higher than those in slightly higher elevation areas between the pools (CMS-4106 and CMS-4109). Subsurface samples were analyzed to evaluate the vertical extent of contamination. Samples with dioxin TEQ concentrations exceeding 1 ppb were found in the organic-rich surface layer in borings CMS-4106, CMS-4109, and CMS-4110, with no apparent differences between slightly lower and higher elevation areas. The organic-rich layer was found at all sampling locations, indicating that the entire tailrace east of the Centredale Manor building is an area of deposition. None of the samples collected from the sandy gravel or sand layers had dioxin TEQ concentrations exceeding 1 ppb. Although fewer subsurface

samples have been collected, available data indicate that the dioxin tends to occur in the organic-rich surface layer and not in the subsurface sand and gravel deposits. The majority of samples collected downstream of CMS-SD-2020 and SD-30 at the south end of the area shown in Figure 4-2 have dioxin TEQ concentrations below 1 ppb.

A composite surface soil sample was collected from the organic-rich surface layer at CMS-4104 to help delineate the extent of contamination on the eastern boundary of the site. The dioxin TEQ concentration in this sample was 5.8 ppb (Figure 4-2). The eastern limit of soil with dioxin TEQ concentrations exceeding 1 ppb in the area east of 01-DEL-100, CMS-4104, and 01-DEL-300 is not delineated, and further sampling east of this area was not possible due to lack of access to private property. Dioxin TEQ concentrations in surface soils on the eastern embankment elsewhere in the tailrace are below 1 ppb.

Samples were collected from borings CMS-4107, CMS-4108 and CMS-4111 to delineate the horizontal and vertical extent of contamination on the western edge of the tailrace. Dioxin TEQ concentrations in samples from CMS-4107 and CMS-4108 were below 1 ppb, although surface contamination was previously observed at CMS-098. One subsurface sample (1 to 2.8 ft below the surface) collected from the artificial fill at CMS-4111 had a dioxin TEQ concentration of 4 ppb. A sweet odor, indicating the possible presence of solvents, was observed in this boring. As previously noted, solvents could increase the solubility and mobility of dioxin in groundwater.

The distribution of dioxin contamination suggests that dioxin-containing waste entered the tailrace at the north end of the broad, low-lying area. This area is believed to have received direct discharges and/or contaminated surface runoff from waste disposal areas formerly located in the vicinity of the Centredale Manor building and north parking lot. Contaminated soils subsequently may have been transported downstream and reworked by episodic flow; alternatively, contaminated surface soils from the site may have been eroded, transported by surface runoff, and deposited in the low-lying part of the tailrace. The dioxin is primarily associated with the fine-grained, highly organic surface layer along the main depression of the tailrace. The extent of contamination is well bounded to the north and south. The lateral extent of contamination is not bounded on the east in the vicinity of sampling locations 01-DEL-100, CMS-4104, and 01-DEL-300. Elevated dioxin concentrations have been found in several locations along the western edge of the tailrace, adjacent to the access road behind the Centredale Manor building (CMS-4111, 1 to 2.8 ft below the surface; and surface soil at CMS-098).

4.1.2 Other Contaminants

Concentrations of a variety of COPCs measured in two surface soil samples from the tailrace were compared to Rhode Island residential direct exposure criteria to screen for the presence of other potential site-related contaminants (Table 4-1). Concentrations of four metals (arsenic, beryllium, lead, and manganese), a variety of PAHs, dieldrin, and total PCBs exceeded the residential direct exposure criteria in both samples.

4.2 Groundwater

Table 4-2 compares VOC concentrations measured in groundwater samples in 2002 to levels measured in 2001 and to Rhode Island objectives for Class GB groundwater. Table 4-3 compares the dioxin concentration in groundwater samples from Well MW-05S. These data indicate that contaminant concentrations generally have decreased or remained the same from 2001 to 2002. All VOC concentrations detected in 2002 were below the Rhode Island GB groundwater objectives except for

tetrachloroethene (PCE) and trichloroethene (TCE) in the sample from Well MW-05S, and PCE in the samples from Wells MW-13D and MW-14M.

Figure 4-3 shows the distribution of PCE detected in groundwater samples. In wells with PCE concentrations exceeding 100 μg/L (wells GEC-6, MW-02D, MW-05S, MW-13B, and MW-13D), the PCE concentrations have decreased since 2001. However, the PCE concentration in Well MW-14M increased from below detection in 2001 to 1900 μg/L in 2002. This well is in the Brook Village parking lot, south-southeast (downgradient) of Well MW-05S, which has the highest PCE concentration on site. These results indicate that the PCE plume has migrated downgradient from the vicinity of Well MW-05S to Well MW-14M. The dioxin (2,3,7,8-TCDD) concentration in Well MW-05S decreased from 4460 pg/L in 2001 to 1071 pg/L in 2002 (1513 pg/L in the field duplicate sample).

Table 4-4 presents the groundwater elevation data measured in October 2002. Figure 4-4 is a water table elevation map based on the shallow monitoring well data. Piezometer data were not included in the map because of uncertainties regarding data comparability. Groundwater elevations are consistent with those measured in the fall of 2001 (TTNUS, 2002). The direction of shallow groundwater flow is generally to the south. Differences in groundwater elevations between collocated shallow, deep, and bedrock wells indicate that there are no strong vertical hydraulic gradients, which is also consistent with previous groundwater measurements at the site (TTNUS, 2002).

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5.0 CONCLUSIONS

The results of the interim data collection effort will be used in conjunction with previously-collected data to complete the RI for the Centredale Manor Restoration Project Site. The following conclusions can be drawn from the data collected in the fall of 2002:

Tailrace Soils

- Dioxin concentrations are highest at the north end of the low-lying part of the tailrace that is inundated with standing water (i.e., east of the Centredale Manor north parking lot). Historical aerial photographs indicate that this area may have received discharges from surface impoundments in the source area.
- Dioxin TEQ concentrations above 1 ppb are found throughout the tailrace downstream of the area of highest concentrations. Contaminated soils may have been transported downstream during periods of high flow, or may have been contained in runoff from the source area and deposited in the tailrace depression.
- Dioxin is primarily associated with the organic-rich surface layer beneath the ponded water in the tailrace. Native sands and gravels beneath the organic layer generally do not appear to be contaminated.
- Dioxin TEQ concentrations exceeding 1 ppb are also found in artificial fill material present on the west side of the tailrace, adjacent to the access road behind the Centredale Manor building. The sweet odor detected in artificial fill from boring CMS-4111 may indicate the presence of solvents, which could increase the solubility and mobility of dioxin.
- Concentrations of metals, PAHs, dieldrin, and total PCBs in two surface soil samples collected in the center of the tailrace exceeded Rhode Island residential direct exposure criteria.

John E. Fogarty Center Soils

- Three surface soil samples were collected from the John E. Fogarty Center at the south end of Lyman Mill Pond and analyzed for a variety of COPCs. These data will be evaluated in an addendum to the BHHRA report.

Groundwater

- VOC concentrations in groundwater samples collected from existing monitoring wells on the site generally remained the same or decreased from 2001 to 2002, except in Well MW-14M, where the PCE concentration increased from below detection to 1900 µg/L. Well MW-14M is downgradient of Well MW-05S, where the highest PCE concentrations on site have been measured. The dioxin concentration in samples from Well MW-05S decreased.
- All VOC concentrations detected in 2002 were below the Rhode Island GB groundwater objectives except for PCE and TCE in the sample from Well MW-05S, and PCE in the samples from Wells MW-13D and MW-14M.
- Groundwater elevations and gradients were similar to those measured in the fall of 2001.

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6.0 REFERENCES

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7.0 TABLES

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Table 2-1. Tailrace Soil Sample Summary, Fall 2002

Boring	Top of Sample (ft)	Bottom of Sample (ft)	Northing	Easting	Ground Surface Elevation (ft)	Sample Collection Date	Sample ID	Analysis Conducted
CMS-4101	1.0	1.9	282068.8708	331815.6462	96.7	22-Nov-02	CMS-SS-4101-1019-01	Dioxin/HCX
CMS-4101	3.0	4.2	282068.8708	331815.6462	96.7	22-Nov-02	CMS-SS-4101-3042-01	Dioxin/HCX
CMS-4102	0.0	0.8	281861.4373	331900.6413	95.6	22-Nov-02	CMS-SS-4102-0008-01	Dioxin/HCX
CMS-4102	1.0	1.9	281861.4373	331900.6413	95.6	22-Nov-02	CMS-SS-4102-1019-01	Dioxin/HCX
CMS-4102	3.0	3.8	281861.4373	331900.6413	95.6	22-Nov-02	CMS-SS-4102-3038-01	Dioxin/HCX
CMS-4103	0.0	1.0	281849.9108	331916.0011	95.4	22-Nov-02	CMS-SS-4103-0010-01	Dioxin/HCX
CMS-4104	0.0	1.0	281824.6230	331925.9334	93.5	22-Nov-02	CMS-DU-112202A-01 (a)	Dioxin/HCX
CMS-4104	0.0	1.0	281824.6230	331925.9334	93.5	22-Nov-02	CMS-SS-4104-0010-01	Dioxin/HCX
CMS-4105	0.0	1.0	281789.5767	331913.4607	93.2	20-Nov-02	CMS-SS-4105-0010-01	Full suite (c)
CMS-4105	1.0	1.5	281789.5767	331913.4607	93.2	20-Nov-02	CMS-SS-4105-1015-01	Dioxin/HCX
CMS-4105	3.0	4.0	281789.5767	331913.4607	93.2	20-Nov-02	CMS-SS-4105-3040-01	Dioxin/HCX
CMS-4106	0.0	1.0	281733.4293	331930.7663	93.8	19-Nov-02	CMS-DU-111902A-01 (a)	Dioxin/HCX
CMS-4106	0.0	1.0	281733.4293	331930.7663	93.8	19-Nov-02	CMS-SS-4106-0010-01	Dioxin/HCX
CMS-4106	1.0	1.6	281733.4293	331930.7663	93.8	19-Nov-02	CMS-SS-4106-1016-01	Dioxin/HCX
CMS-4106	3.0	3.6	281733.4293	331930.7663	93.8	19-Nov-02	CMS-SS-4106-3036-01	Dioxin/HCX
CMS-4107	1.0	3.0	281711.7051	331886.1194	97.2	21-Nov-02	CMS-SS-4107-1030-01	Dioxin/HCX
CMS-4107	3.0	4.0	281711.7051	331886.1194	97.2	21-Nov-02	CMS-SS-4107-3040-01	Dioxin/HCX
CMS-4108	0.0	1.0	281661.0193	331898.2405	97.2	21-Nov-02	CMS-SS-4108-0010-01	Dioxin/HCX
CMS-4108	1.0	3.0	281661.0193	331898.2405	97.2	21-Nov-02	CMS-SS-4108-1030-01	Dioxin/HCX
CMS-4108	3.0	4.0	281661.0193	331898.2405	97.2	21-Nov-02	CMS-SS-4108-3040-01	Dioxin/HCX
CMS-4109	0.0	1.0	281624.6748	331964.7882	91.8	18-Nov-02	CMS-SS-4109-0010-01	Dioxin/HCX
CMS-4109	1.0	1.4	281624.6748	331964.7882	91.8	18-Nov-02	CMS-SS-4109-1014-01	Dioxin/HCX
CMS-4109	3.0	3.8	281624.6748	331964.7882	91.8	18-Nov-02	CMS-SS-4109-3038-01	Dioxin/HCX
CMS-4110	0.0	1.0	281573.0434	332000.7455	91.6	19-Nov-02	CMS-SS-4110-0010-01	Dioxin/HCX, full suite (c)
CMS-4110	1.0	1.5	281573.0434	332000.7455	91.6	19-Nov-02	CMS-SS-4110-1015-01	Dioxin/HCX
CMS-4110	3.7	3.9	281573.0434	332000.7455	91.6	19-Nov-02	CMS-SS-4110-3739-01	Dioxin/HCX
CMS-4111	0.0	0.9	281549.2179	331935.9552	96.5	21-Nov-02	CMS-SS-4111-0009-01	Dioxin/HCX
CMS-4111	1.0	2.8	281549.2179	331935.9552	96.5	21-Nov-02	CMS-SS-4111-1028-01	Dioxin/HCX
CMS-4111	3.0	4.5	281549.2179	331935.9552	96.5	21-Nov-02	CMS-SS-4111-3046-01	Dioxin/HCX
N/A	N/A	N/A	N/A	N/A	N/A	21-Nov-02	CMS-RB-112102A-01 (b)	Dioxin/HCX

N/A: Not applicable.
(a) Field duplicate sample.
(b) Rinsate blank sample.
(c) Full suite: grain size, TOC, metals, SVOCs, chlorinated pesticides, and PCBs

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Table 2-2. John E. Fogarty Center Soil Sample Summary, Fall 2002

Station ID	Top of Sample (ft)	Bottom of Sample (ft)	Northing	Easting	Ground Surface Elevation (ft)	Sample Collection Date	Sample ID	Analysis Conducted
LPX-4112	0.0	0.5	275853.2575	334445.1798	83.7	22-Nov-02	LPX-DU-112202B-01 (a)	Dioxin/HCX, full suite [b]
LPX-4112	0.0	0.5	275853.2575	334445.1798	83.7	22-Nov-02	LPX-SS-4112-0005-01	Dioxin/HCX, full suite (b)
LPX-4113	0.0	0.5	275834.8632	334456.2825	84.3	22-Nov-02	LPX-SS-4113-0005-01	Dioxin/HCX, full suite (b)
LPX-4114	0.0	0.5	275818.2951	334466.5947	84.4	22-Nov-02	LPX-SS-4114-0005-01	Dioxin/HCX, full suite (b)

(a) Field duplicate sample.
(b) Full suite: grain size, TOC, metals, SVOCs, chlorinated pesticides, PCBs.

Table 2-3. Groundwater Sample Summary, Fall 2002

Well ID	Northing	Easting	Sample Collection Date	Sample ID	Analysis Completed
GEC1	282460.5000	331644.3000	23-Oct-02	CMS-GW-GEC1-03	VOCs
GEC2	282220.0000	331641.3000	23-Oct-02	CMS-GW-GEC2-03	VOCs
GEC3	282243.9000	331684.4000	24-Oct-02	CMS-GW-GEC3-03	VOCs
GEC4	282142.9000	331616.3000	23-Oct-02	CMS-GW-GEC4-03	VOCs
GEC5	282112.1000	331662.1000	23-Oct-02	CMS-GW-GEC5-03	VOCs
GEC6	282028.5000	331650.7000	23-Oct-02	CMS-GW-GEC6-03	VOCs
GEC7	281990.3000	331696.7000	23-Oct-02	CMS-GW-GEC7-03	VOCs
MW01S	281970.4000	331841.8000	24-Oct-02	CMS-GW-MW01S-03	VOCs
MW02D	281435.5000	332002.1000	22-Oct-02	CMS-GW-MW02D-03	VOCs
MW02M	281446.7000	331999.4000	22-Oct-02	CMS-GW-MW02M-03	VOCs
MW02S	281459.3000	332019.5000	22-Oct-02	CMS-GW-MW02S-03	VOCs
MW03S	282104.3000	331787.6000	21-Nov-02	CMS-GW-MW03S-03	VOCs
MW03S	282104.3000	331787.6000	21-Nov-02	CMS-GW-MW03S-03 DUP (a)	VOCs
MW04B	281137.2000	331995.0000	22-Oct-02	CMS-GW-MW04B-03	VOCs
MW04D	281142.7000	331986.8000	22-Oct-02	CMS-GW-MW04D-03	VOCs
MW04S	281148.6000	331981.2000	22-Oct-02	CMS-GW-MW04S-03	VOCs
MW05S	282100.3000	331613.2000	24-Oct-02	CMS-DU-102402A-03 (a)	VOCs
MW05S	282100.3000	331613.2000	24-Oct-02	CMS-GW-MW05S-03	VOCs
MW05S	282100.3000	331613.2000	21-Nov-02	CMS-GW-MW05S-04	Dioxin
MW05S	282100.3000	331613.2000	21-Nov-02	CMS-GW-MW05S-04 DU (a)	Dioxin
MW06S	281925.6000	331684.9000	23-Oct-02	CMS-DU-102302A-03 (a)	VOCs
MW06S	281925.6000	331684.9000	23-Oct-02	CMS-GW-MW06S-03	VOCs
MW07D	281671.7000	331660.7000	23-Oct-02	CMS-GW-MW07D-03	VOCs
MW07S	281685.8000	331657.5000	23-Oct-02	CMS-GW-MW07S-03	VOCs
MW08S	281409.3000	331727.6000	22-Oct-02	CMS-GW-MW08S-03	VOCs
MW09S	281241.9000	331797.1000	22-Oct-02	CMS-GW-MW09S-03	VOCs
MW10B	282151.7000	331826.1300	22-Oct-02	CMS-GW-MW10B-03	VOCs
MW10D	282155.9000	331825.0000	22-Oct-02	CMS-GW-MW10D-03	VOCs
MW11B	281773.1000	331366.6000	23-Oct-02	CMS-GW-MW11B-03	VOCs
MW11M	281774.4000	331373.6000	23-Oct-02	CMS-GW-MW11M-03	VOCs
MW11S	281775.1000	331361.7000	24-Oct-02	CMS-GW-MW11S-03	VOCs
MW12B	280888.6000	331817.2000	24-Oct-02	CMS-GW-MW12B-03	VOCs
MW12D	280894.1000	331815.5000	24-Oct-02	CMS-GW-MW12D-03	VOCs
MW13B	281288.2000	332129.9000	22-Oct-02	CMS-GW-MW13B-03	VOCs
MW13D	281283.3000	332131.3000	22-Oct-02	CMS-GW-MW13D-03	VOCs
MW13S	281287.2000	332135.4000	22-Oct-02	CMS-GW-MW13S-03	VOCs
MW14M	282015.6000	331645.6000	23-Oct-02	CMS-GW-MW14M-03	VOCs
MW15D	282204.5000	331619.2000	23-Oct-02	CMS-GW-MW15D-03	VOCs
N/A	N/A	N/A	22-Oct-02	CMS-TB-102202A-03 (b)	VOCs
N/A	N/A	N/A	21-Nov-02	CMS-TB-112102A (b)	VOCs

N/A: Not applicable.
(a) Field duplicate sample.
(b) Trip blank sample.

Table 3-1. Summary of Dioxin Concentrations in Tailrace Soil Samples, Fall 2002

Boring ID	Depth (ft)	Depth (ft)	2,3,7,8-TCDD (pg/g dry wt)	Qualifier	HCCF (pg/g dry wt)	Qualifier	Total TCDD (pg/g dry wt)
CMS-4101	1.0	1.9	3.14		14	J	10.4
CMS-4101	3.0	4.2	44	J	367	J	59.7
CMS-4102	0.0	0.8	65.2		257	J	76
CMS-4102	1.0	1.9	52.6		469	J	60.9
CMS-4102	3.0	3.8	58.6		384	J	67.2
CMS-4103	0.0	1.0	151		7270	J	160
CMS-4104 (a)	0.0	1.0	3020	J	85100	J	3070
CMS-4104	0.0	1.0	5730	J	68900	J	5780
CMS-4105	1.0	1.5	41.9		236	J	42.9
CMS-4105	3.0	4.0	223		5370	J	229
CMS-4106 (a)	0.0	1.0	929	J	5830	J	967
CMS-4106	0.0	1.0	523		3560	J	542
CMS-4106	1.0	1.6	2310	J	11400	J	2400
CMS-4106	3.0	3.6	348		5240	J	351
CMS-4107	1.0	3.0	54.4		164	J	76.7
CMS-4107	3.0	4.0	19.4		64.4	J	20
CMS-4108	0.0	1.0	54.6		357	J	68.1
CMS-4108	1.0	3.0	65.3		343	J	114
CMS-4108	3.0	4.0	15.8		88.2	J	23.4
CMS-4109	0.0	1.0	2130	J	16000	J	2290
CMS-4109	1.0	1.4	88.3		105	J	90.3
CMS-4109	3.0	3.8	143		90.3	J	146
CMS-4110	0.0	1.0	4060		55900	J	4160
CMS-4110	1.0	1.5	787		3720	J	798
CMS-4110	3.7	3.9	16.5	J	25.7	J	16.6
CMS-4111	0.0	0.9	279		7450	J	311
CMS-4111	1.0	2.8	1660		55900	J	3970
CMS-4111	3.0	4.5	15.2		147	J	21.7

(a) Field duplicate sample.
J Estimated value.

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Table 3-2. Summary of COPCs Detected in Tailrace Soil Samples, Fall 2002

Parameter	Boring ID Sample Depth (ft)	CMS-4105 0.0 - 1.0		CMS-4110 0.0 - 1.0	
Grain size					
Clay	Percent	9		10.3	
Coarse Sand	Percent	5.57		2.38	
Fine Sand	Percent	23.4		25.7	
Gravel	Percent	12.7		0.59	
Medium Sand	Percent	14.5		15.2	
Silt	Percent	34.9		45.9	
Total Organic Carbon					
Total Organic Carbon	Percent	12.2		10.5	
Metals					
Aluminum	mg/kg dry wt	12000	J	13000	J
Antimony	mg/kg dry wt	0.815	J	0.387	J
Arsenic	mg/kg dry wt	17.3		4.93	
Barium	mg/kg dry wt	151		106	
Beryllium	mg/kg dry wt	1.03		0.95	
Cadmium	mg/kg dry wt	12.6		4.23	
Chromium	mg/kg dry wt	330		195	
Cobalt	mg/kg dry wt	8.88		5.75	
Copper	mg/kg dry wt	106		103	
Iron	mg/kg dry wt	27700		19400	
Lead	mg/kg dry wt	1110	J	761	J
Manganese	mg/kg dry wt	480		423	
Mercury	mg/kg dry wt	2.98		5.91	
Methyl mercury	mg/kg dry wt	0.000513		0.00526	
Molybdenum	mg/kg dry wt	10.7	J	3.66	J
Nickel	mg/kg dry wt	24.6		31.1	
Silver	mg/kg dry wt	1.75	J	2.05	J
Thallium	mg/kg dry wt	0.215	J	0.2	J
Vanadium	mg/kg dry wt	77.2		56.9	
Zinc	mg/kg dry wt	731		417	
Detected SVOCs					
bis(2-Ethylhexyl)phthalate	µg/kg dry wt	33000		35000	
Carbazole	µg/kg dry wt	610	J	6400	U
Di-n-butylphthalate	µg/kg dry wt	5400	J	6400	U
2-Methylnaphthalene	µg/kg dry wt	493	J	482	J
Acenaphthene	µg/kg dry wt	336	J	274	J
Acenaphthylene	µg/kg dry wt	1300	J	930	J
Anthracene	µg/kg dry wt	1710	J	741	J
Benzaldehyde	µg/kg dry wt	632	J	347	J
Benzo[a]anthracene	µg/kg dry wt	7070	J	2980	J
Benzo[a]pyrene	µg/kg dry wt	5840	J	2320	J
Benzo[b]fluoranthene	µg/kg dry wt	6380	J	3220	J
Benzo[g,h,i]perylene	µg/kg dry wt	4370	J	1790	J
Benzo[k]fluoranthene	µg/kg dry wt	7140	J	3050	J
Biphenyl	µg/kg dry wt	1610	J	338	J
Chrysene	µg/kg dry wt	9270	J	4660	J
Dibenz[a,h]anthracene	µg/kg dry wt	1500	J	673	J
Dibenzofuran	µg/kg dry wt	422	J	309	J
Fluoranthene	µg/kg dry wt	17900	J	9360	J
Fluorene	µg/kg dry wt	992	J	621	J
Indeno[1,2,3-c,d]pyrene	µg/kg dry wt	4190	J	1560	J
Naphthalene	µg/kg dry wt	471	J	449	J

Table 3-2. Summary of COPCs Detected in Tailrace Soil Samples, Fall 2002 (continued)

Parameter	Sampling ID Sample Depth (ft)	CMS-4165 0.0 - 1.0		CMS-4166 0.0 - 1.0	
Phenanthrene	µg/kg dry wt	5240	J	3540	J
Pyrene	µg/kg dry wt	16700	J	8680	J
Total PAH (a)	µg/kg dry wt	91300	J	45600	J
Pesticides	µg/kg dry wt				
4,4'-DDD	µg/kg dry wt	58.1	J	79.2	J
4,4'-DDE	µg/kg dry wt	545	J	39.4	J
4,4'-DDT	µg/kg dry wt	0.164	UJ	2.49	J
alpha-Chlordane	µg/kg dry wt	5.44	J	32.6	J
Dieldrin	µg/kg dry wt	151	J	54.3	J
Endosulfan II	µg/kg dry wt	96.2	J	59.8	J
gamma-BHC	µg/kg dry wt	0.611	J	2.84	J
gamma-Chlordane	µg/kg dry wt	1.03	J	59.9	J
Technical chlordane	µg/kg dry wt	10600	J	6360	J
Total Endosulfan (b)	µg/kg dry wt	96.2	J	59.8	J
Total DDT (c)	µg/kg dry wt	603	J	121	J
PCB as Aroclors					
Aroclor-1254	µg/kg dry wt	14600	J	8960	J
Aroclor-1268	µg/kg dry wt	4350	J	2010	J
Total PCB as Aroclor (d)	µg/kg dry wt	19000	J	11000	J

(a) Total PAH = sum of PAHs (non-detects considered zero in sums).
(b) Total endosulfan = sum of endo I, endo II and endo sulfate (non-detects considered zero in sums).
(c) Total DDT = sum of 4,4'-DDT, 4,4'-DDE and 4,4'-DDD (non-detects considered zero in sums).
(d) Total PCB = sum of Aroclors (non-detects considered zero in sums).
J Estimated value.

U Not detected at the given detection limit.

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Table 3-3. Summary of COPCs Detected in John E. Fogarty Center Soil Samples, Fall 2002

Parameter	Boring ID	LPX-4112 (a)		LPX-4112		LPX-4113		LPX-4114	
	Sample Depth (ft)	0.0 - 0.5		0.0 - 0.5		0.0 - 0.5		0.0 - 0.5	
Dioxin/HCX									
2,3,7,8-TCDD	pg/g dry wt			2.01		3.18		2.65	
HCX	pg/g dry wt			15.2	J	4.35	J	25	J
Total TEQ	pg/g dry wt			4.98		4.88		6.45	
Grain Size									
Clay	Percent	4		5		4.5		6	
Coarse Sand	Percent	7.64		7.72		10.1		2.5	J
Fine Sand	Percent	25		24.2		14.1		25.1	
Gravel	Percent	16.8		15.4		26.2		21.7	J
Medium Sand	Percent	21.7		20.2		19.1		19.7	
Silt	Percent	24.8		27.6		26.1		25.1	
Total Organic Carbon									
Total Organic Carbon	Percent	1.99	J	0.88	J	2.3		4.36	
Metals									
Aluminum	mg/kg dry wt	15900	J	17100	J	24800	J	18300	J
Antimony	mg/kg dry wt	0.0702	J	0.13	J	0.0675	J	0.163	J
Arsenic	mg/kg dry wt	9.64		11.5		9.98		9.77	
Barium	mg/kg dry wt	51.6		54.7		126		80.7	
Beryllium	mg/kg dry wt	0.473		0.556		0.934		0.623	
Cadmium	mg/kg dry wt	0.222	J	0.184	J	0.409	J	0.428	J
Chromium	mg/kg dry wt	20.6		21.7		27		22.3	
Cobalt	mg/kg dry wt	4.76		5.11		6.62		5.56	
Copper	mg/kg dry wt	26.9		30		29.2		36.7	
Iron	mg/kg dry wt	18500		22800		23100		21800	
Lead	mg/kg dry wt	109	J	169	J	154	J	215	J
Manganese	mg/kg dry wt	372		402		448		478	
Mercury	mg/kg dry wt	0.111		0.116		0.258		0.243	
Methyl mercury	mg/kg dry wt	0.000203		0.000223		0.000195	J	0.000183	J
Molybdenum	mg/kg dry wt	0.538	J	0.636	J	0.84	J	0.723	J
Nickel	mg/kg dry wt	9.87		10.6		15.2		13.9	
Silver	mg/kg dry wt	0.173	J	0.201	J	0.257	J	0.27	J
Thallium	mg/kg dry wt	0.141	J	0.143	J	0.242	J	0.18	J
Vanadium	mg/kg dry wt	36.3		39.5		54.9		38	
Zinc	mg/kg dry wt	366		397		2190		583	
Detected SVOCs									
bis(2-Ethylhexyl)phthalate	µg/kg dry wt	220	J	280	J	65	J	280	J
Butylbenzylphthalate	µg/kg dry wt	400	U	80	J	400	U	440	U
Carbazole	µg/kg dry wt	400	U	400	U	630		440	U
Di-n-butylphthalate	µg/kg dry wt	400	U	400	U	400		440	U
2-Methylnaphthalene	µg/kg dry wt	5.63	J	2.38	J	1560		4.45	
Acenaphthene	µg/kg dry wt	14	J	4.74	J	2590		10.3	
Acenaphthylene	µg/kg dry wt	13.8	J	7.09	J	152		13.4	
Anthracene	µg/kg dry wt	35	J	15.9	J	3380		28.4	
Benzaldehyde	µg/kg dry wt	39.9	J	15.8	U	23	U	26	U
Benzo[a]anthracene	µg/kg dry wt	142		105		7300		172	
Benzo[a]pyrene	µg/kg dry wt	112		86.3		5120		128	
Benzo[b]fluoranthene	µg/kg dry wt	141		123		5140		207	
Benzo[g,h,i]perylene	µg/kg dry wt	90.6		91.3		3170		135	
Benzo[k]fluoranthene	µg/kg dry wt	127		110		5720		181	
Biphenyl	µg/kg dry wt	2.8		1.11		503		2.2	

Table 3-3. Summary of COPCs Detected in John E. Fogarty Center Soil Samples, Fall 2002 (continued)

Parameter	Station ID	LPX-0118 (a)		LPX-0118		LPX-0119		LPX-0119	
	Sample Depth (ft)	0.0 - 0.5		0.0 - 0.5		0.0 - 0.5		0.0 - 0.5	
Chrysene	µg/kg dry wt	159		122		7510		212	
Dibenz[a,h]anthracene	µg/kg dry wt	27.4		25.8		668		37.8	
Dibenzofuran	µg/kg dry wt	13.3	J	3.95	J	3110		7.16	
Fluoranthene	µg/kg dry wt	331		210		21800		381	
Fluorene	µg/kg dry wt	16.6	J	4.86	J	2810		9.88	
Indeno[1,2,3-c,d]pyrene	µg/kg dry wt	104		97.5		3570	J	148	
Naphthalene	µg/kg dry wt	9.02	J	3.97	J	4390		7.86	
Phenanthrene	µg/kg dry wt	203	J	94.2	J	24600		174	
Pyrene	µg/kg dry wt	283		185		17300		337	
Total PAH (b)	µg/kg dry wt	1830		1290		120000		2190	
Pesticides									
4,4'-DDD	µg/kg dry wt	2.7		2.55		0.0888	U	2.59	
4,4'-DDE	µg/kg dry wt	12.5		11.4		17.1		9.05	
4,4'-DDT	µg/kg dry wt	27.2	J	22.8	J	22.2	J	16.8	J
alpha-Chlordane	µg/kg dry wt	114		88.8		6.03		31	
Dieldrin	µg/kg dry wt	3.22		2.88		3.36		2.56	
Endosulfan II	µg/kg dry wt	2.55		2.36		32		1.58	
Endosulfan Sulfate	µg/kg dry wt	1.12		1.08		0.0936	U	0.101	U
gamma-Chlordane	µg/kg dry wt	94.5		76.2		0.0701	U	25.5	
Heptachlor	µg/kg dry wt	3.44		3.09		0.0742	U	1.37	
Heptachlor Epoxide	µg/kg dry wt	13.2		10.2		1.83		4.6	
Technical chlordane	µg/kg dry wt	1220		943		490		598	
Total Endosulfan (c)	µg/kg dry wt	3.67		3.44		32		1.58	
Total DDT (d)	µg/kg dry wt	42.4		36.8		39.3		28.4	
PCB as Aroclors									
Aroclor-1254	µg/kg dry wt	826		938		10.1	U	467	
Total PCB as Aroclor (e)	µg/kg dry wt	826		938		10.1	U	467	

(a) Field duplicate sample.
(b) Total PAH = sum of PAHs (detects considered zero in sums).
(c) Total endosulfan = sum of endo I, endo II and endo sulfate (detects considered zero in sums).
(d) Total DDT = sum of 4,4'-DDT, 4,4'-DDE and 4,4'-DDD (detects considered zero in sums).
(e) Total PCB = sum of Aroclors (value detects considered zero in sums).
J Estimated value.
U Not detected at the given detection limit.

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples

Parameter	Units	MW-85S CMS-GW-MW85S-02	MW-85S CMS-GW-MW85S-02 (DUP)	MW-86S CMS-GW-MW86S-02-DUP(a)	MW-86S CMS-GW-MW86S-02 (a)	MW-90S CMS-GW-MW90S-02 (a)	GEC-1 CMS-GW-GEC1-02	GEC-2 CMS-GW-GEC2-02	GEC-3 CMS-GW-GEC3-02
2,3,7,8-TCDD	pg/L	1030	1460	NA	NA	NA	NA	NA	NA
Total TEQ	pg/L	1030	1460	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
1,2-Dichlorobenzene	µg/L	NA	NA	1 U	13	1000 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
1,3-Dichlorobenzene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
1,4-Dichlorobenzene	µg/L	NA	NA	1 U	6.2 J	1000 U	1 U	1 U	1 U
Benzene	µg/L	NA	NA	1 U	11	1000 U	1 U	1 U	1 U
Chlorobenzene	µg/L	NA	NA	1 U	190	1000 U	1 U	1 U	1 U
Chloroform	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	µg/L	NA	NA	1 U	10 U	520 J	1 U	1 U	1 U
Ethylbenzene	µg/L	NA	NA	1 U	2.7 J	1000 U	1 U	1 U	1 U
Isopropylbenzene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
Methylene Chloride	µg/L	NA	NA	2 U	3.6 J	2000 U	2 U	2 U	2 U
n-Propylbenzene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
Naphthalene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
p-Isopropyltoluene	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
Tetrachloroethene	µg/L	NA	NA	1 U	10 U	37000	1 U	1 U	1 U
Toluene	µg/L	NA	NA	0.35 U	10 U	1000 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	µg/L	NA	NA	1 U	10 U	1000 UJ	1 UJ	1 UJ	1 UJ
Trichloroethene	µg/L	NA	NA	1 U	10 U	2200	1 U	1 U	1 U
Vinyl Chloride	µg/L	NA	NA	1 U	10 U	1000 U	1 U	1 U	1 U
m-Xylene & p-Xylene	µg/L	NA	NA	0.21 J	12 J	2000 U	2 U	2 U	2 U
o-Xylene	µg/L	NA	NA	1 U	11	1000 U	1 U	1 U	1 U

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples (continued)

2,3,7,8-TCDD	pg/L	NA		NA		NA		NA		NA		NA		NA	
Total TEQ	pg/L	NA		NA		NA		NA		NA		NA		NA	
1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
1,2-Dichlorobenzene	µg/L	1	U	1	U	0.22	J	1	U	1	U	4	U	5	U	1	U
1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	0.27	J	1	U	4	U	5	U	1	U
1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Benzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Chlorobenzene	µg/L	1	U	1	U	1.5		0.31	J	1	U	4	U	5	U	2.1	
Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
cis-1,2-Dichloroethene	µg/L	2.8		21		5.6		0.48	J	1	U	12		5	U	1	U
Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Methylene Chloride	µg/L	2	U	2	U	2	U	2	U	2	U	1.9	J	10	U	2	U
n-Propylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Naphthalene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
p-Isopropyltoluene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U
Tetrachloroethene	µg/L	1	U	0.86	J	11		0.21	J	1	U	73		110		1	U
Toluene	µg/L	1	U	1	U	1	U	1	U	1	U	1.8	J	5	U	1	U
trans-1,2-Dichloroethene	µg/L	1	UJ	1	U	1	UJ	1	U	1	UJ	4	U	5	U	1	U
Trichloroethene	µg/L	1	U	0.62	J	0.74	J	1	U	1	U	4.2		1.1	J	1	U
Vinyl Chloride	µg/L	1		1.8		0.39	J	1	U	1	U	4	U	5	U	0.69	J
m-Xylene & p-Xylene	µg/L	2	U	2	U	2	U	2	U	2	U	8	U	10	U	2	U
o-Xylene	µg/L	1	U	1	U	1	U	1	U	1	U	4	U	5	U	1	U

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples (continued)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	CMS-GW-MW065-03	CMS-GW-MW065D-03	CMS-GW-MW065D-03	CMS-GW-MW065-03	CMS-GW-MW065-03	CMS-GW-MW065-03	CMS-GW-MW065D-03
2,3,7,8-TCDD	pg/L	NA	NA	NA	NA	NA	NA	NA
Total TEQ	pg/L	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	2.1 J	1 U
1,2-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	13	1 U
1,3,5-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
1,3-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
1,4-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	4.9 J	1 U
Benzene	µg/L	1 U	1 U	1 U	1 U	1000 UJ	6.8 J	1 UJ
Chlorobenzene	µg/L	1 U	1 U	1 U	2.1	1000 U	160	1 U
Chloroform	µg/L	1 U	1 U	0.31 J	1 U	1000 U	6 U	1 U
cis-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	5.9	1600 J	2.8 J	1 U
Ethylbenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	1.2 J	1 U
Isopropylbenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
Methylene Chloride	µg/L	2 U	2 U	2 U	2 U	2000 U	12 U	2 U
n-Propylbenzene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
Naphthalene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
p-Isopropyltoluene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
Tetrachloroethene	µg/L	1 U	17	27	4.4	28000	6 U	10
Toluene	µg/L	0.44 U	1 U	1 U	1 U	1000 U	3.3 J	1 U
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1000 U	6 U	1 U
Trichloroethene	µg/L	1 UJ	0.39 J	0.46 J	3.2	1800	6 U	0.31 J
Vinyl Chloride	µg/L	1 U	1 U	1 U	0.68 J	1000 U	6 U	1 U
m-Xylene & p-Xylene	µg/L	0.22 J	2 U	2 U	2 U	2000 U	9.2 J	2 U
o-Xylene	µg/L	1 U	1 U	1 U	1 U	1000 U	9.5	1 U

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples (continued)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2,3,7,8-TCDD	pg/L	NA	NA	NA	NA	NA	NA	NA
Total TEQ	pg/L	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	µg/L	1 U	110	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	µg/L	1 U	2.1 J	1 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene	µg/L	1 U	29	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	µg/L	1 U	3 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	µg/L	1 U	3 U	1 U	1 U	1 U	1 U	1 U
Benzene	µg/L	1 U	12 J	9.7	1 U	1 U	1 U	1 U
Chlorobenzene	µg/L	1 U	25	3.4	1 U	1 U	1 U	1 U
Chloroform	µg/L	1 U	3 U	1 U	1.7	4.1	1 U	1 U
cis-1,2-Dichloroethene	µg/L	1 U	9.3	14	1 U	1 U	1 U	1 U
Ethylbenzene	µg/L	1 U	2.7 J	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	µg/L	1 U	2.4 J	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	µg/L	2 U	6 U	2 U	2 U	2 U	2 U	2 U
n-Propylbenzene	µg/L	1 U	8.1	1 U	1 U	1 U	1 U	1 U
Naphthalene	µg/L	1 U	1.5 J	1 U	1 U	1 U	1 U	1 U
p-Isopropyltoluene	µg/L	1 U	1.4 J	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	µg/L	1 U	3 U	3.3	0.25 J	0.39 J	1 U	1 U
Toluene	µg/L	1 U	0.98 J	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	µg/L	1 UJ	3 U	1 U	1 U	1 U	1 UJ	1 UJ
Trichloroethene	µg/L	1 U	2.8 J	0.72 J	1 U	1 U	1 U	1 U
Vinyl Chloride	µg/L	1 U	3 U	14	1 U	1 U	1 U	1 U
m-Xylene & p-Xylene	µg/L	2 U	14	2 U	2 U	2 U	2 U	2 U
o-Xylene	µg/L	1 U	16	1 U	1 U	1 U	1 U	1 U

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples (continued)

Parameter	Units	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
		[illegible]		CMS-GW-MW128-03		CMS-GW-MW128D-03		[illegible]		[illegible]		CMS-GW-MW139-03		[illegible]		CMS-GW-MW150D-03	
2,3,7,8-TCDD	pg/L	NA		NA		NA		NA		NA		NA		NA		NA	
Total TEQ	pg/L	NA		NA		NA		NA		NA		NA		NA		NA	
1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Benzene	µg/L	1	U	1	U	1	U	4	UJ	10	U	1	U	100	UJ	1	U
Chlorobenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Chloroform	µg/L	1	U	0.25	J	1	U	4	U	10	U	1	U	100	U	1	U
cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Ethylbenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Isopropylbenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Methylene Chloride	µg/L	2	U	2	U	2	U	8	U	20	U	2	U	200	U	0.2	J
n-Propylbenzene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Naphthalene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
p-Isopropyltoluene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
Tetrachloroethene	µg/L	1	U	0.89	J	0.64	J	96		220		7.7		1900		1	U
Toluene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
trans-1,2-Dichloroethene	µg/L	1	UJ	1	UJ	1	U	4	U	10	U	1	U	100	U	1	U
Trichloroethene	µg/L	1	U	1	U	1	U	5		5.2	J	1	U	100	U	1	U
Vinyl Chloride	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U
m-Xylene & p-Xylene	µg/L	2	U	2	U	2	U	8	U	20	U	2	U	200	U	2	U
o-Xylene	µg/L	1	U	1	U	1	U	4	U	10	U	1	U	100	U	1	U

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Table 3-4. Summary of Dioxin and VOCs Detected in Fall 2002 Groundwater Samples (continued)

2,3,7,8-TCDD	pg/L	NA		NA	
Total TEQ	pg/L	NA		NA	
1,2,4-Trimethylbenzene	µg/L	1	U	1	U
1,2-Dichlorobenzene	µg/L	1	U	1	U
1,3,5-Trimethylbenzene	µg/L	1	U	1	U
1,3-Dichlorobenzene	µg/L	1	U	1	U
1,4-Dichlorobenzene	µg/L	1	U	1	U
Benzene	µg/L	1	U	1	U
Chlorobenzene	µg/L	1	U	1	U
Chloroform	µg/L	1	U	1	U
cis-1,2-Dichloroethene	µg/L	1	U	1	U
Ethylbenzene	µg/L	1	U	1	U
Isopropylbenzene	µg/L	1	U	1	U
Methylene Chloride	µg/L	2	U	2	U
n-Propylbenzene	µg/L	1	U	1	U
Naphthalene	µg/L	1	U	1	U
p-Isopropyltoluene	µg/L	1	U	1	U
Tetrachloroethene	µg/L	1	U	1	U
Toluene	µg/L	1	U	0.22	J
trans-1,2-Dichloroethene	µg/L	1	UJ	1	U
Trichloroethene	µg/L	1	U	1	UJ
Vinyl Chloride	µg/L	1	U	1	U
m-Xylene & p-Xylene	µg/L	2	U	2	U
o-Xylene	µg/L	1	U	1	U

(a) Field duplicate sample.

(b) Trip blank sample.

J Estimated value.

U Not detected above the given detection limit.

NA Not applicable.

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Table 4-1. Comparison of Tailrace COPC Concentrations to Rhode Island Residential Direct Exposure Criteria

Parameter	Units	RI Standard (a)	CMS-4105 0.0 - 1.0 ft		CMS-4105 Exceeds RI Standard	CMS-4110 0.0 - 1.0 ft		CMS-4110 Exceeds RI Standard
Metals								
Antimony	mg/kg dry wt	10	0.815	J		0.387	J	
Arsenic	mg/kg dry wt	1.7	17.3		Yes	4.93		Yes
Barium	mg/kg dry wt	5500	151			106		
Beryllium	mg/kg dry wt	0.4	1.03		Yes	0.95		Yes
Cadmium	mg/kg dry wt	39	12.6			4.23		
Chromium	mg/kg dry wt	1790 (b)	330			195		
Copper	mg/kg dry wt	3100	106			103		
Lead	mg/kg dry wt	150	1110	J	Yes	761	J	Yes
Manganese	mg/kg dry wt	390	480		Yes	423		Yes
Mercury	mg/kg dry wt	23	2.98			5.91		
Nickel	mg/kg dry wt	1000	24.6			31.1		
Selenium	mg/kg dry wt	390	2.49	U		1.38	U	
Silver	mg/kg dry wt	200	1.75	J		2.05	J	
Thallium	mg/kg dry wt	5.5	0.215	J		0.2	J	
Vanadium	mg/kg dry wt	550	77.2			56.9		
Zinc	mg/kg dry wt	6000	731			417		
SVOCs								
2,4,5-Trichlorophenol	µg/kg dry wt	330000	5400	U		6400	U	
2,4-Dinitrophenol	µg/kg dry wt	160000	26000	U		31000	U	
bis(2-Ethylhexyl)phthalate	µg/kg dry wt	46000	33000			35000		
Pentachlorophenol	µg/kg dry wt	5300	26000	U		31000	U	
Phenol	µg/kg dry wt	6000000	5400	U		6400	U	
2-Methylnaphthalene	µg/kg dry wt	123000	493	J		482	J	
Acenaphthene	µg/kg dry wt	43000	336	J		274	J	
Acenaphthylene	µg/kg dry wt	23000	1300	J		930	J	
Anthracene	µg/kg dry wt	35000	1710	J		741	J	
Benzo[a]anthracene	µg/kg dry wt	900	7070	J	Yes	2980	J	Yes
Benzo[a]pyrene	µg/kg dry wt	400	5840	J	Yes	2320	J	Yes
Benzo[b]fluoranthene	µg/kg dry wt	900	6380	J	Yes	3220	J	Yes
Benzo[g,h,i]perylene	µg/kg dry wt	800	4370	J	Yes	1790	J	Yes
Benzo[k]fluoranthene	µg/kg dry wt	900	7140	J	Yes	3050	J	Yes
Biphenyl	µg/kg dry wt	800	1610	J	Yes	338	J	
Chrysene	µg/kg dry wt	400	9270	J	Yes	4660	J	Yes
Dibenz[a,h]anthracene	µg/kg dry wt	400	1500	J	Yes	673	J	Yes
Fluoranthene	µg/kg dry wt	20000	17900	J		9360	J	
Fluorene	µg/kg dry wt	28000	992	J		621	J	
Indeno[1,2,3-c,d]pyrene	µg/kg dry wt	900	4190	J	Yes	1560	J	Yes
Naphthalene	µg/kg dry wt	54000	471	J		449	J	
Phenanthrene	µg/kg dry wt	40000	5240	J		3540	J	
Pyrene	µg/kg dry wt	13000	16700	J	Yes	8680	J	
Pesticides								
Dieldrin	µg/kg dry wt	40	151	J	Yes	54.3	J	Yes
PCB as Aroclor								
Total PCB as Aroclor (c)	µg/kg dry wt	10000	18950	J	Yes	10970	J	Yes

(a) Direct Exposure Criteria for residential soils, State of Rhode Island Remediation Regulations.
(b) Generated from Chromium III (Trivalent) + Chromium VI (Hexavalent) = 1400 + 390 (mg/kg)
(c) Total PCB = sum of Aroclors (value 0 used for non-detect).

Table 4-2. VOC Concentrations in Groundwater Samples Collected in 2001 and 2002

Well ID	Chemical	[illegible] (µg/L)	[illegible] (µg/L)	[illegible] (µg/L)	[illegible] Sample (µg/L)	GS [illegible] Objective * (µg/L)	[illegible] Objective *
GEC-1	Total Xylenes	4.1		3 U			
GEC-4	cis-1,2-Dichloroethene	1 U		2.8		2400	
GEC-4	Vinyl Chloride	27		1			
GEC-5	cis-1,2-Dichloroethene	38 U		21		2400	
GEC-5	Tetrachloroethene	2.2		0.86 J		150	
GEC-5	Trichloroethene	1.3		0.62 J		540	
GEC-5	Vinyl Chloride	2 U		1.8			
GEC-6	1,2-Dichlorobenzene		10 U	0.22 J			
GEC-6	Chlorobenzene		10 U	1.5		3200	
GEC-6	cis-1,2-Dichloroethene	10 U	18	5.6		2400	
GEC-6	Tetrachloroethene	150	200 *	11		150	
GEC-6	Trichloroethene	1 U	10 U	0.74 J		540	
GEC-6	Vinyl Chloride	2 U	10 U	0.39 J			
GEC-7	Benzene	1.3		1 U		140	
GEC-7	cis-1,2-Dichloroethene	5.6 U		0.48 J		2400	
GEC-7	Tetrachloroethene	11		0.21 J		150	
GEC-7	Trichloroethene	2		1 U		540	
GEC-7	Vinyl Chloride	6.9		1 U			
MW02D	cis-1,2-Dichloroethene		2 J	12		2400	
MW02D	Methylene Chloride		10 U	1.9 J			
MW02D	Tetrachloroethene		700 *	73		150	
MW02D	Toluene		10 U	1.8 J		1700	
MW02D	Trichloroethene		27	4.2		540	
MW02M	Tetrachloroethene		110	110		150	
MW02M	Trichloroethene		2 J	1.1 J		540	
MW02S	Benzene	10 U	1 J	1 U		140	
MW02S	Chlorobenzene	10 U	1 J	2.1		3200	
MW02S	Vinyl Chloride	10 UJ	10 U	0.69 J			
MW03S	Total Xylenes	10 U	10 U	0.22 J	0.21 J		
MW04B	Tetrachloroethene		63	17		150	
MW04B	Trichloroethene		0.9 J	0.39 J		540	
MW04D	Chloroform		10 U	0.31 J			
MW04D	Tetrachloroethene		64	27		150	
MW04D	Trichloroethene		1 J	0.46 J		540	
MW04S	Benzene		2 J	1 U		140	
MW04S	Chlorobenzene		5 J	2.1		3200	
MW04S	cis-1,2-Dichloroethene		7 J	5.9		2400	
MW04S	Tetrachloroethene		17 U	4.4		150	
MW04S	Trichloroethene		0.8 J	3.2		540	
MW04S	Vinyl Chloride		3 J	0.68 J			
MW05S	cis-1,2-Dichloroethene		1200 J	1600 J	520 J	2400	
MW05S	Tetrachloroethene		61000 *	28000	37000	150	Yes
MW05S	Trichloroethene		2500	1800	2200	540	Yes
MW06S	1,2-Dichlorobenzene	21	4 J	13	13		
MW06S	1,4-Dichlorobenzene	5 J	3 J	4.9 J	6.2 J		
MW06S	Benzene	5 J	6 J	6.8 J	11	140	
MW06S	Chlorobenzene	100	58	160	190	3200	
MW06S	cis-1,2-Dichloroethene	4 J	4 J	2.8 J	10 U	2400	
MW06S	Ethylbenzene	7 J	10 U	1.2 J	2.7 J	1600	
MW06S	Isopropylbenzene	1 J	10 U	6 U	10 U		

Table 4-2. VOC Concentrations in Groundwater Samples Collected in 2001 and 2002 (continued)

Well ID	Parameter	Spring 2001 (µg/L)	Summer 2001 (µg/L)	Fall 2002 (µg/L)	Fall 2002 Field Duplicate Sample (µg/L)	GB Groundwater Objective[a] (µg/L)	Exceeds GB Groundwater Objective[b]
MW06S	Methylene Chloride	20 U	10 UJ	12 U	3.6 J		
MW06S	Toluene	5 J	10 U	3.3 J	10 U	1700	
MW06S	Trichloroethene	10 U	0.9 J	6 U	10 U	540	
MW06S	Total Xylenes	69	3 J	18.7	23		
MW07D	Tetrachloroethene		10 U	10		150	
MW07D	Trichloroethene		10 U	0.31 J		540	
MW07S	1,1,2,2-Tetrachloroethane	10 U	4 J	1 U			
MW07S	1,2-Dibromo-3-chloropropane	10 U	7 J	1 U		2	
MW07S	1,2-Dibromoethane	10 U	1 J	1 U			
MW07S	Bromoform	10 U	2 J	1 U			
MW08S	1,2-Dichlorobenzene	1 J	10 U	2.1 J			
MW08S	1,3,5-Trimethylbenzene	61 NJ		29			
MW08S	1,4-Dichlorobenzene	10 U	10 U	3 U			
MW08S	Benzene	6 J	4 J	12 J		140	
MW08S	Chlorobenzene	10	40	25		3200	
MW08S	cis-1,2-Dichloroethene	10 U	10 U	9.3		2400	
MW08S	Ethylbenzene	1 J	10 U	2.7 J		1600	
MW08S	Isopropylbenzene	10 U	10 U	2.4 J			
MW08S	Toluene	1 J	10 U	0.98 J		1700	
MW08S	trans-1,2-Dichloroethene	10 U	10 UJ	3 U		2800	
MW08S	Trichloroethene	10 U	10 U	2.8 J		540	
MW08S	Vinyl Chloride	10 UJ	10 U	3 U			
MW08S	Total Xylenes	27	8 J	30			
MW09S	Benzene	1 J	21	9.7		140	
MW09S	Chlorobenzene	1 J	10 U	3.4		3200	
MW09S	cis-1,2-Dichloroethene	2 J	12	14		2400	
MW09S	Tetrachloroethene	2 J	21 U	3.3		150	
MW09S	Trichloroethene	10 U	1 J	0.72 J		540	
MW09S	Vinyl Chloride	10 UJ	10 J	14			
MW10B	Chloroform		10 U	1.7			
MW10B	Tetrachloroethene		10 U	0.25 J		150	
MW10D	Chloroform		10 U	4.1			
MW10D	Tetrachloroethene		10 U	0.39 J		150	
MW12B	Chloroform		10 U	0.25 J			
MW12B	Tetrachloroethene		10 U	0.89 J		150	
MW12D	Tetrachloroethene		18	0.64 J		150	
MW13B	Tetrachloroethene		220 *	96		150	
MW13B	Trichloroethene		7 J	5		540	
MW13D	Tetrachloroethene		340 *	220		150	Yes
MW13D	Trichloroethene		6 J	5.2 J		540	
MW13S	Tetrachloroethene		10 U	7.7		150	
MW14M	Tetrachloroethene		10 U	1900		150	Yes
MW15D	Methylene Chloride		10 UJ	0.2 J			

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

*** From dilution analysis.**

Table 4-3. Dioxin Concentrations in Samples from Well MW-05S in 2001 and 2002

PARAMETER	UNITS	Summer 2001 CMS-GW-MW05S-02		Fall 2002 CMS-GW-MW05S-04		Fall 2002 CMS-GW-MW05S-04-DU	
Total TCDD	pg/L	4460	J	1071	J	1513	J
Total TCDF	pg/L	2710	J	113	J	108	J
Total TEQ	pg/L	4400	J	1030		1460	

J Estimated value.

Table 4-4. Groundwater Elevation Data, October 2002

Station ID	Date Measured	Depth to Water (ft)	Groundwater Elevation (ft MSL)	Comments
MW-01S	10/21/2002	4.29	94.94	
MW-02S	10/21/2002	3.93	93.23	
MW-02M	10/21/2002	6.71	93.07	
MW-02D	10/21/2002	6.91	93.04	
MW-03S	11/21/2002	4.29	96.30	not included in water level map
MW-04S	10/21/2002	6.87	91.92	
MW-04D	10/21/2002	6.78	91.92	
MW-04B	10/21/2002	6.30	91.87	
MW-05S	10/21/2002	7.42	94.92	
MW-06S	10/21/2002	5.90	94.60	odor present
MW-07S	10/21/2002	4.24	94.08	
MW-07D	10/21/2002	3.65	94.26	
MW-08S	10/21/2002	3.58	92.75	
MW-09S	10/21/2002	7.96	92.59	
MW-10D	10/21/2002	12.56	95.43	
MW-10B	10/21/2002	12.66	95.45	
MW-11S	10/21/2002	24.19	95.23	
MW-11M	10/21/2002	23.51	95.22	
MW-11B	10/21/2002	24.01	95.29	
MW-12D	10/21/2002	14.22	91.40	
MW-12B	10/21/2002	13.96	91.44	
MW-13S	10/21/2002	6.42	92.43	
MW-13D	10/21/2002	5.99	92.44	
MW-13B	10/21/2002	6.00	92.48	
MW-14M	10/21/2002	4.30	95.01	
MW-15D	10/21/2002	7.34	95.35	
GEC-1	10/21/2002	7.91	96.41	
GEC-2	10/21/2002	8.62	95.18	
GEC-3	10/21/2002	8.12	95.55	
GEC-4	10/21/2002	7.55	94.79	
GEC-5	10/21/2002	8.49	95.02	
GEC-6	10/21/2002	4.77	94.93	
GEC-7	10/21/2002	3.92	94.98	
P2	10/24/2002	5.12	97.51	piezometer
P3	10/24/2002	8.36	95.04	piezometer
P4	10/24/2002	2.75	95.88	piezometer
P5	10/24/2002	7.11	94.48	piezometer
P6	10/24/2002	2.89	94.70	piezometer
P7	10/24/2002	3.41	94.20	piezometer
P8	10/24/2002	4.87	93.92	piezometer
P9	10/24/2002	3.42	94.15	piezometer
P10	10/24/2002	4.91	93.23	piezometer

Table 4-4. Groundwater Elevation Data, October 2002 (continued)

Station ID	Date Measured	Depth to Water (ft)	Groundwater Elevation (ft MSL)	Comments
P11	10/24/2002	5.05	93.15	piezometer
P12	10/24/2002	4.37	93.89	piezometer
P13	10/24/2002	4.42	93.03	piezometer
P14	10/24/2002	2.67	92.10	piezometer
P16	10/24/2002	9.15	95.86	piezometer
P17	10/24/2002	3.80	92.09	piezometer
P20	10/24/2002	7.35	94.90	piezometer
P21	10/24/2002	4.36	94.62	piezometer
SP-01	10/21/2002	N/A	N/A	staff gauge; minimal water
SP-02	10/21/2002	N/A	N/A	staff gauge; minimal water
SP-03	10/21/2002	N/A	N/A	staff gauge; minimal water
SP-04	10/21/2002	2.20	96.90	USGS staff gauge location

8.0 FIGURES

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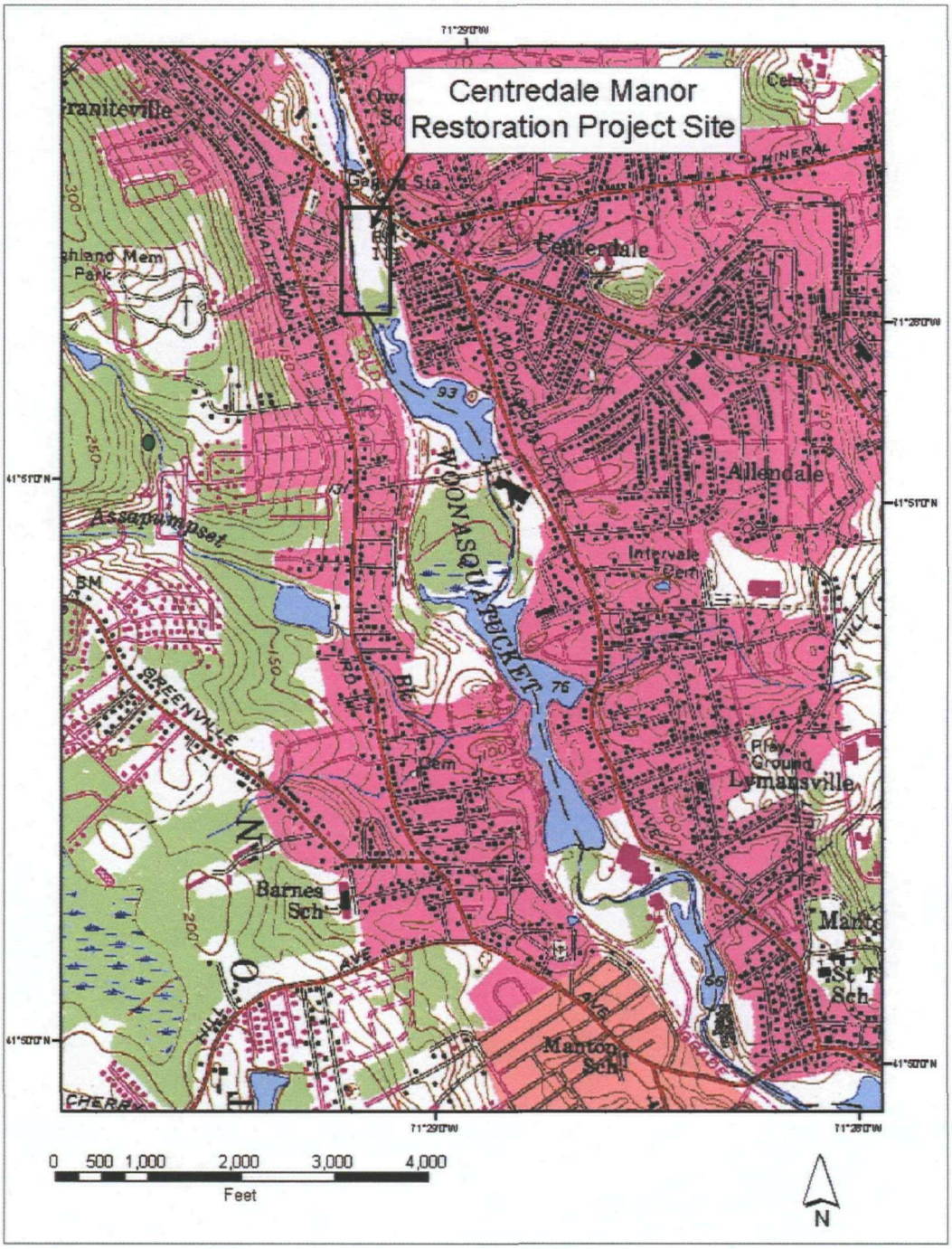

Figure 1-1. Site Location Map

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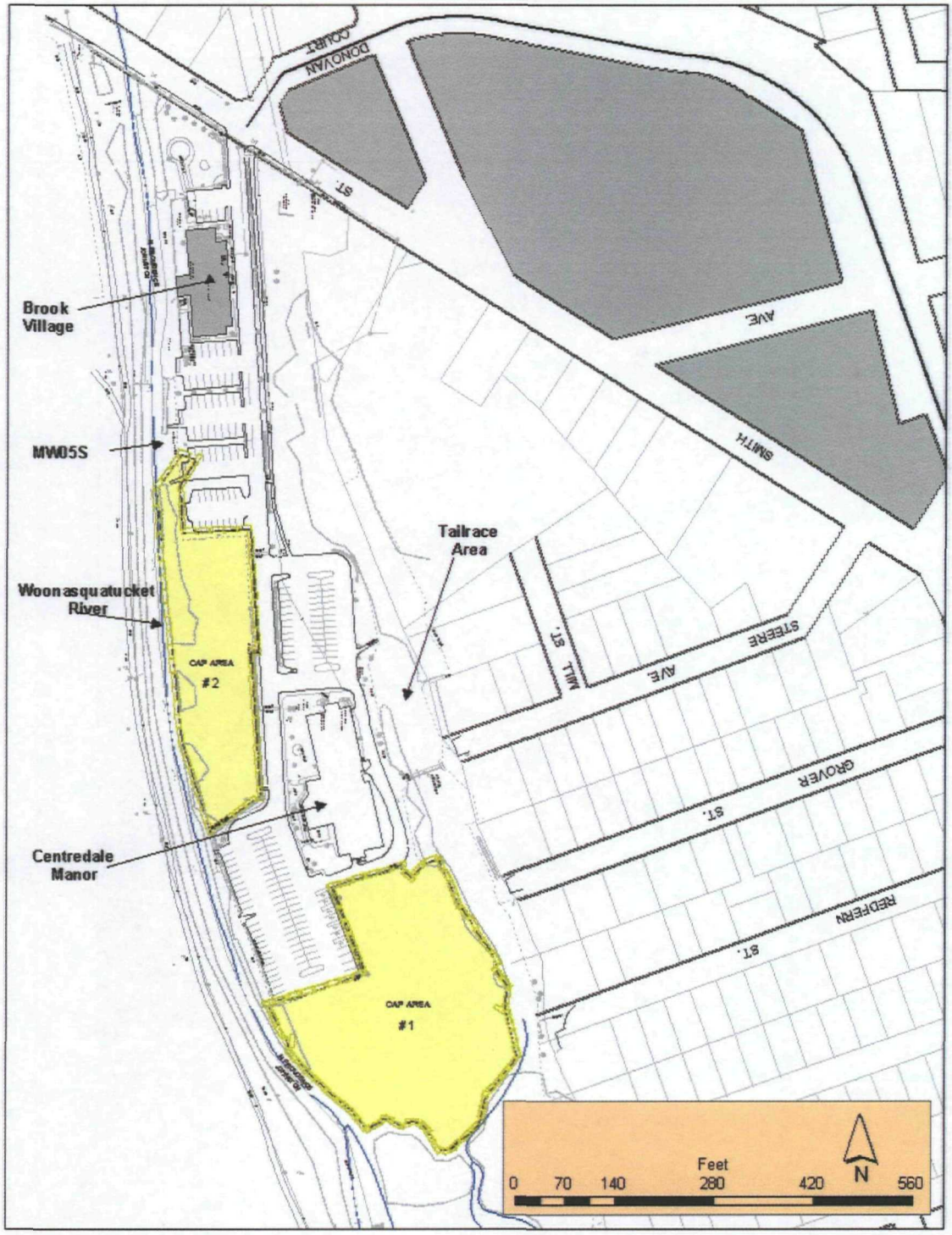

Figure 1-2. Source Area Features

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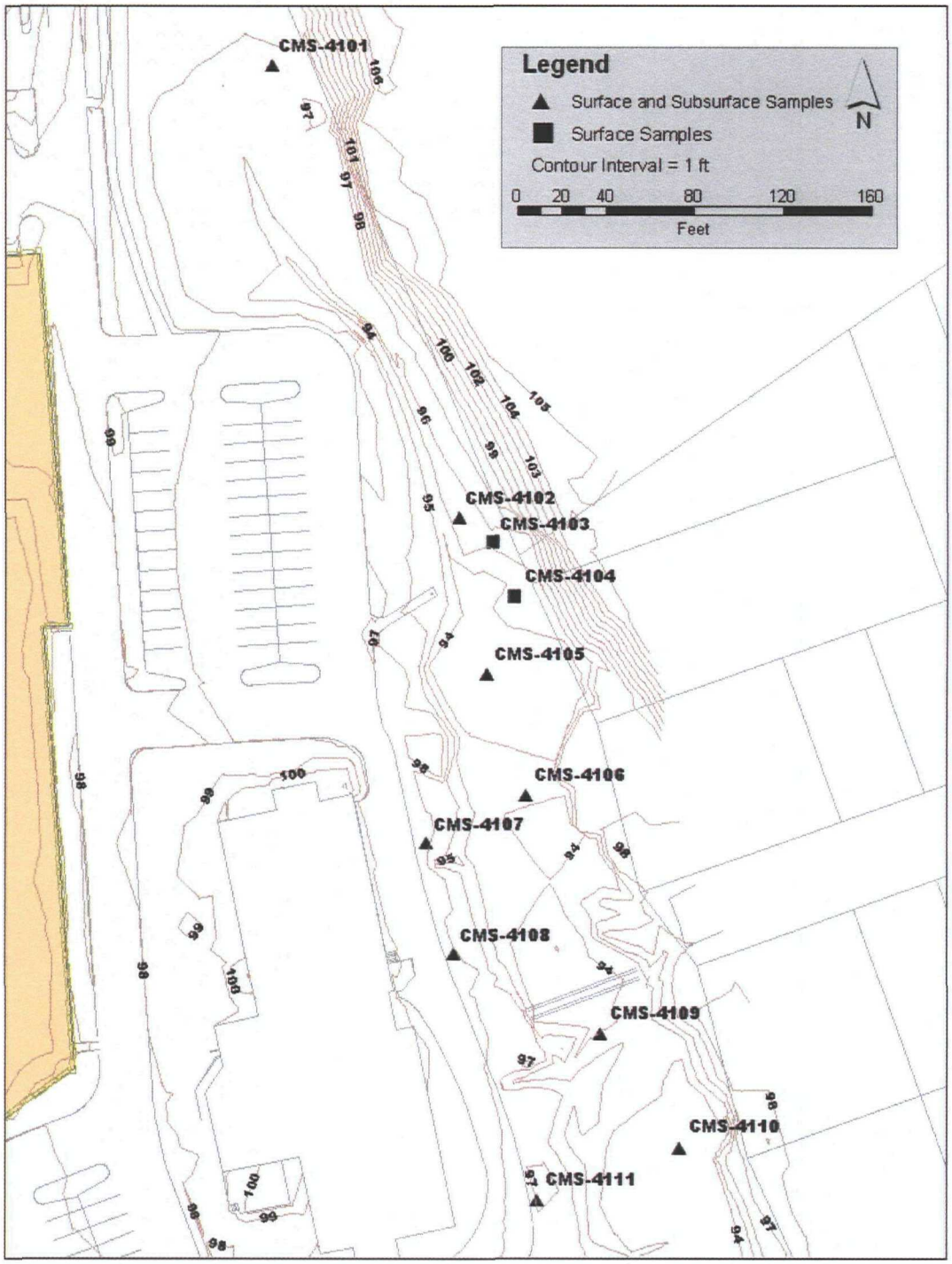

Figure 2-1. Tailrace Soil Boring Locations

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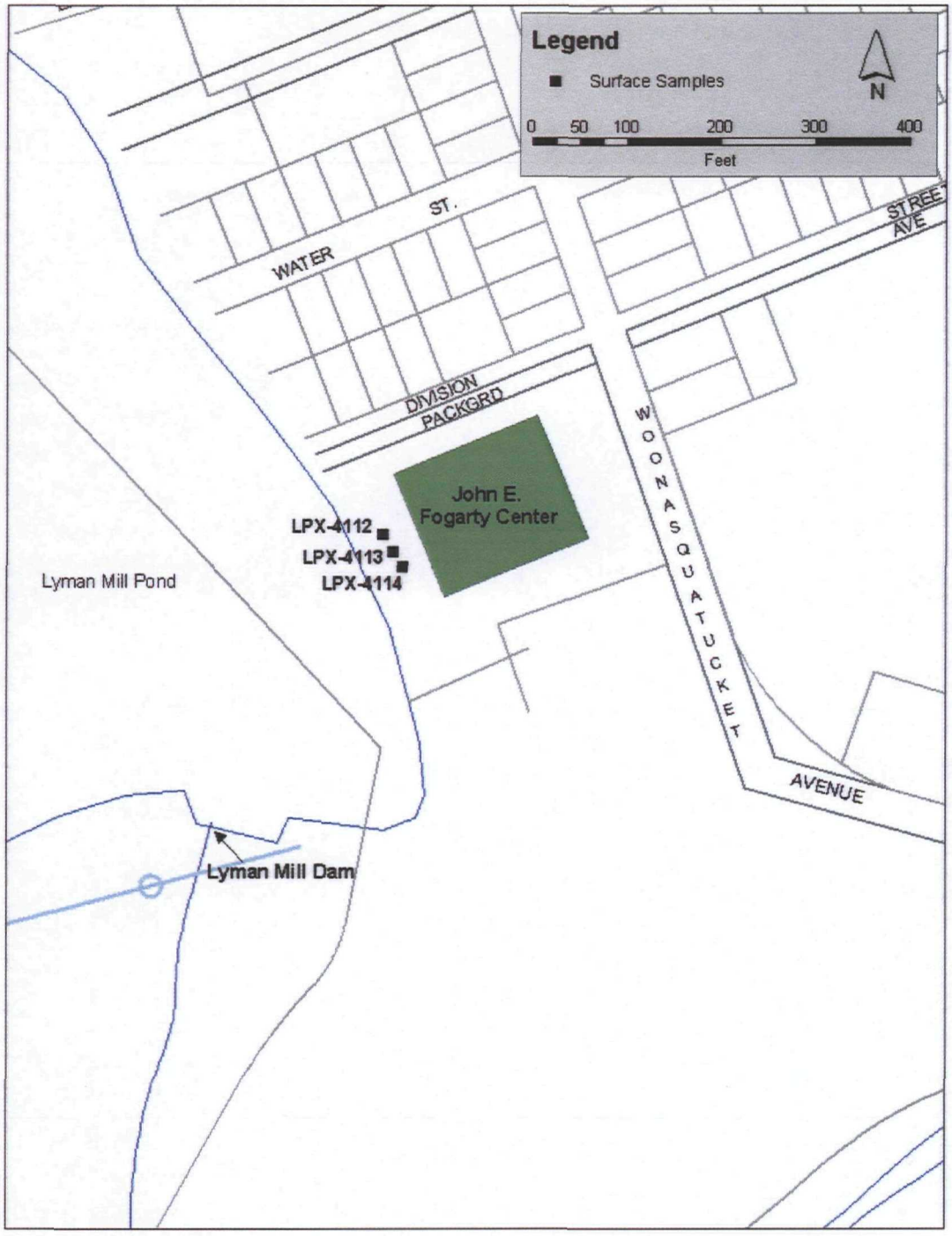

Figure 2-2. John E. Fogarty Center Soil Sample Locations

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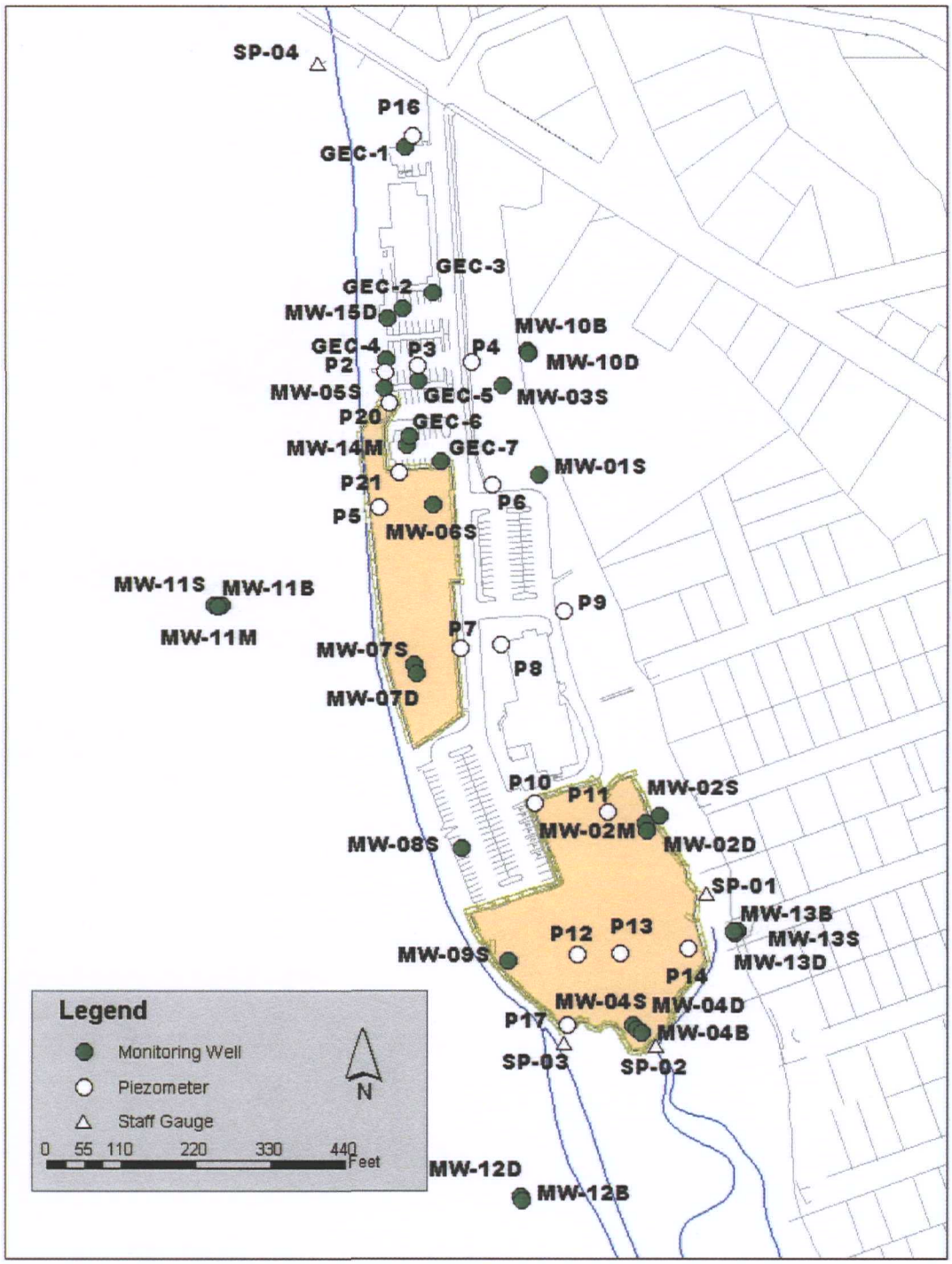

Figure 2-3. Monitoring Well, Piezometer and Staff Gauge Locations

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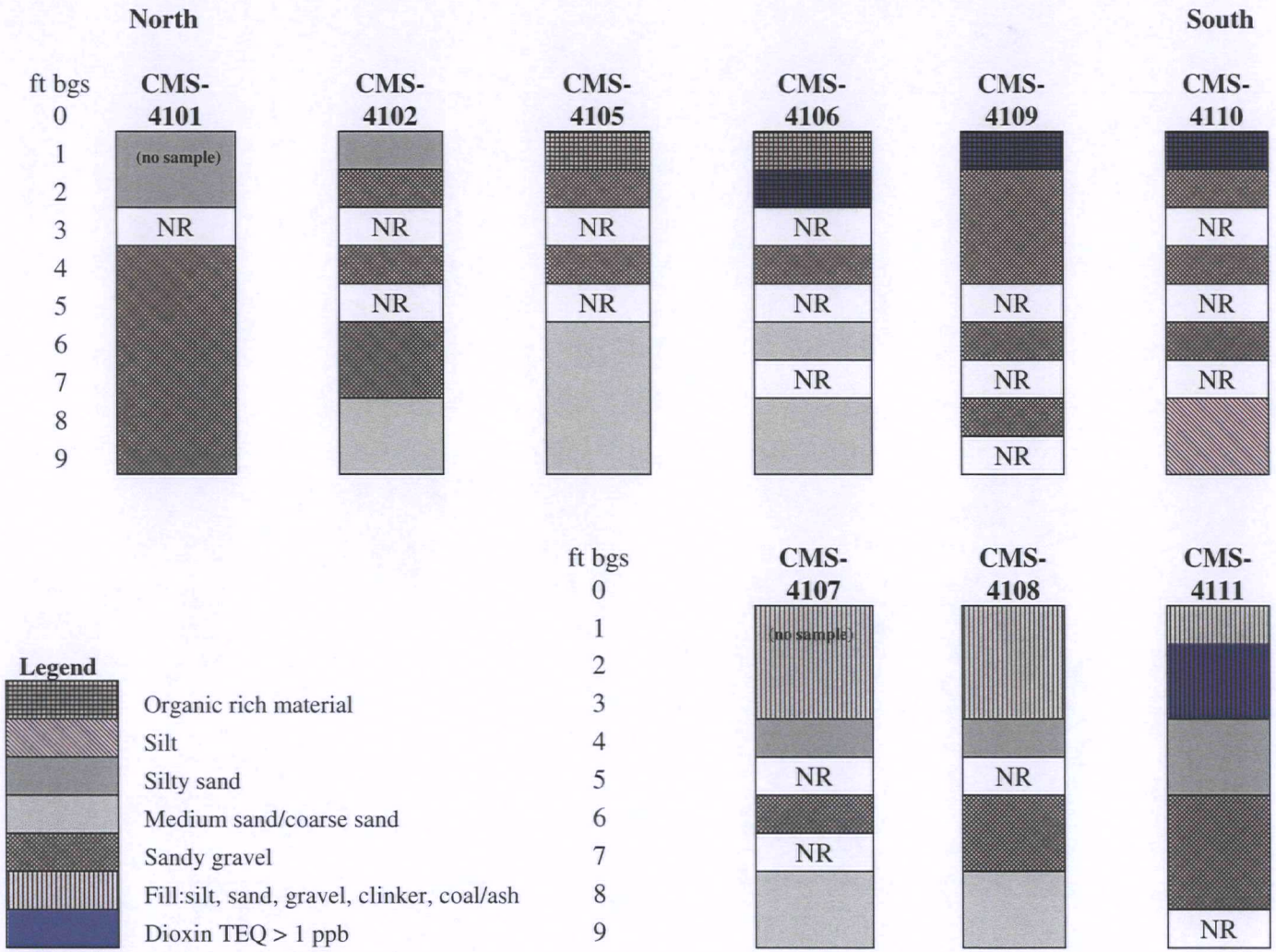

NR: No recovery

Note: dioxin concentrations not measured in samples below 5 ft.

Figure 4-1 Cross Sections of Tailrace Soil Types

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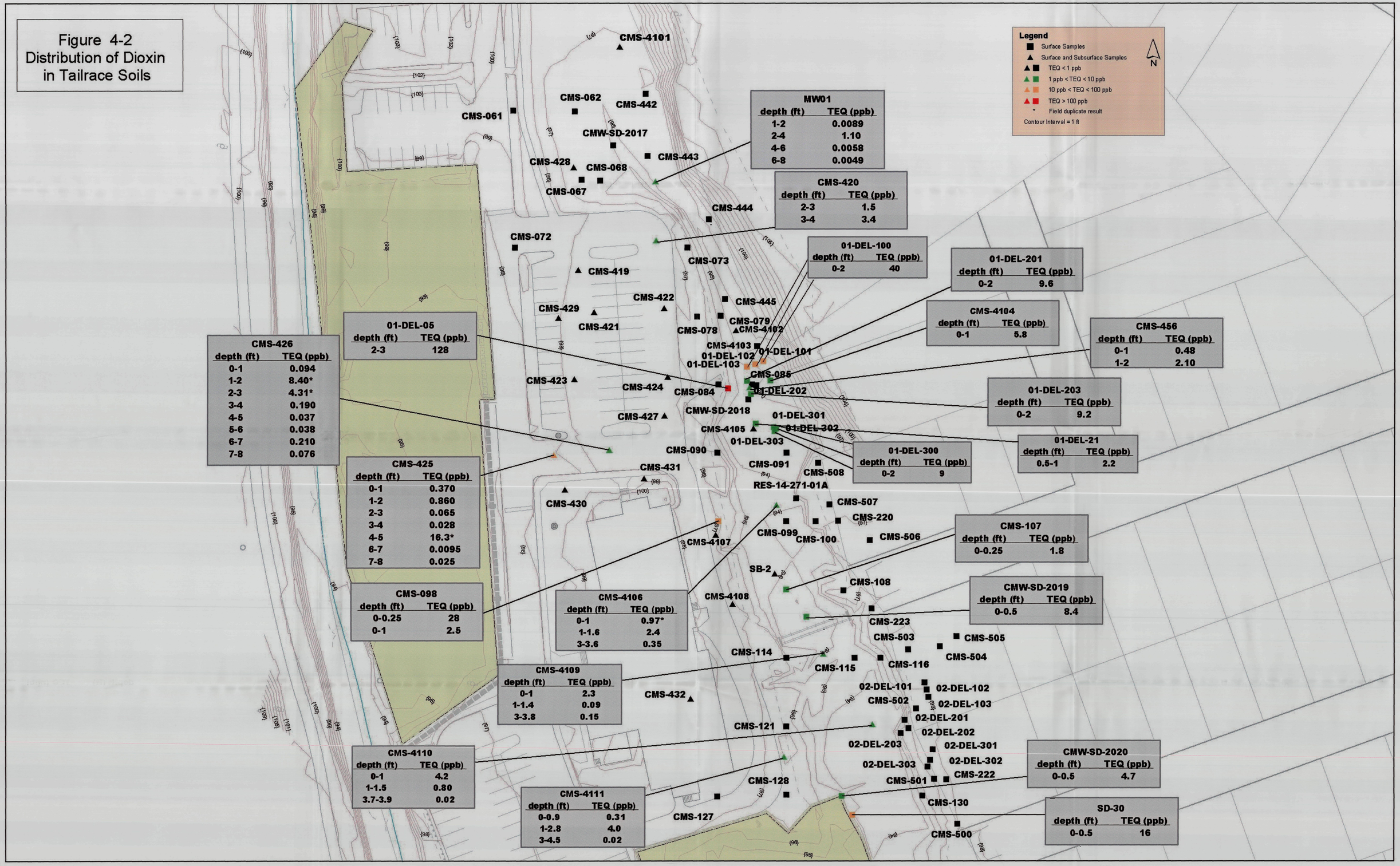
Figure 4-2
Distribution of Dioxin in Tailrace Soils



MW01	
depth (ft)	TEQ (ppb)
1-2	0.0089
2-4	1.10
4-6	0.0058
6-8	0.0049

CMS-420	
depth (ft)	TEQ (ppb)
2-3	1.5
3-4	3.4

01-DEL-100	
depth (ft)	TEQ (ppb)
0-2	40

01-DEL-201	
depth (ft)	TEQ (ppb)
0-2	9.6

CMS-4104	
depth (ft)	TEQ (ppb)
0-1	5.8

CMS-456	
depth (ft)	TEQ (ppb)
0-1	0.48
1-2	2.10

01-DEL-203	
depth (ft)	TEQ (ppb)
0-2	9.2

01-DEL-21	
depth (ft)	TEQ (ppb)
0.5-1	2.2

01-DEL-300	
depth (ft)	TEQ (ppb)
0-2	9

01-DEL-05	
depth (ft)	TEQ (ppb)
2-3	128

CMS-426	
depth (ft)	TEQ (ppb)
0-1	0.094
1-2	8.40*
2-3	4.31*
3-4	0.190
4-5	0.037
5-6	0.038
6-7	0.210
7-8	0.076

CMS-425	
depth (ft)	TEQ (ppb)
0-1	0.370
1-2	0.860
2-3	0.065
3-4	0.028
4-5	16.3*
6-7	0.0095
7-8	0.025

CMS-107	
depth (ft)	TEQ (ppb)
0-0.25	1.8

CMW-SD-2019	
depth (ft)	TEQ (ppb)
0-0.5	8.4

CMS-098	
depth (ft)	TEQ (ppb)
0-0.25	28
0-1	2.5

CMS-4106	
depth (ft)	TEQ (ppb)
0-1	0.97*
1-1.6	2.4
3-3.6	0.35

CMS-4109	
depth (ft)	TEQ (ppb)
0-1	2.3
1-1.4	0.09
3-3.8	0.15

CMS-4110	
depth (ft)	TEQ (ppb)
0-1	4.2
1-1.5	0.80
3.7-3.9	0.02

CMS-4111	
depth (ft)	TEQ (ppb)
0-0.9	0.31
1-2.8	4.0
3-4.5	0.02

CMW-SD-2020	
depth (ft)	TEQ (ppb)
0-0.5	4.7

SD-30	
depth (ft)	TEQ (ppb)
0-0.5	16

See Map in Sleeve

Figure 4-2. Distribution of Dioxin in Tailrace Soils

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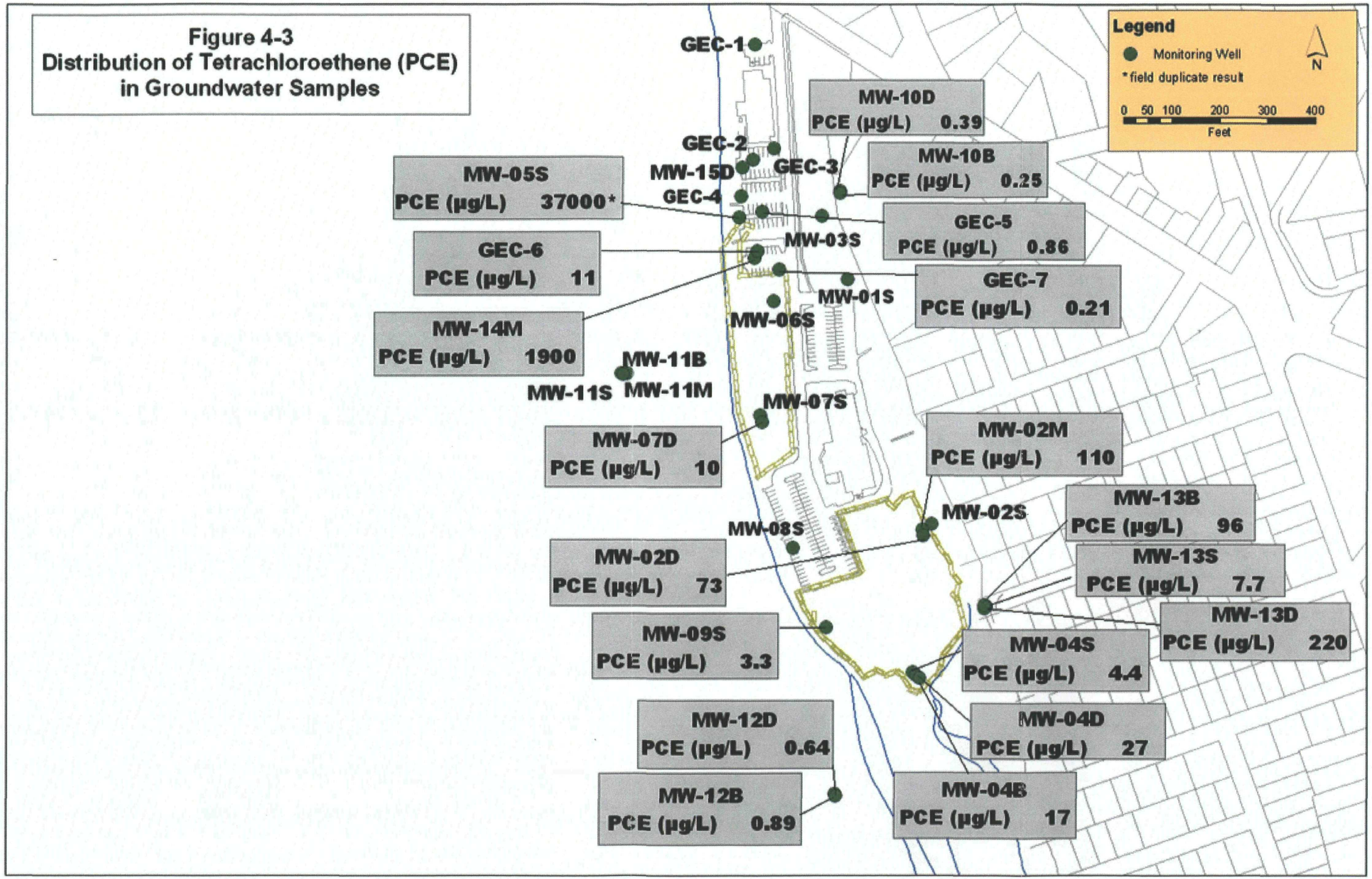
Figure 4-3
Distribution of Tetrachloroethene (PCE)
in Groundwater Samples
Legend
Monitoring Well
*field duplicate result
N
0 50 100 200 300 400
Feet
GEC-1
MW-10D
PCE (µg/L) 0.39
GEC-2
MW-15D
GEC-3
MW-10B
PCE (µg/L) 0.25
MW-05S
PCE (µg/L) 37000*
GEC-4
GEC-5
PCE (µg/L) 0.86
MW-03S
GEC-6
PCE (µg/L) 11
GEC-7
PCE (µg/L) 0.21
MW-01S
MW-06S
MW-14M
PCE (µg/L) 1900
MW-11B
MW-11S
MW-11M
MW-07S
MW-07D
PCE (µg/L) 10
MW-02M
PCE (µg/L) 110
MW-13B
PCE (µg/L) 96
MW-02S
MW-08S
MW-02D
PCE (µg/L) 73
MW-13S
PCE (µg/L) 7.7
MW-13D
PCE (µg/L) 220
MW-09S
PCE (µg/L) 3.3
MW-04S
PCE (µg/L) 4.4
MW-12D
PCE (µg/L) 0.64
MW-04D
PCE (µg/L) 27
MW-12B
PCE (µg/L) 0.89
MW-04B
PCE (µg/L) 17

See Map in Sleeve

Figure 4-3. Distribution of Tetrachloroethene (PCE) in Groundwater Samples

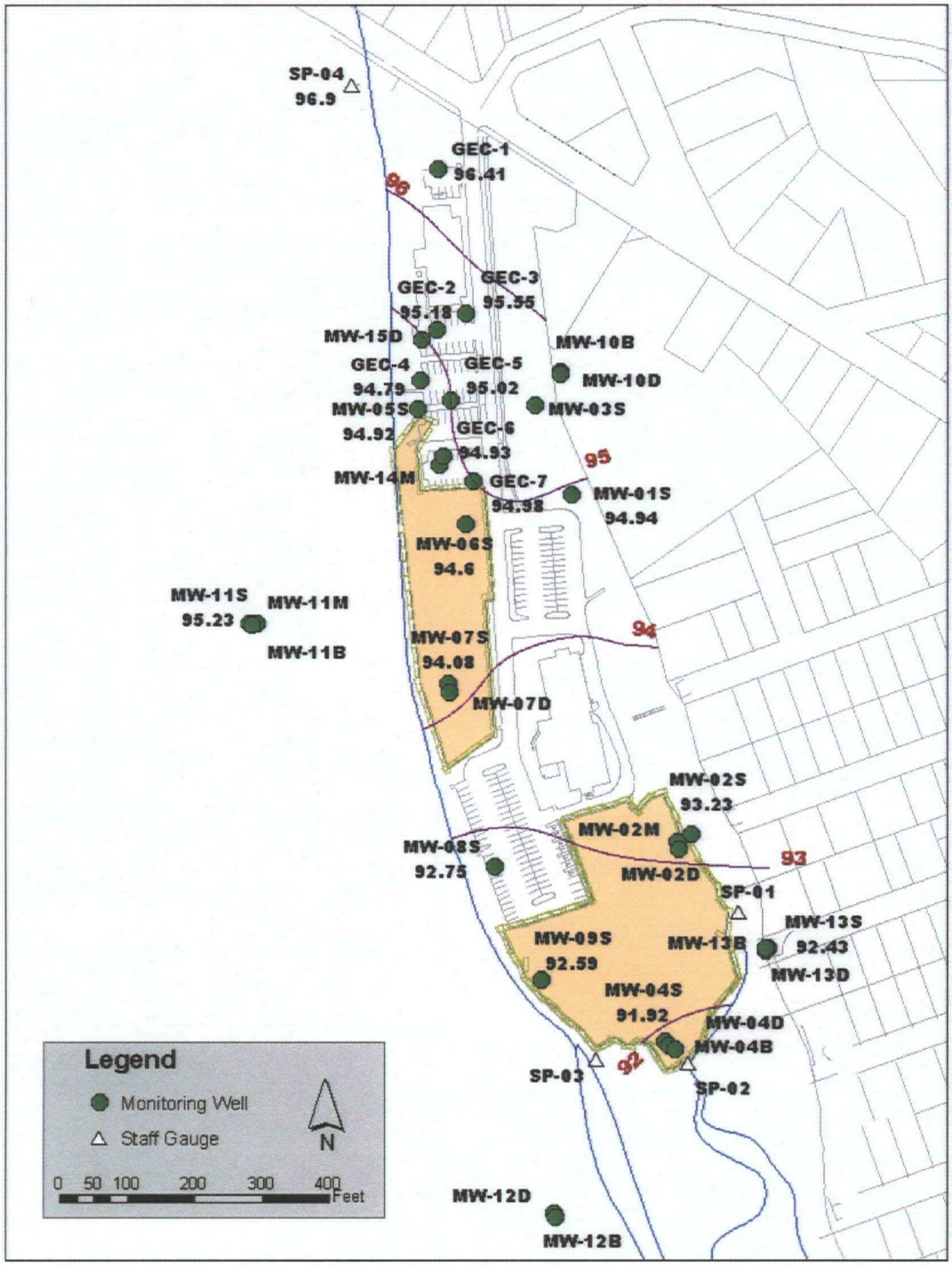

Figure 4-4. Water Table Elevations, October 2002

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APPENDIX A

FIELD SUMMARY REPORT

December 19, 2002

PN: 51226/RI1

Ms. Patricia White
Battelle
397 Washington Street
Duxbury, Massachusetts 02332

SUBJECT: October/November 2002 Field Summary Report
Centredale Manor Restoration Project Site
North Providence, Rhode Island
Contract No. DACW33-01-D-0004

Dear Ms. White:

MACTEC Engineering and Consulting, Inc. (MACTEC) (formerly Harding ESE, Inc.) is pleased to present the following Field Summary Report from the recent subsurface field investigation conducted at the Centredale Manor Restoration Project Site (the Site) in North Providence, Rhode Island located at 2072 and 2074 Smith Street.

INTRODUCTION

MACTEC completed the field work at the Site in two mobilizations during the weeks of October 21 and November 18, 2002, in accordance with specifications outlined in the Final Field Sampling Plan (September 2002) prepared by Battelle. The first mobilization pertained to activities performed to complete the groundwater sampling portion and the second mobilization pertained to activities performed to complete the soil sampling activities.

The following is a chronological listing of field activities performed completing the two mobilizations of field work: (Note: several activities overlapped as field conditions warranted.)

- GPS and flagging of proposed soil sampling locations;
- Site-wide groundwater monitoring well and staff gauging activities;
- Groundwater monitoring well sampling activities;
- Underground utility clearance;
- Brush clearing and fence removal/repair activities;
- Piezometer gauging activities;
- Soil sampling activities; and
- Investigation Derived Waste (IDW) handling.

Each of these activities is described in more detail below.

GLOBAL POSITIONING SYSTEM (GPS) AND FLAGGING ACTIVITIES

On October 21, 2002, MACTEC arrived on Site to flag/stake and obtain GPS coordinates for the nine proposed sampling locations using a back-mounted Trimble GPS unit (model TSC1) capable of sub meter accuracy once post processing steps are completed. The GPS unit was programmed to the Rhode Island State Planar coordinate system (NAD 83 Conus) prior to mobilizing to the field. The GPS was also pre-programmed to receive real time corrective data from a nearby fixed position beacon.

Battelle and MACTEC walked the Site placing a flag/stake at the proposed soil sampling locations. Several locations were not accessible by foot due to the standing water in the tail race area. At the time, the depth of the standing water was unknown, so these multiple locations (CMS-4104, CMS-4105, CMS-4106, CMS-4109 and CMS-4110) were not marked with a stake until the sampling activities were completed with the barge drill rig. Upon completion of sampling activities at each of the above mentioned boring locations, a wooden stake was driven into the ground and labeled accordingly.

On October 21, 2002 MACTEC was able to acquire GPS coordinates for the following locations: CMS-4102, CMS-4108, and CMS-4111. MACTEC attempted to obtain satellite and beacon reception at other locations, but was restricted due to poor reception from several possible factors. The combination of dense vegetation in the tail race and the proximity of the tall apartment building likely contributed to the poor reception. On several occasions during the field work, the GPS was utilized to reacquire locations. On October 24, 2002 MACTEC was able to acquire two additional locations with the GPS: CMS-4103 and CMS-4107.

During the second phase of field work that occurred during the week of November 18, 2002, the vegetation in the tail race had significantly thinned out since October. Although the canopy covering the tail race in November was much thinner, the tall apartment building still proved to be the dominant factor in interrupting transmissions to the GPS. This was apparent when MACTEC walked across the parking lot away from the building and was able to obtain strong satellite and beacon signals. Several attempts were made back in the tail race without successfully receiving signals for the remaining locations.

Post processing of GPS data was corrected due to the information obtained from the University of Rhode Island's web site using the Pathfinder software provided with the Trimble unit. Corrective information was downloaded from the University of Rhode Island Cooperative CORS in Kingston, Rhode Island via:

- www.ngs.noaa.gov/CORS/Sites/uril.html; and
- www.edc.uri.edu/gpsdata/ssf/yymm/yymmhh.exe.

Coordinates for the LPX surface soil locations are unavailable at this time. It is noted that the GPS rover files for the three LPX sampling locations at the John E. Fogerty Complex were possibly corrupted during the downloading process from the TSC1 unit to the PC. Attempts at recovering the files have been unsuccessful to date. It is unknown if the three files will be able to be recovered.

The table below lists the post-processed corrected coordinates for the soil sampling locations where satellite and beacon information was received by the GPS unit.

Sample Location	North (ft)	East (ft)
CMS-4102	281861.583	331898.102
CMS-4103	281847.938	331918.994
CMS-4107	281727.581	331854.501
CMS-4108	281662.706	331900.144
CMS-4111	281536.824	331935.193
*MW-05S	282099.670	331613.150

* Note: Denotes GPS control point

After discussions with Battelle, a Site ground survey completed by a registered survey crew may be necessary in order to locate and map all sampling locations where GPS data is not available.

The following soil sampling locations do not have known coordinates to date: CMS-4101, CMS-4104, CMS-4105, CMS-4106, CMS-4109, CMS-4110, LPX-4112, LPX-4113, and LPX-4114.

SITE-WIDE GROUNDWATER MONITORING WELL AND STAFF GAUGING ACTIVITIES

On October 21, 2002, MACTEC completed the Site-wide round of water level gauging for the proposed groundwater sampling locations and staff gauges. Several of the river gauges were not gauged due to the low water level in the Woonasquatucket River. Also, monitoring well MW-03S was not gauged on this date due to the inability to locate the well in the dense vegetation. On November 21, 2002, MW-03S was gauged and sampled by MACTEC for VOCs after being located by Battelle personnel.

Water levels were obtained using a ¼" diameter Slope transducer. Measurements were recorded to the nearest hundredth of a foot referenced to the top of riser material (TOR), unless otherwise stated. Well mouth headspace readings were also recorded upon opening the well cap with a Thermo Environmental Model TE-580B photoionization detector (PID) calibrated to zero gas and 100 parts per million by volume (ppmv) isobutylene.

Keys for the locked wells were not available during the time that MACTEC was in the field; therefore, the locks were cut open using bolt cutters. Once the wells were accessed and gauged, new Master Lock® brand locks were used to secure the wells.

Below is a table listing depths to water for the 33 monitoring well locations and single staff gauge that were measured on October 21, 2002:

Sample Location	Depth to Water	Headspace PPMV	Date Measured	Reference Point	Comments
MW-09S	7.96	0	10/21/02	TOR	
MW-04S	6.87	0	10/21/02	TOR	
MW-04D	6.78	0	10/21/02	TOR	
MW-04B	6.30	0	10/21/02	TOR	
MW-02D	6.91	0	10/21/02	TOR	
MW-02M	6.71	0	10/21/02	TOR	
MW-02S	3.93	0	10/21/02	TOR	
MW-07S	4.24	0	10/21/02	TOR	
MW-07D	3.65	0	10/21/02	TOR	
MW-06S	5.90	10.1	10/21/02	TOR	odor present
MW-14M	4.30	0	10/21/02	TOR	
GEC-6	4.77	0	10/21/02	TOR	
GEC-7	3.92	0	10/21/02	TOR	
GEC-5	8.49	0	10/21/02	TOR	bailer remaining in well
GEC-4	7.55	0	10/21/02	TOR	bailer remaining in well
MW-15D	7.34	0	10/21/02	TOR	
GEC-2	8.62	0	10/21/02	TOR	
GEC-3	8.12	0	10/21/02	TOR	
GEC-1	7.91	0	10/21/02	TOR	bailer remaining in well
MW-10D	12.56	0	10/21/02	TOR	
MW-10B	12.66	0	10/21/02	TOR	
MW-01S	4.29	0	10/21/02	TOR	
MW-05S	7.42	338	10/21/02	TOR	
SP-04	2.20	0	10/21/02	NA	USGS staff gauge location
MW-13S	6.42	0	10/21/02	TOR	
MW-13D	5.99	19.5	10/21/02	TOR	
MW-13B	6.00	21.4	10/21/02	TOR	
MW-12B	13.96	0	10/21/02	TOR	
MW-12D	14.22	0	10/21/02	TOR	
MW-11S	24.19	5.7	10/21/02	TOR	
MW-11B	24.01	0	10/21/02	TOR	
MW-11M	23.51	0	10/21/02	TOR	
MW-08S	3.58	0	10/21/02	TOR	
MW-03S	4.29	0	11/21/02	TOR	**not part of Site-wide event**

*Note: MW and GEC indicate monitoring well location
SP indicates USGS staff gauge

GROUNDWATER MONITORING WELL SAMPLING ACTIVITIES

Upon completion of the Site-wide round of water level gauging on October 21, 2002, MACTEC returned to the Site on October 22, 2002, to begin low flow sampling of the 33 existing monitoring wells as listed in the table above.

The list below consists of equipment and materials used by MACTEC for the groundwater sampling activities.

- ¼ inch diameter Slope water level meter
- Geopump and battery
- Horiba U-22 and flow through cell
- ¼ inch diameter, new dedicated tubing
- Silicone (pliable) tubing for pump head, new and dedicated
- Graduated container for flow rate measurement
- Collapsible five-gallon purge container
- TE-580B (PID)

From October 22 through October 24, 2002, MACTEC executed the groundwater sampling activities. The monitoring wells were purged and groundwater samples collected following the procedures outlined in the USEPA Region I document, *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (July 30, 1996 Revision 2).

In order to expedite the groundwater sampling activities, MACTEC incorporated the use of three separate sets of sampling equipment and three field scientists. Each scientist mobilized to predetermined wells for sampling activities.

Upon opening each well cap, a static depth to water was recorded on each of the field sheets. See Attachment A (Field Data Record- Groundwater Sampling) for details pertaining to low flow sampling. New, dedicated, disposable tubing was lowered into the water column until the intake was at the midpoint of the well screen. Each well was purged using the Geopump through a flow through cell connected to a Horiba U-22. Purge rates were maintained below 500 milliliters per minute. Field parameters including depth to water, purge rate, temperature, pH, turbidity, specific conductivity, dissolved oxygen and reduction-oxidation potential were measured and recorded on the field sheets. Upon stabilization of the above parameters, the flow through cell was disconnected and the sample was then collected in the appropriate sample container supplied by the laboratory and then immediately placed on ice.

Samples from each well were analyzed in the laboratory for volatile organic compounds (VOCs) using USEPA method 8260B with an additional analysis for Dioxin/Furan at MW-05S. On October 24, 2002, MW-05S did not contain an adequate amount of water to fill the required sample volume for the Dioxin/Furan analysis; therefore, MW-05S was sampled for VOCs only. When MACTEC returned to the Site in November, the water table was slightly higher, and therefore, an adequate

amount of water was available to collect a sample at MW-05S on November 21, 2002, for Dioxin/Furan analysis.

Upon completion of the sampling activities at each well, the depth to the bottom of the well was measured and recorded for historical confirmation. Samples were packed in coolers on ice and sent to the appropriate laboratories for chemical analysis. See the electronic field data deliverable (EDD) for sample identifications and QC information.

Purge water generated from the groundwater sampling was field screened for total VOCs with a PID and disposed of at the ground surface in the vicinity of the well to non-landscaped, vegetated areas. If PID readings exceeded 10 ppmv or the water visually exhibited a color or sheen, the purge water was containerized in the on-Site 55-gallon drums until later being purged through the bag filters on the soil cap area #1 located in the southern portion of the Site.

For additional details regarding information on well conditions and groundwater characteristics, please see the attached low-flow sampling field data sheets.

UNDERGROUND UTILITY CLEARANCE

On October 22, 2002, prior to initiating soil sampling activities, MACTEC obtained a legal start date and time through DIGSAFE by calling DIGSAFE from the field phone at 1-888-DIGSAFE. DIGSAFE provided MACTEC with the following information over the field phone on October 22, 2002 at 1245:

- DIGSAFE Ticket Number: 20024304379
- Site Address: 2072/2074 Smith Street, North Providence, Rhode Island
- Legal Start Date: October 24, 2002
- Legal Start Time: 1245

Intrusive, subsurface field work did not commence until November 18, 2002, during the active DIGSAFE ticket number. November 18, 2002 was the start date for the second mobilization when the crane, barge, and drill rig arrived on Site to commence drilling in the tail race area.

BRUSH CLEARING AND FENCE REMOVAL/REPAIR ACTIVITIES

On October 23, 2002, Fleet Environmental Services, LLC (Fleet) of Randolph, Massachusetts, met with MACTEC on Site to clear access ways into the tail race area from the parking lot. MACTEC walked the Site with Fleet indicating to them which areas would need to be cleared so that safe foot and rig passage to the proposed soil boring locations could be made.

Fleet commenced activities by temporarily altering three sections of the chain link fence so that access into the tail race area could be gained. The three fence sections between the support poles were cut so that during the field work they could be rolled back, allowing for an approximate eight foot wide opening. Each night prior to leaving the Site, the fence was rolled back and locked into place. This enabled day use access only, and prevented any unauthorized entry by passersby.

Once the fence altering activities were completed, Fleet utilized gasoline powered brush cutting equipment to clear pathways from the fence openings to the waters edge in the tail race portion of the Site. An additional pathway was cleared at the northern end of the Site for access to boring location CMS-4101. This location did not require fence altering activities.

Clearing activities were limited to the removal of tall grass, weeds, Purple Loosestrife (Lythrum salicaria) and small saplings with trunk sizes no greater than two-inches in diameter at waist height. The cut brush was laid aside and left to naturally decompose in the wetland. All equipment refueling activities were completed outside of the fenced area in the parking lot to avoid any possible spills to the wetland biota.

While MACTEC was on Site managing the IDW, Fleet returned to the Site on November 25, 2002, to permanently repair the three sections of fence. Prior to Fleet's departure, MACTEC inspected the fence repair work. All three sections of fence were adequately and permanently repaired to the extent that one could not distinguish where the previous openings existed.

PIEZOMETER GAUGING ACTIVITIES

In addition to the monitoring well gauging activities, MACTEC completed a Site-wide round of water level gauging for 17 piezometers on October 24, 2002. MACTEC gauged a total of 17 of 19 listed piezometers. Piezometer P19 could not be gauged because of a private vehicle that was parked over this location. MACTEC was not able to contact the owner of this vehicle while on Site. Piezometer P1 could not be gauged because this location could not be found. After visually searching for P1, MACTEC used the metal detector in an attempt to locate it. After scanning a large area surrounding the location for P1 with the metal detector, it was determined that P1 may have been damaged or removed.

Water levels were obtained using a ¼" diameter Slope transducer as was used for the groundwater measurements at each of the monitoring wells. Measurements were recorded to the nearest hundredth of a foot and referenced to the top of riser material (TOR), unless otherwise stated.

Below is a list of the piezometers gauged and associated depths to water.

Piezometer ID	Depth to Water	Date Measured	Reference Point	Comments
P2	5.12	10/24/02	TOR	
P19	NM	10/24/02	TOR	vehicle blocking location
P16	9.15	10/24/02	TOR	
P4	2.75	10/24/02	TOR	
P3	8.36	10/24/02	TOR	
P20	7.35	10/24/02	TOR	
P1	NM	10/24/02	TOR	could not locate w/ metal detector
P21	4.36	10/24/02	TOR	

Piezometer ID	Depth to Water	Date Measured	Reference Point	Comments
P6	2.89	10/24/02	TOR	
P9	3.42	10/24/02	TOR	
P8	4.87	10/24/02	TOR	
P7	3.41	10/24/02	TOR	
P10	4.91	10/24/02	TOR	
P11	5.05	10/24/02	TOR	
P12	4.37	10/24/02	TOR	
P13	4.42	10/24/02	TOR	
P14	2.67	10/24/02	TOR	
P17	3.80	10/24/02	TOR	
P5	7.11	10/24/02	TOR	

*NM-denotes piezometer not measured, see comments in table above.

SOIL SAMPLING ACTIVITIES

Prior to the commencement of the soil boring activities, a brief health and safety meeting was held for all of those involved in the field work. The work carried out during the soil boring installations was completed with workers wearing poly-coated Tyvek suits, gloves, hard hats, and disposable rubber boots.

On November 18, 2002, GeoSearch, Inc. (GeoSearch) arrived on Site to begin the soil boring installations in the tail race area. TG&B Marine Services provided a 24 foot barge (Carolina Skiff) to complete the four wet boring locations in the tail race (CMS-4105, CMS-4106, CMS-4109, and CMS-4110). GeoSearch also subcontracted a crane to assist in the movement and placement of the barge and rig in the tail race.

On November 18, 2002, MACTEC initiated the soil boring activities. Boring installation was initiated by advancing stainless steel split spoon samplers for the collection and continuous logging of soil characteristics. Following the sampler, steel casing was advanced to keep the hole open. See attached field boring logs for details regarding soil characteristics and associated depths. A PID was used to measure headspace VOC concentration levels in soil. Headspace values are reported in parts per million by volume (ppmv) and are provided on the attached soil boring logs.

A poly-sheeted decontamination pad was constructed in the grass area adjacent to, but outside of the tail race area. High pressure steam cleaning of tools and equipment between each boring was carried out within this decontamination pad.

Sampling equipment was decontaminated in the decontamination pad between sample intervals and locations. The following is a list of decontamination steps executed for the decontamination of sampling equipment.

- Liquinox and water scrub
- Water rinse
- Isopropanol rinse
- Deionized water rinse
- Hexane rinse
- Deionized water rinse

Upon completion of the four wet boring locations, water remaining in the pad was containerized in on-Site 55-gallon drums. Soil cuttings were also containerized in appropriately labeled drums.

The soil sampling program began at location CMS-4109. From this location, the boat was relocated with the crane and set up at CMS-4110. Generally, the work continued from the southern end of the tail race towards the northern end of the tail race ending with CMS-4105 on November 20, 2002. Ground surface averaged approximately nine inches below the standing water in the tail race. In total, four locations were completed using the barge and crane.

Upon completion of the four wet boring locations mentioned above, the barge was lowered into the decontamination pad and high pressure steam cleaned prior to placement of the barge on the truck trailer for demobilization. During the decontamination process of the barge, a worker from GeoSearch slipped and fell. The worker slipped while stepping on the wet plastic sheeting inside the decontamination pad while wearing disposable, rubber boot covers and a hard hat. These boot covers were required as outlined in the Health and Safety Plan. According to the worker, he was not injured during the fall. Several times during the day, MACTEC's FOL checked on the worker's status. MACTEC's FOL made an entry into the health and safety logbook on this day noting the incident. MACTEC's FOL also prepared a near miss report for this incident at the request of the US Army Corps of Engineers and submitted it to Battelle. No other health and safety issues occurred while on Site for either of the two mobilizations.

The remaining borings were completed on dry land utilizing a conventional truck-mounted rig (CMS-4107, CMS-4108, and CMS-4111) and portable tripod rig (CMS-4101 and CMS-4102).

Three soil borings were completed using a conventional truck mounted rig capable of 4.25-inch hollow stem augers. Continuous split spoon samples were collected from the ground surface to nine feet below ground surface. Similar sampling and logging practices were followed as was executed in the barge drilling.

The two borings, CMS-4101 and CMS-4102 were completed with the same techniques as described in the barge drilling, just using a portable tripod rig.

Upon completion of each of the nine soil borings, the drillers introduced a cement/bentonite mix to seal off the hole from the ground surface to the termination depth.

Five locations (CMS-4103, CMS-4104, LPX-4112, LPX-4113, and LPX-4114) were completed as surface soil sampling locations and collected using a stainless steel hand auger.

The following table is a summary of the soil sampling locations, further detail can be found on the attached soil boring logs.

Sample Location	Location Type	Method Used	Date Completed	Depth to Water (ft bgs)	Termination Depth (ft bgs)	Highest PID Reading in Soil
CMS-4101	soil boring	tripod	11/22/02	2" standing water	9.0	0.9 ppmv
CMS-4102	soil boring	tripod	11/22/02	~1.0	9.0	0.0 ppmv
CMS-4103	surface soil	hand auger	11/21/02	NA	1.0	NM
CMS-4104	surface soil	hand auger	11/21/02	4" standing water	1.0	NM
CMS-4105	soil boring	barge rig	11/20/02	12" standing water	9.0	NM
CMS-4106	soil boring	barge rig	11/19/02	6" standing water	9.0	0.9 ppmv
CMS-4107	soil boring	truck rig	11/21/02	~3.0	9.0	NM
CMS-4108	soil boring	truck rig	11/21/02	~3.0	9.0	NM
CMS-4109	soil boring	barge rig	11/18/02	6" standing water	9.0	NM
CMS-4110	soil boring	barge rig	11/19/02	12" standing water	9.0	4.9 ppmv
CMS-4111	soil boring	truck rig	11/21/02	~3.0	9.0	11.1 ppmv
LPX-4112	surface soil	hand auger	11/22/02	NA	0.5	NM
LPX-4113	surface soil	hand auger	11/22/02	NA	0.5	NM
LPX-4114	surface	hand auger	11/22/02	NA	0.5	NM

*NA- denotes that water table not reached
*NM- denotes not measured (see boring log)
*~- indicates approximate depth

INVESTIGATION DERIVED WASTE (IDW)

Solid Waste

Solid IDW (soil and PPE) was handled and containerized in 55-gallon DOT approved drums located on the cap area #1 behind a locked gate. Soil cuttings generated from the drilling activities are containerized in one drum. Analytical results will determine the ultimate disposal characteristics for the soil drum. Five 55-gallon drums contain solid waste such as used personal protective equipment (PPE), poly sheets and bag filters. The six total drums will ultimately be transported off-Site for proper disposal.

Liquid IDW

All liquid IDW generated was temporarily stored in 55-gallon DOT approved drums until November 25, 2002 when the liquid was pumped through a series of bag filters. Service Tech Industries provided MACTEC with equipment to pump the liquid waste through a series of three bag filters with pore spaces

was discharged to the middle of the cap and allowed to percolate through the soil. The bag filters were disposed of in the solid waste drums while the bag housing units were pressure washed and flushed with approximately 60 gallons of fresh water. As of November 25, 2002, there is no liquid IDW on Site.

If you have any questions regarding the information contained in this report, please do not hesitate to call either of the undersigned at (781) 245-6606.

Sincerely,

MACTEC Engineering and Consulting, Inc.

Mark Phaneuf
Senior Staff Scientist

Alan Fillip
Project Manager

Centredale Manor Restoration Project Superfund Site
Interim Data Collection, Remedial Investigation and Feasibility Study
Final Data Summary Report

Attachment to Appendix A
Additional Information for Field Boring Logs
October 2003

1. Individual split spoons in tailrace borings CMS-4101 through CMS-CMS-4111 were driven over the targeted depth intervals as follows:
   - 0 – 1 ft
   - 1 – 3 ft
   - 3 – 5 ft
   - 5 – 7 ft
   - 7 – 9ft

2. Split spoons were 2 inches in diameter. Three-inch diameter split spoons were used in several cases where sample recovery was poor.

3. The fall height of hammer was between 18 and 24 inches.

4. The diameter of casing was 4 inches.

5. The casing was advanced by being driven (not spun).

6. Wash water was not introduced into the borings. If the holes did not stay open between samples, then they were cleaned out with 3-inch diameter spoons.

FIELD BORING LOGS

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4101**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/22/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/22/2002	**Drilling Method:**	Tripod with casing and spoons
Total Depth:	9'	**Depth to Water:**	~ surface (2" standing water)
Comments:	**Tripod Drilling, 140 lb hammer**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Dk brown saturated silty sand, with organic roots, leaves, burned (blackened) wood fragments. From (0.8-1.0') Med to coarse sand. No odors.	1.0/1.0	0	17,22	CMS-SS-4101-0010-01 Archive (0-1') 1150
2	Same dk brown silty sand as in 0-1', only a trace of organics (roots), saturated, med to coarse sand and subrounded gravel and angular rock fragments.	1.0/0.9	0	29,22	CMS-SS-4101-0019-01 Dioxin (1-1.9') 1200
3	No Recovery	1.0/0.0	-	15,16	
4	Brown to grey, sandy gravel, well sorted, well rounded, gravel to 0.08" dia., 5-10% fines. Minor Fe-staining, slight hydrocarbon odor	1.0/1.0	0.9	30,37	CMS-SS-4101-3042-01 Dioxin (3-4.2') 1220
5	Same sandy gravel as in 3-4' interval, no change	1.0/0.2	0.6	35,40	
6	Same sandy gravel as in 3-4', grey, saturated very slight hydrocarbon odor, no Fe-staining	1.0/1.0	0	13,17	CMS-SS-4101-5062-01 Archive (5-6.2') 1235
7	Saturated sandy gravel as in 5-6', slight hydrocarbon odor, contains angular rock frags, 0.30" dia.	1.0/0.2	0	19,24	
8	Sandy gravel, 5-10% silt, saturated, light brown, gravel subrounded, 0.1-0.3" dia, med to coarse sand, no odors.	1.0/1.0	0	30,31	CMS-SS-4101-7085-01 Archive (7-8.5') 1300
9	Same material as in 7-8', saturated sandy gravel.	1.0/0.5	0	25,26	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4102**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/22/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/22/2002	**Drilling Method:**	Tripod with casing and spoons
Total Depth:	9'	**Depth to Water:**	~1' bgs
Comments:	**Tripod Drilling, 140 lb hammer**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Dk brown, wet, silty sand with large angular rock frags to 1" dia, roots, leaves, pebbles subrounded 0.05-0.1" dia.	1.0/0.8	0	27,35	CMS-SS-4102-0008-01 Dioxin (0-0.8') 0930
2	Sandy gravel, <5% fines, large subrounded pebbles to 0.5" dia. With angular rock frags, saturated, tan.	1.0/0.9	0	10,12	CMS-SS-4102-1019-01 Dioxin (1-1.9') 0945
3	No Recovery	1.0/0.0	-	14,10	
4	Sandy gravel, 5-10% fines, gravel well rounded, 0.05-0.15" dia. Grey, saturated, med to coarse sand	1.0/0.8	0	26,46	CMS-SS-4102-3038-01 Dioxin (3-3.8') 1005
5	No Recovery	1.0/0.0	-	63,20	
6	Dk grey sandy gravel, med to coarse sand, saturated, no odors, pebbles rounded to subrounded with trace angular rock frags	1.0/1.0	NA	17,15	CMS-SS-4102-5062-01 Archive (5-6.2') 1025
7	Top 0.2' of sample same sandy gravel as in 5-6'	1.0/0.2	NA	20,21	
8	Grey grading to yellow/tan med to coarse sand, saturated, trace amounts of pebbles, no odors, well sorted	1.0/1.0	0	25,27	CMS-SS-4102-7090-01 Archive (7-9') 1045
9	Tan to yellow med to coarse sand, saturated, trace amounts of pebbles, subrounded, well sorted, no odors	1.0/1.0	0	24,27	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4105**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/20/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/20/2002	**Drilling Method:**	Casing w/ hammer and spoon
Total Depth:	9'	**Depth to Water:**	1' standing water
Comments:	**Barge Drilling, 140 lb hammer**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Organic rich layer with leaves and roots, med to coarse sand throughout, dk brown to black, saturated, with pebbles from 0.25-0.50" dia., subrounded pebbles and rock frags near tip from 0.8-1.0'. <5% fines, hydrocarbon odor	1.0/1.0 (total 1.0 obtained after 2 attempts)	Not Enough Recovery	17,37; second attempt 41,37	CMS-SS-4105-0010-01 Full suite of analyses except Dioxin (0-1') 0915
2	Sandy gravel, <5% fines, saturated, large rock frags, med to coarse sand, with Fe-staining present	1.0/0.5	Not Enough Recovery	11,15	CMS-SS-4105-1015-01 Dioxin (1-1.5') 0930
3	No Recovery	1.0/0.0	-	15,9	-
4	Sandy gravel, med to fine grained, with 5-10% fines, 5% subrounded gravel, grey in color with organic rich layer from 3.3-3.6' black with roots, all saturated	1.0/1.0	-	15,27	CMS-SS-4105-3040-01 Dioxin (3-4') 1055
5	No Recovery	1.0/0.0	-	30,27	-
6	Saturated well sorted med to coarse sand, <5% fines, yellow to tan color with 5% pebbles subrounded 0.25" dia.	1.0/1.0	NA	11,11	CMS-SS-4105-5066-01 Archive (5-6.6') 1015
7	Same well sorted sand as in 5-6' interval	1.0/0.6	NA	13,7	
8	Coarse to med sand, 5% fines,saturated, black in color, well sorted with large subrounded cobbles and pebbles	1.0/1.0	NA	18,20	CMS-SS-4105-8088-01 Archive (8-8.8')1130
9	Coarse to med sand as above in 7-8' but yellow in color, no black. Interface is at 8'	1.0/0.8	NA	20,27	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4106**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/19/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/19/2002	**Drilling Method:**	Casing with hammer and spoons
Total Depth:	9'	**Depth to Water:**	6" of standing water at surface
Comments:	**Barge Drilling, 140 lb. hammer**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0					
1	Dk brown, saturated organic rich layer with leaves, trace amount of silty sand, non-plastic	1.0/0.3	0.6	2,3	CMS-SS-4106-0003-01 Dioxin (0-0.3') 1445
2	Dk brown saturated organic rich layer with leaves, wood (roots), silty sand, slightly plastic	1.0/0.6	0	4,4	CMS-SS-4106-1016-01 and duplicate ID CMS-DU-111902A-01 for Dioxin (1-1.6') 1315
3	No Recovery	1.0/0.0	-	5,4	
4	Dk brown to black sandy gravel, coarse to med sand with 5% fines, saturated, slight sheen, gravel and pebbles, 0.25-0.5" dia. With angular rock frags	1.0/0.6	0	13,42	CMS-SS-4106-3036-01 Dioxin (3-3.6') 1330
5	No Recovery	1.0/0.0	-	52,40	
6	Med to coarse sand, well sorted, saturated, qtz. rich, <5% fines, tan to grey	1.0/0.7	0.1	3,8	CMS-SS-4106-5057-01 Archive (5-5.7') 1400
7	No Recovery	1.0/0.0	-	30,14	
8	Coarse, well sorted sand, saturated, qtz. rich, grey. <5% fines	1.0/1.0	0.9	5,7	
9	Coarse sand, well sorted as above, <5% fines, with slightly siltier layer from 8.4-8.5'	1.0/0.5	0	7,11	CMS-SS-4106-7085-01 Archive (7-8.5') 1415

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4107**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/21/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/21/2002	**Drilling Method:**	4.25" HSA
Total Depth:	9'	**Depth to Water:**	~3' bgs
Comments:		**Truck Rig, 140 lb hammer**	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Light to med brown silty sand with no odors, <5% subrounded pebbles 0.1-0.2" dia with trace of roots and organics, slight amount of clinker material throughout (fill)	1.0/1.0	NA	4,5	No offsite sample for 0-1' interval
2	Dk brown, wet, slightly plastic silty sand, med to coarse sand, few wood fibers and clinkers, no odors, with Fe-staining thoughout (fill)	1.0/1.0	-	4,5	CMS-SS-4107-1030-01 Dioxin (1-3') 1330
3	Same material as in 1-2' with slightly greyer color from 2.3-3'. Fe-staining present throught interval. Saturated, approx. 3', trace amount clinkers (fill)	1.0/1.0	-	4,5	
4	Light brown, saturated silty sand, native, Fe-staining, slightly plastic, no evidence of fill, no pebbles	1.0/1.0	-	12,15	CMS-SS-4107-3040-01 Dioxin (3-4') 1345
5	No Recovery	1.0/0.0	-	18,21	
6	Saturated, grey, sandy gravel, <5% fines, large angular rock frags, to 2.5" dia. No odor, trace pebbles, subrounded	1.0/0.8	-	13,15	CMS-SS-4107-5058-01 Dioxin (5-5.8') 1400
7	No Recovery	1.0/0.0	-	21,21	
8	Tan to grey saturated med to coarse sand, well sorted, ~5% fines, with trace amounts of gravel, mod. Rounded. No odors	1.0/1.0	-	7,11	CMS-SS-4107-7088-01 Archive (7-8.8') 1420
9	Same material as in 7-8' tan to grey saturated med to coarse sand. No odors	1.0/0.8	-	15,17	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4108**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/21/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/21/2002	**Drilling Method:**	4.25" HSA
Total Depth:	9'	**Depth to Water:**	~3' bgs
Comments:	**Truck Rig, 140 lb hammer** **NA under headspace indicates PID inoperable.**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Light brown silty sand with 5-10% subrounded pebbles, with trace organics, roots, stiff, damp, and contains clinker materials from 0.5-1.0 (FILL) Also noted live earthworm	1.0/1.0	0	8,7	CMS-SS-4108-0010-01 Dioxin (0-1') 1145
2	Tan to light brown silty sand with wood fibers and friable coal like material and ash. Wet to saturated near 2'. 5% subrounded pebbles. No odor evident (FILL)	1.0/1.0	0	5,4	CMS-SS-4108-1030-01 Dioxin (1-3') 1205
3	Med to dk. Brown silty sand as above with trace amounts of friable burned wood and ash. Near saturated at 3'. No odor evident (FILL)	1.0/1.0	0	6,5	
4	Saturated dk brown silty sand with 5-12% fines, 10-15% gravel 0.1-0.2" dia, subrounded. No odors evident, appears to be native material	1.0/1.0	0	15,18	CMS-SS-4108-3040-01 Dioxin (3-4') 1215
5	No Recovery	1.0/0.0	NA	21,19	
6	Dk brown, saturated sandy gravel, <5% fines, (0.1-0.25" dia) sub to well rounded, no odors	1.0/1.0	NA	22,18	CMS-SS-4108-5070-01 Archive (5-7') 1230
7	Same saturated sandy gravel material as in 5-6'. No odors present	1.0/1.0	NA	15,15	
8	Tan to grey saturated med to coarse sand, well sorted, <5% fines, no odors, trace amounts of well rounded pebbles	1.0/1.0	NA	5,9	CMS-SS-4108-7090-01 Archive (7-9') 1245
9	Same material as in 7-8', saturated med. to coarse sand. No odors	1.0/1.0	NA	8,15	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4109**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/18/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/18/2002	**Drilling Method:**	casing with hammer and spoons
Total Depth:	9'	**Depth to Water:**	6" of standing water at location
Comments:	**Barge Drilling (note drillers moved over 1' to collect 1-3' interval)**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Black, organic rich, saturated, slight hydrocarbon odor, leaves, twigs	1.0/0.6	12.9	weight of rods	CMS-SS-4109-0010-01 Dioxin (0-1') 1230
2	Gravel, subrounded, qtz at tip, little recovery (will move over to obtain sample from 1-3' interval) Sandy gravel, 3-5mm dia, <5% fines	1.0/0.4	not enough recovery	weight of rods	CMS-SS-4109-1014-01 Dioxin (1-1.4') 1415
3	See 1-2' description	1.0/0.0	not enough recovery	weight of rods	
4	Subangular rock frags 8-10mm dia, with subrounded pebbles 3-5mm, coarse sand with <5% fines, grey saturated silt at spoon tip. Sandy gravel	1.0/0.8	not enough recovery	10,9	CMS-SS-4109-3038-01 Dioxin (3-3.8') 1300
5	No Recovery	1.0/0.0	-	6,4	
6	Subrounded qtz rich pebbles with 15-20% coarse sand, <5% fines, sheen noted. Sandy gravel	1.0/0.6	not enough recovery	14,10	CMS-SS-4109-5056-01 Archive (5-5.6') 1330
7	No Recovery	1.0/0.0	-	6,4	
8	Sandy gravel, coarse sand, saturated, well sorted, <5% fines, Fe-staining present	1.0/0.9	-	10,6	CMS-SS-4109-7079-01 Archive (7-7.9') 1405
9	No Recovery	1.0/0.0	-	4,3	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4110**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/19/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/19/2002	**Drilling Method:**	casing with hammer and spoons
Total Depth:	9'	**Depth to Water:**	1' standing water at location
Comments:	**Barge Drilling, 140 lb hammer**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Saturated, black organics with silty sand, slightly plastic, well sorted, 20% fine sand, slight hydrocarbon odor	1.0/1.0	4.9	14,11	CMS-SS-4110-0010-01 Pesticides, PCBs, PAHs, Aroclors, Dioxin, HCX, MeHg, Metals, TOC, Grainsize, SVOCs (0-1') 0915
2	Poorly sorted sandy gravel, subrounded 0.25-0.5" dia, coarse to med sand, saturated	1.0/0.5	0	11,7	CMS-SS-4110-1015-01 Dioxin (1-1.5') 1055
3	No Recovery	1.0/0.0	-	7,7	
4	Poorly sorted sandy gravel, coarse sand, <5% fines, pebbles from 0.25-0.5" dia, subrounded. (Silt, grey, saturated, slightly plastic from 3.7-3.9')	1.0/0.9	0.2	80,64	CMS-SS-4110-3739-01 Dioxin (3.7-3.9') 1015
5	No Recovery	1.0/0.0	-	40,60	
6	Poorly sorted sandy gravel, coarse to med sand, 5-10% fines, subrounded gravel with angular rock frags 0.25-0.5" dia	1.0/0.5	0.1	2,2	CMS-SS-4110-5055-01 Archive (5-5.5') 1045
7	No Recovery	1.0/0.0	-	2,5	
8	Silt, non plastic, tan with grey in color, saturated, with fine, thin alternating grey silt beds	1.0/1.0	0.1	11,7	CMS-SS-4110-7085-01 Archive (7-8.5') 1115
9	Silt as above in 7-8' with fine thin beds of grey silt	1.0/0.5	0	7,3	

MACTEC

Soil Boring Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	**CMS-4111**		
Project Name:	Centredale RIFS	**Geologist:**	M. Phaneuf
Date Started:	11/21/2002	**Drilling Company:**	GeoSearch
Date Completed:	11/21/2002	**Drilling Method:**	4.25" HSA
Total Depth:	9'	**Depth to Water:**	~3' bgs
Comments:	**Truck rig with 140 lb hammer Noted odors, sweet and hydrocarbon**		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0 1	Light brown silty sand with 5% pebbles, subrounded (0.25" dia) Minor amounts of organic roots throughout interval, stiff, damp, noted several clinkers near 0.8-0.9' (FILL)	1.0/0.9	0.8	9,10	CMS-SS-4111-0009-01 Dioxin (0-0.9') 0905
2	Tan to light brown silty sand with piece of rigid black plastic, wood fibers, coal-like material (friable) with white ash present, thin lens of grey silty sand from 1.3-1.4' then grading to darker brown silty sand as above (FILL)	1.0/1.0	3.1	8,7	CMS-SS-4111-1028-01 Dioxin (1-2.8') 0920
3	Darker brown silty sand as in 1-2' interval with trace amounts of clinkers and coal like material, small pieces of white friable burned wood, med sands, wet at 2.8'. Soil has a sweet smell to it (FILL)	1.0/0.8	9.8	5,4	
4	Saturated, dk brown silty sand with 5-10% med to coarse sand and gravel, small pieces of white plastic at 3.1' with wood, then appears to be native material. Sweet hydrocarbon smell	1.0/1.0	11.6	6,12	CMS-SS-4111-3046-01 Dioxin (3-4.6') 0935
5	Saturated, dk brown silty sand as above in 3-4' with 5-10% med to coarse sand and gravel. Grey gravel at spoon tip, well rounded 0.25-0.5" dia, <5% fines with coarse sand	1.0/0.6	11.1	10,12	
6	Dk grey to black, saturated sandy gravel, <5% fines, gravel from 0.1-0.4" in dia, well rounded, hydrocarbon, sweet odor present	1.0/1.0	8.2	13,20	CMS-SS-4111-5070-01 Archive (5-7') 0955
7	Same material as in 5-6' interval, also exhibits sweet odor with hydrocarbon smell	1.0/1.0	8.9	26,22	
8	Same dk grey to black saturated sandy gravel <5% fines, med to coarse sands, very slight hydrocarbon odor, similar material as in 5-6' and 6-7'. Note: angular rock frags up to 2.5" in diameter present.	1.0/1.0	3.9	14,26	CMS-SS-4111-7080-01 Archive (7-8') 1015
9	No Recovery	1.0/0.0	-	19,21	

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: Centredale Manor Tailrace
Project Number: 51226-121
Date: 11/22/02
Sample Location ID: CMS-4103-0810-01
Time: Start: 0815 End: 0900
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR _____
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL ALCOHOL~~ ISOPROPANOL
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [X] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [X] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

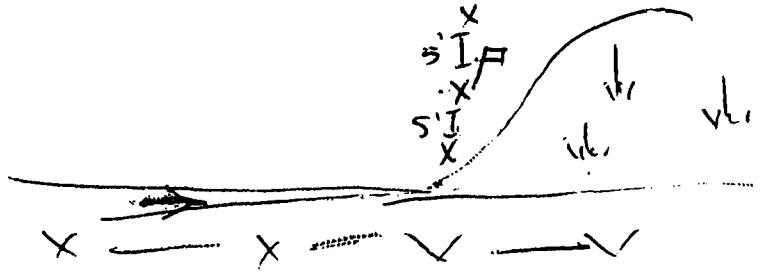
FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [X] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] DIOXIN	[ ]	[ ]	[X]	[ ]	125 mL	[X] 0830	/ /
[X] FURAN	[ ]	[ ]	[X]	[ ]	↓	[X]	/ /
[X] HCV	[ ]	[ ]	[X]	[ ]		[X]	/ /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ /

NOTES/SKETCH SAMPLE CONSISTS OF LT BRN CLAY AND FINE TO MED SAND WITH SOME GRAVEL, ROOT MATTER. WET.



SURFACE SOIL SAMPLE FIELD DATA RECORD

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: Centredale Manor Tailrace
Project Number: 51226-R1 Date: 11/22/02
Sample Location ID: CMS-SS-4104-0010-01
Time: Start: 0745 End: 0815 Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1 ft bgs

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR _____
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL ALCOHOL~~ ISOPROPANOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [X] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [ ] SAND
- [X] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID CMS-DU-112202A-01

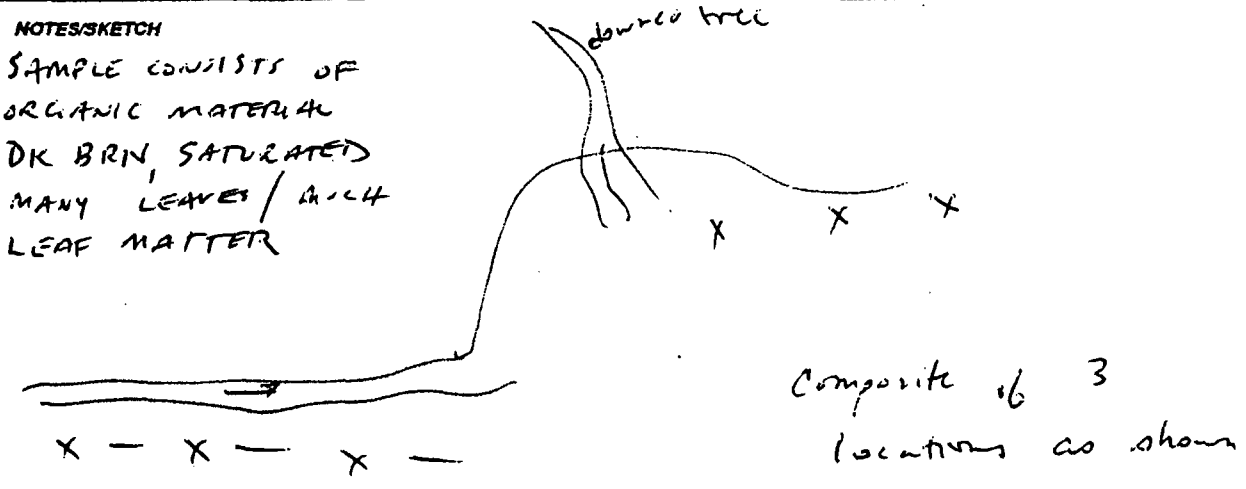
SAMPLE LOCATION SKETCH:
- [X] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: OIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] DIOXIN	[ ]	[ ]	[X]	[ ]	125 mL	[X] 0800	/ / /
[X] FURAN	[ ]	[ ]	[X]	[ ]	↓	[X]	/ / /
[X] HCX	[ ]	[ ]	[X]	[ ]		[X]	/ / /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SAMPLE CONSISTS OF ORGANIC MATERIAL DK BRN, SATURATED MANY LEAVES / RICH LEAF MATTER



Composite of 3 locations as shown

SURFACE SOIL SAMPLE FIELD DATA RECORD

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: Cintredale Manor
Project Number: 51226
Sample Location ID: ~~[illegible]~~ LPX-SS-4112-0005-01
Time: Start: 1055 End: 1105

1100 SAMPLE
Date: 11/22/02
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-0.5 ft.

EQUIPMENT USED FOR COLLECTION:
- [ ] HAND AUGER
- [X] ~~S.S. SCOOP~~ SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR _____
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL ALCOHOL~~ ISOPROPANOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [X] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

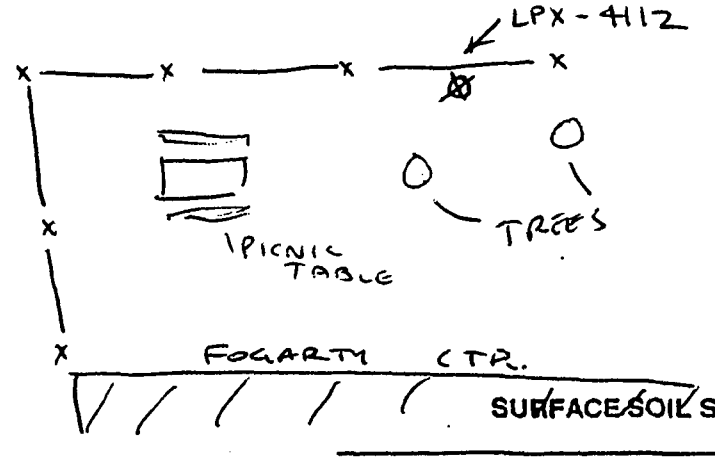
FIELD GC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____
LPX-DU-112202B-01 (except Dioxin/Furan/HCX)

SAMPLE LOCATION SKETCH:
- [X] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED (mL)	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[ ]	X	[ ]	125	X	/ / /
[X] DIOXIN	[ ]	[ ]	X	[ ]	125	X	/ / /
[X] TOC	[ ]	[ ]	X	[ ]	500	X	/ / /
[X] METAL	[ ]	[ ]	X	[ ]	125	X	1100 / / /
[X] Me Hg	[ ]	[ ]	X	[ ]	125	X	/ / /
[X] PEST/PCB	[ ]	[ ]	X	[ ]	250	X	/ / /
[ ]							

NOTES/SKETCH LT BRN SAND & GRAVEL WITH CLAY, COBBLES. SOME ROOT MATTER, COBBLES. DAMP



SURFACE SOIL SAMPLE FIELD DATA RECORD

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: CENTREDALE MANOR — 1110 SAMPLE
Project Number: 51226 — Date: 11/22/02
Sample Location ID: LPX-4113-0005-01
Time: Start: 1105 End: 1115 — Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-0.5 ft

EQUIPMENT USED FOR COLLECTION:
- [ ] HAND AUGER
- [x] S.S. ~~BPLF~~ SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [x] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR _____
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [x] ~~ETHYL ALCOHOL~~ ISOPROPANOL
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [x] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [x] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [x] SAND
- [ ] ORGANIC
- [ ] GRAVEL

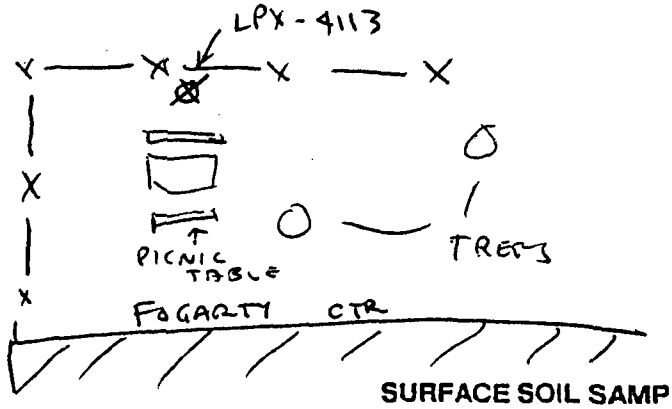
FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [x] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED (mL)	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[x] SVOC	[ ]	[ ]	[x]	[ ]	125	[x]	1110
[x] DIOXIN	[ ]	[ ]	[x]	[ ]	125	[x]	
[x] TOC	[ ]	[ ]	[x]	[ ]	500	[x]	
[x] METAL	[ ]	[ ]	[x]	[ ]	125	[x]	
[x] PESTIPCB	[ ]	[ ]	[x]	[ ]	250	[x]	
[x] MeHg	[ ]	[ ]	[x]	[ ]	125	[x]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	

NOTES/SKETCH LT BRN SAND & GRAVEL WITH COBBLES, SOME CLAY. DAMP.



SURFACE SOIL SAMPLE FIELD DATA RECORD

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: CENTERDALE MANOR
Project Number: 51226
Sample Location ID: LPX-SS-4114-0005-01
Time: Start: 1115 End: 1125

1120 SAMPLE
Date: 11/22/02
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-0.5 ft

EQUIPMENT USED FOR COLLECTION:
- [ ] HAND AUGER
- [X] S.S. ~~SCOOP~~ SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR _____
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL ALCOHOL~~ ISOPROPANOL
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [X] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [X] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

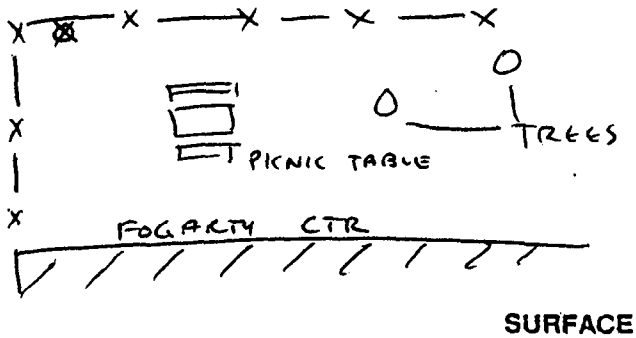
SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

EXTRA SVOC VOLUME COLLECTED FOR MS/MSD

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED (mL)	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[ ]	[X]	[ ]	125	[X]	/ / /
[X] DIOXIN	[ ]	[ ]	[X]	[ ]	125	[X]	/ / /
[X] METAL	[ ]	[ ]	[X]	[ ]	125	[X]	/ / /
[X] Mercury	[ ]	[ ]	[X]	[ ]	125	[X] 1120	/ / /
[X] TOC	[ ]	[ ]	[X]	[ ]	500	[X]	/ / /
[X] PEST/PCB	[ ]	[ ]	[X]	[ ]	750	[X]	/ / /
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH BRN SAND & GRAVEL WITH CLAY, ORGANICS, AND FEW COBBLES. ROOT MATTER. DAMP



SURFACE SOIL SAMPLE FIELD DATA RECORD

LOW FLOW SAMPLING DATA LOG

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor
JOB NUMBER: 51226.32
DATE: 10-22-02
WELL ID: MW-10D
ACTIVITY TIME: START 930 END 1035
BOTTLE TIME: 1035
SAMPLE ISIS ID: CMS-GW-MW10D-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID: -
MS ID: -
MSD ID: -

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 48.75 FT (TOR)
HISTORICAL WELL DEPTH: 45.0 FT (TOR) BGS
PROTECTIVE CASING STICKUP (FROM GROUND): ~~N/A~~ 3.30' FT MSP
PROTECTIVE CASING / WELL DIFFERENCE: -0.5 FT
DEPTH TO WATER: 12.63 FT (TOR)
SCREEN LENGTH: 6.3 FT
WELL DIAMETER: 2" IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 32.12 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 5.60 GAL/VOL
TOTAL VOLUME PURGED: 5.60 GAL
AMBIENT AIR: 0.0 PPM
WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	920	940	950	1000	1005	1010	1020	1025	1030	1035
DEPTH TO WATER (ft)	12.69	12.49	12.53	12.56	12.59	12.61	12.60	12.61	12.61	S
PURGE VOLUME (gallons)										A
TEMPERATURE (degreesC)	13.1	13.4	13.4	13.3	13.3	13.3	13.3	13.4	13.4	M
pH (units)	5.91	5.99	6.09	6.10	6.09	6.04	6.13	6.13	6.13	P
TURBIDITY (ntu)	5.4	4.2	4.9	6.1	6.2	6.9	6.9	4.1	4.6	L
SPEC. COND. (~~mS~~ mS/cm)	.519	.500	.502	.504	.529	.537	.525	.524	.524	E
DISSOLVED OXYGEN (mg/L)	8.72	9.37	9.55	9.73	10.07	10.47	10.49	10.51	10.44	
REDOX POTENTIAL	310	305	310	314	304	306	299	298	299	

SAMPLE OBSERVATIONS:
☑ CLEAR
☐ CLEAR
☐ COLORED _____
☐ COLORED _____
☐ CLOUDY _____
☐ TURBID _____
☐ ODOR _____
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☑
SAMPLING: ☑ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER; ☐ _____

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☒ POTABLE WATER; ☒ DEIONIZED WATER; ☐ HEXANE; ☐ NITRIC ACID; ☐ _____
Ded. tubing

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE; ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☑ VOC	8260C	N	HCL	3x40mL	☒	

NOTES - Well purge ~ 300 ml/min.
- Dedicated tubing.
- Pump intake @ 42.5 B.T.O.R

SIGNATURE: [signature]

RECEIVED BY: _____

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226
DATE: 10/22/02
WELL ID: MW08S
ACTIVITY
TIME START: 0900 END: 1140
BOTTLE TIME: 1125
SAMPLE ISIS ID: CMS-GW-MW08S-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 9.21 FT (TOR)
HISTORICAL WELL DEPTH: 8.50 FT (TOR) DGS
PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT
PROTECTIVE CASING / WELL DIFFERENCE: -0.24 FT
DEPTH TO WATER: 3.58' FT (TOR)
SCREEN LENGTH: 5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 5.63 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.90 GAL/VOL
TOTAL VOLUME PURGED: 5.0 GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

	TIME	0920	1010	1020	1030	1040	1050
	DEPTH TO WATER (ft)	3.63	3.94	3.94	3.94	3.94	3.94
	PURGE VOLUME (gallons)		1.5	2.0	2.5	3.0	3.5
3%	TEMPERATURE (degrees C)		18.99	18.98	19.13	19.17	19.09
0.1	pH (units)	8.52	8.67	8.43	8.09	7.97	7.91
10%	TURBIDITY (ntu)		0	0	0	0	0
3%	SPEC. COND. (~~mS/cm~~ mS/cm)		7.37	5.02	3.38	2.91	2.62
10%	DISSOLVED OXYGEN (mg/L)		0.0	0.0	0.0	0.0	0.0
±10mV	REDOX POTENTIAL		-253	-278	-273	-266	-265
	Rate ml/min	Stopped	250ml/min	250ml/min	250	250	250

SEE PAGE 2 →

SAMPLE OBSERVATIONS:
- ☐ CLEAR
- ☐ CLEAR
- ☒ COLORED Amber
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒
SAMPLING: ☒ GEOPUMP
- ☐ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID

DEDICATED TUBING

WATER LEVEL EQUIPMENT USED
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs 8260	8260B	No	HCL/ICE	3X40ml	☒	

Stopped purging around 925 when Fleet was onsite, then performed site walk w/ Dave L objiener w/ Corp. Restarted low flow around 1010

NOTES: Initial purging H_2O is amber colored. Hdspc on water is 6.1 ppm, Will however containerize due to color of water. Took several Photos of well setup showing color of water

SIGNATURE: [signature]
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3% Cond, Temp
0.1 PH
10% Turb, D.O
ORP ±10mV

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226
DATE: 10/22/02
WELL ID: MW08S
ACTIVITY TIME: START 0900 END 1140
BOTTLE TIME: 1125
SAMPLE ISIS ID: CMS-GW-MW08S-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	9.21 FT (TOR)	HISTORICAL WELL DEPTH	8.5 FT ~~(TOR)~~ BGS	PROTECTIVE CASING STICKUP (FROM GROUND)	Flush FT	PROTECTIVE CASING / WELL DIFFERENCE	-0.24 FT
DEPTH TO WATER	3.58 FT (TOR)	SCREEN LENGTH	5 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 5.63 FT × ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.90 GAL/VOL

TOTAL VOLUME PURGED: 5.0 GAL

AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

TIME	1100	~~1110~~ 1115	1120	1125			
DEPTH TO WATER (ft)	3.94	3.94	3.94	CLOSE			
PURGE VOLUME (gallons)	4.0	4.5	5.0				
TEMPERATURE (degrees C)	19.14	19.15	19.14				
pH (units)	7.82	7.75	7.73				
TURBIDITY (ntu)	0	0	0				
SPEC. COND. ~~(umhos/cm)~~ mS/cm	2.38	2.13	2.13				
DISSOLVED OXYGEN (mg/L)	0.0	0.0	0.0				
REDOX POTENTIAL	-261	-261	-262				
Rate ml/min	250	250	250				

SAMPLE OBSERVATIONS:
- ☐ CLEAR
- ☐ CLEAR
- ☒ COLORED Amber
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☐ POTABLE WATER; ☒ DEIONIZED WATER; ☐ HEXANE; ☐ NITRIC ACID; ☐

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE; ☐

NUMBER OF FILTERS USED

Dedicated tubing

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ 8260 B	8260B	No	HCl/ICE	3X40ml	☑	

NOTES

SEE PAGE 1

SIGNATURE: [signature]

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226-32
DATE: 10/22/02
WELL ID: MW-10B
ACTIVITY
TIME: START 0945 END 1215
BOTTLE TIME: 1200
SAMPLE ISIS ID: CMS-GW-MW10B-03

[ ] QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 69 ~~85~~ FT (TOR)
HISTORICAL WELL DEPTH: 85 FT (TOR)
PROTECTIVE CASING STICKUP (FROM GROUND): 2.9 FT
PROTECTIVE CASING / WELL DIFFERENCE: 0.15 FT
DEPTH TO WATER: 12.74 FT (TOR)
SCREEN LENGTH: 25 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC / bedrock
HEIGHT OF WATER COLUMN: 72 FT x [X] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 11.52 GAL/VOL
TOTAL VOLUME PURGED: 12 GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

BEGIN PURGE AT 1015, 200 mL/min

OVER →

TIME	1020	1025	1030	1035	1040
DEPTH TO WATER (ft)	12.76	12.74	12.75	12.75	12.75
PURGE ~~VOLUME (gallons)~~ RATE mL/min	200	200	200	200	200
TEMPERATURE (degrees C)	13.1	13.4	13.4	13.4	13.4
pH (units)	6.43	6.51	6.52	6.53	6.52
TURBIDITY (ntu)	3.6	0	0	0	0
SPEC. COND. (~~mhos~~ mS/cm)	0.401	0.400	0.399	0.396	0.394
DISSOLVED OXYGEN (mg/L)	2.63	0	0	0	0
REDOX POTENTIAL	-182	-207	-211	-213	-214

SAMPLE OBSERVATIONS:
- [X] CLEAR
- [ ] CLEAR
- [ ] COLORED
- [ ] COLORED
- [ ] CLOUDY
- [ ] TURBID
- [ ] ODOR
- [ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING / SAMPLING:
- [X] PERISTALTIC PUMP
- [ ] SUBMERSIBLE PUMP
- [ ] BLADDER PUMP
- [ ] PVC/SILICON TUBING
- [ ] TEFLON/SILICON TUBING
- [ ] WATTERA
- [ ] IN LINE FILTER
- [ ] PRESS/VAC FILTER

DECON FLUIDS USED:
- [ ] METHANOL
- [ ] LIQUINOX
- [ ] POTABLE WATER
- [X] DEIONIZED WATER
- [ ] HEXANE
- [ ] NITRIC ACID
- [X] dedicated, disposable tubing used

WATER LEVEL EQUIPMENT USED:
- [X] ELECTRIC COND. PROBE
- [ ] FLOAT ACTIVATED
- [ ] KECK INTERFACE PROBE

NUMBER OF FILTERS USED: ____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
[X] VOCs	8260	N	HCl	120 mL	[X]	

NOTES

More purge data on reverse

SIGNATURE: [signature]

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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor

JOB NUMBER: 51226.32

DATE: 10-22-02

WELL ID: MW-04B

ACTIVITY

TIME: START 1215 END 1340

BOTTLE TIME: 1340

SAMPLE ISIS ID: CMS-GW-MW4B-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 77.91 FT (TOR)

HISTORICAL WELL DEPTH: 77.0 FT (TOR) BTS

PROTECTIVE CASING STICKUP (FROM GROUND): 2.16 FT

PROTECTIVE CASING / WELL DIFFERENCE: 0.19 FT

DEPTH TO WATER: 6.42 FT (TOR)

SCREEN LENGTH: 31.0 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 71.58 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 11.5 GAL/VOL

TOTAL VOLUME PURGED: 8.5 GAL

AMBIENT AIR: 0.0 PPM

WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1215	1225	1235	1245	1255	1305	1315	1325	1335	~~1340~~
DEPTH TO WATER (ft)	6.49	6.52	6.41	6.45	6.49	6.47	6.41	6.45	6.45	S
PURGE VOLUME (gallons)										A
TEMPERATURE (degrees C)	13.4	13.4	13.3	13.2	13.3	13.3	13.3	13.2	13.3	M
pH (units)	6.81	6.72	6.30	6.01	6.02	6.06	6.08	6.02	6.01	P
TURBIDITY (ntu)	14.0	0.0	Ø	Ø	Ø	Ø	Ø	Ø	Ø	L
SPEC. COND. (mmhos/cm)	.591	.601	.607	.679	.693	.745	.755	.753	.755	I
DISSOLVED OXYGEN (mg/L)	7.55	4.07	2.95	1.15	1.18	0.93	.90	.99	.99	N
REDOX POTENTIAL	274	268	275	264	263	260	256	258	258	G

SAMPLE OBSERVATIONS:

- ☑ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER
☐	☐	_____

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☐ _____

WATER LEVEL EQUIPMENT USED

- ☑ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

		METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒	VOC	8260C	N	HCL	3x40	☐	

NOTES
- Intake for tubing @ 57.0' BTOR.
- Purge @ 350 mL/min.
- Dedicated tubing.

SIGNATURE: [signature]

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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/22/02

WELL ID: MW-04S

ACTIVITY TIME: START 1300 END 1415

BOTTLE TIME: 1405

SAMPLE ISIS ID: CMS-GW-MW04S-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	14 FT (TOR)	HISTORICAL WELL DEPTH	14 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	3.95 FT	PROTECTIVE CASING / WELL DIFFERENCE	0.62 FT
DEPTH TO WATER	6.96 FT (TOR)	SCREEN LENGTH	10 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 7 FT × ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.12 GAL/VOL

TOTAL VOLUME PURGED: 4 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

13:30 begin purging MW-04S at 350 mL/min

PURGE DATA

TIME	1340	1345	1350	1355	1400
DEPTH TO WATER (ft)	6.96	6.96	6.96	6.96	6.96
PURGE ~~VOLUME (gallons)~~ RATE mL/min	350	350	350	350	350
TEMPERATURE (degrees C)	15.8	15.7	15.7	15.6	15.6
pH (units)	6.13	6.13	6.13	6.14	6.14
TURBIDITY (ntu)	0	0	0	0	0
SPEC. COND. (~~uS/cm~~ mS/cm)	0.566	0.573	0.575	0.577	0.576
DISSOLVED OXYGEN (mg/L)	1.16	0	0	0	0
REDOX POTENTIAL	-20	-17	-18	-18	-17

SAMPLE OBSERVATIONS: DUPE

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER

DECON FLUIDS USED:
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☒ disposable, dedicated equipment used

WATER LEVEL EQUIPMENT USED:
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120 mL	☒	

NOTES

dedicated tubing used

SIGNATURE: [signature]

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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: CENTREDALE

JOB NUMBER: 51226

DATE: 10/22/02

WELL ID: MW09S

ACTIVITY TIME START 1330 END 1430

BOTTLE TIME 1420

SAMPLE ISIS ID: CMS-GW-MW09S-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID \ \

MS ID \ \

MSD ID \ \

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 14.30 FT (TOR)

HISTORICAL WELL DEPTH: 10.00 FT (TOR) BGS

PROTECTIVE CASING STICKUP (FROM GROUND): 2.90 FT

PROTECTIVE CASING / WELL DIFFERENCE: -0.50 FT

DEPTH TO WATER: 7.95 FT (TOR)

SCREEN LENGTH: 5 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 6.35 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.02 GAL/VOL

TOTAL VOLUME PURGED: ≈3 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1335	1345	1355	1405	1415	1420
DEPTH TO WATER (ft)	8.28	6.45	6.39	6.39	6.40	C
PURGE VOLUME (gallons) ≈	0.3	1	1.5	2.5	3	O
TEMPERATURE (degrees C)	13.77	14.06	14.05	14.05	14.06	L
pH (units)	6.28	6.37	6.40	6.40	6.43	E
TURBIDITY (ntu)	2	0	0	0	0	T
SPEC. COND. mS/cm (~~umhos/cm~~)	0.459	0.513	0.513	0.513	0.513	P
DISSOLVED OXYGEN (mg/L)	0.0	0.0	0.0	0.0	0.0	L
REDOX POTENTIAL mV	-77	-105	-132	-135	-133	E
RATE ml/min	260	260	260	260	260	

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING:
- ☒ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED:
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID

Dedicated Tubing

WATER LEVEL EQUIPMENT USED:
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED —

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs 8260B	8260B	No	HCL/ice	3X40ml	☒	

NOTES: 0ppm Hdspc. on Water from this well, no sheen
curbed ≈20-25' East of this well location
on capped area 1.

SIGNATURE: [signature]

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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor

JOB NUMBER: 51226.32

DATE: 10-22-07

WELL ID: MW-04D

ACTIVITY TIME: START 1400 END 1450

BOTTLE TIME: 1430

SAMPLE ISIS ID: CMS-GW-MW4D-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID: \ \

MS ID: \ \

MSD ID: \ \

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 48.25 FT (TOR)

HISTORICAL WELL DEPTH: 45.0 FT (TOR) BGS

PROTECTIVE CASING STICKUP (FROM GROUND): 2.62 FT

PROTECTIVE CASING / WELL DIFFERENCE: 0.35 FT

DEPTH TO WATER: 6.87 FT (TOR)

SCREEN LENGTH: 3.5 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 39.13 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 6.80 GAL/VOL

TOTAL VOLUME PURGED: 5.0 GAL

AMBIENT AIR: 0.0 PPM

WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1400	1410	1420	1430	1435	1440	1445	1450	
DEPTH TO WATER (ft)	6.99	6.91	6.87	6.89	6.89	6.93			
PURGE VOLUME (gallons)									
TEMPERATURE (degrees C)	14.1	13.6	13.7	13.9	13.0	13.0	13.0	13.0	
pH (units)	6.57	6.60	6.49	6.31	5.72	5.70	5.73	5.74	
TURBIDITY (ntu)	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	
SPEC. COND. (mS/cm)	.509	.488	.510	.513	.710	.728	.730	.730	
DISSOLVED OXYGEN (mg/L)	6.95	2.91	2.21	2.27	.80	.62	.61	.63	
REDOX POTENTIAL	251	260	270	274	273	285	280	281	

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING / SAMPLING:

- ☑ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER
- ☐ _____

DECON FLUIDS USED:

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☐ _____

WATER LEVEL EQUIPMENT USED:

- ☑ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260C	N	HCL	3x40mL	☑	

NOTES

- Dedicated tubing
- purge @ 350 mL/min
- Pump intake @ 43.0' BTOR.

SIGNATURE: [signature]

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226-32
DATE: 10/20/02
WELL ID: MW-02D
ACTIVITY TIME START: 1430 END: 1545
BOTTLE TIME: 1520
SAMPLE ISIS ID: CMS-GW-MW02D-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	75 ~~69~~ FT (TOR)	HISTORICAL WELL DEPTH	69 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	2.95 FT	PROTECTIVE CASING / WELL DIFFERENCE	0.25 FT
DEPTH TO WATER	6.96 FT (TOR)	SCREEN LENGTH	5 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 62 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 9.92 GAL/VOL

TOTAL VOLUME PURGED: 4 GAL

1440 Begin purging at 400 mL/min

AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

OVER ⇒

TIME	1445	1450	1455	1500	1505
DEPTH TO WATER (ft)	7.01	7.01	7.01	7.01	7.01
PURGE VOLUME (~~gallons~~ liters) /min	0.400	0.250	0.250	0.250	0.250
TEMPERATURE (degrees C)	13.4	13.2	13.1	13.0	13.0
pH (units)	7.13	7.21	7.22	7.22	7.22
TURBIDITY (ntu)	0	0	0	0	0
SPEC. COND. (~~dmhos~~ mS/cm)	0.390	0.389	0.389	0.390	0.391
DISSOLVED OXYGEN (mg/L)	2.15	0	0	0	0
REDOX POTENTIAL	-128	-141	-148	-158	-164

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER
		_____

DECON FLUIDS USED
☐ METHANOL
☐ LIQUINOX
☐ POTABLE WATER
☒ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID
☒ Isopropanol

disposable equip used

WATER LEVEL EQUIPMENT USED
☒ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE
_____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260	N	HCl	120 mL	☒	

NOTES
Additional purge data on reverse page

SIGNATURE: [signature]
RECEIVED BY: _____

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale manor
JOB NUMBER: 51626.32
DATE: 10-22-02
WELL ID: MW-02M
ACTIVITY
TIME START 1510 END 1550
BOTTLE TIME: 1550
SAMPLE ISIS ID: CMS-GW-MW02M-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 32.8 FT (TOR)
HISTORICAL WELL DEPTH: 30.0 FT (TOR) BGS
PROTECTIVE CASING STICKUP (FROM GROUND): 2.78 FT
PROTECTIVE CASING / WELL DIFFERENCE: 0.25 FT
DEPTH TO WATER: 6.79 FT (TOR)
SCREEN LENGTH: 5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 23.21 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 5.8 GAL/VOL
TOTAL VOLUME PURGED: 5.1 GAL
AMBIENT AIR: 0.0 PPM
WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1510	1520	1530	1535	1540	1545	1550		
DEPTH TO WATER (ft)	6.91	6.86	6.90	6.86	6.84	6.81	S		
PURGE VOLUME (gallons)							A		
TEMPERATURE (degrees C)	14.6	13.6	13.9	13.8	13.8	13.8	M		
pH (units)	6.43	6.31	5.85	5.85	5.85	5.85	P		
TURBIDITY (ntu)	Ø	Ø	0.6	0.1	Ø	Ø	L		
SPEC. COND. (~~µMS~~ mS/cm)	.628	.639	.889	.883	.890	.889	I		
DISSOLVED OXYGEN (mg/L)	5.99	2.47	0.56	0.51	0.51	0.47	N		
REDOX POTENTIAL	268	271	276	269	264	263	G		

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☐
SAMPLING: ☐ PERISTALTIC PUMP ☐ SUBMERSIBLE PUMP ☐ BLADDER PUMP ☐ PVC/SILICON TUBING ☐ TEFLON/SILICON TUBING ☐ WATTERA ☐ IN LINE FILTER ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL ☐ LIQUINOX ☐ POTABLE WATER ☐ DEIONIZED WATER ☐ HEXANE ☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED: ☐ ELECTRIC COND. PROBE ☐ FLOAT ACTIVATED ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒	8260C	N	HCL	3x40	☒	

NOTES
- Pump intake @ 27.5' B.T.O.R.
- Dedicated tubing
- Pump purge @ 350 ml/min

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PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226

DATE: 10/22/02

WELL ID: MW02S

ACTIVITY: TIME START 1445 END 1615

BOTTLE TIME: 1600

SAMPLE ISIS ID: CMS-GW-MW02S-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: ~~3.96~~ 11.20 FT (TOR) MJP

HISTORICAL WELL DEPTH: 8.00 FT ~~(TOR)~~ BGS

PROTECTIVE CASING STICKUP (FROM GROUND): 3.51 FT

PROTECTIVE CASING / WELL DIFFERENCE: -0.17 FT

DEPTH TO WATER: 3.96 FT (TOR)

SCREEN LENGTH: 4 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 7.24 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.16 GAL/VOL

TOTAL VOLUME PURGED: ≈ 3.5 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1505	1515	1525	1535	1545	1555	1600
DEPTH TO WATER (ft)	4.02	4.02	4.02	4.02	4.02	4.02	
PURGE VOLUME (gallons) ≈	0.2	1.0	1.5	2.5	3	3.5	
TEMPERATURE (degrees C)	14.45	14.67	14.91	14.91	14.91	14.88	
pH (units)	6.91	7.10	7.10	7.12	7.12	7.12	
TURBIDITY (ntu)	4	0	0	0	0	0	
SPEC. COND. (mS/cm)	0.687	0.690	0.690	0.690	0.691	0.691	
DISSOLVED OXYGEN (mg/L)	0.2	0.0	0.0	0.0	0.0	0.0	
REDOX POTENTIAL	-74	-136	-159	-188	-192	-192	

Rate ml/min 220

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☒ CLOUDY slightly
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING / SAMPLING:

- ☒ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED:

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID

Dedicated tubing

WATER LEVEL EQUIPMENT USED:

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260B	No	HCl/ice	3x40ml	☒	

NOTES

Water has very slight cloudy look to it. No hydrocarbon sheen, poured water out Approx 40-45' West of well on capped area.

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226
DATE: 10/22/02
WELL ID: MW13S
ACTIVITY TIME: START 1635 END 1745
BOTTLE TIME: 1725
SAMPLE ISIS ID: CMS-GW-MW13S-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: ≈ 14.0 FT (TOR)
HISTORICAL WELL DEPTH: 14.0 FT (TOR) 8/03
PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT
PROTECTIVE CASING / WELL DIFFERENCE: -0.23 FT
DEPTH TO WATER: 6.43 FT (TOR)
SCREEN LENGTH: 10 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 7.57 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.21 GAL/VOL
TOTAL VOLUME PURGED: ~ 2.8 GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

TIME	1645	1655	1705	1715	1720	1725
DEPTH TO WATER (ft)	6.45	6.45	6.70	6.71	6.74	COLLECTS AMPLE
PURGE VOLUME (gallons) ~	0.2	1.0	1.7	2.0	2.8	
TEMPERATURE (degrees C)	15.84	15.85	15.91	15.97	15.98	
pH (units)	6.66	6.68	6.70	6.73	6.74	
TURBIDITY (ntu)	6.2	1.2	0	0	0	
SPEC. COND. (~~umhos/cm~~ mS/cm)	0.608	0.605	0592	0.592	0.592	
DISSOLVED OXYGEN (mg/L)	2.64	1.92	0.64	0	0	
REDOX POTENTIAL	-92	-105	-118	-131	-131	
Rate ml/min	260	260	260	260	260	

SAMPLE OBSERVATIONS:
- ☐ CLEAR
- ☐ CLEAR
- ☒ COLORED light yellow
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING / SAMPLING:
- ☒ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED:
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED:
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

dedicated tubing

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260B	No	HCL	3x40ml	☒	

NOTES: No hdspc or sheen on water, poured approx 2.8gal out 10' west of MW13S.

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/22/02

WELL ID: MW-13B

ACTIVITY TIME: START 1615 END 1745

BOTTLE TIME: 1730

SAMPLE ISIS ID: CMS-GW-MW13B-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	80 FT (TOR)	HISTORICAL WELL DEPTH	80 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	6.00 FT (TOR)	SCREEN LENGTH	30 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 74 FT × ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 11.84 GAL/VOL

TOTAL VOLUME PURGED: 2.5 GAL

16:30 begin purging @ 150 mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 21.4 PPM

PURGE DATA

OVER →

TIME	1640	1645	1650	1655	1700
DEPTH TO WATER (ft)	7.35	7.63	7.66	8.21	8.33
PURGE ~~VOLUME (gallons)~~ RATE mL/min	150	150	150	150	150
TEMPERATURE (degrees C)	14.1	14.1	14.0	13.8	13.7
pH (units)	7.54	7.68	7.71	7.73	7.74
TURBIDITY (ntu)	0	0	0	0	0
SPEC. COND. (~~mmhos~~ mS/cm)	0.396	0.395	0.395	0.395	0.395
DISSOLVED OXYGEN (mg/L)	0.76	0	0	0	0
REDOX POTENTIAL	66	57	55	52	51

SAMPLE OBSERVATIONS:
- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER

DECON FLUIDS USED
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☒ none

dedicated, disposable equipment

WATER LEVEL EQUIPMENT USED
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

		METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒	VOC	8260	N	HCl	120mL	☒	

NOTES: add'l purge data on reverse

SIGNATURE: [signature]

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor
JOB NUMBER: 51226.82
DATE: 10-22-02
WELL ID: MW-13D
ACTIVITY: BOTTLE
TIME: START 1640 END 1740
TIME: 1740
SAMPLE ISIS ID: CMS-BW-MW13D-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 46.01 FT (TOR)
HISTORICAL WELL DEPTH: 45.5 FT (TOR) BGS
PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT
PROTECTIVE CASING / WELL DIFFERENCE: NA FT
DEPTH TO WATER: 6.05 FT (TOR)
SCREEN LENGTH: 5.5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 39.55 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 7.90 GAL/VOL
TOTAL VOLUME PURGED: 6.1 GAL
AMBIENT AIR: 0.0 PPM
WELL MOUTH: 125 PPM

PURGE DATA

TIME	1640	1650	1700	1705	1710	1715	1720	1725	1730	1735
DEPTH TO WATER (ft)	6.08	6.06	6.06	6.05	6.06	6.07	6.09	6.08	6.09	6.09
PURGE VOLUME (gallons)										
TEMPERATURE (degrees C)	14.3	14.1	13.8	13.7	13.6	13.6	13.6	13.6	13.6	13.6
pH (units)	6.46	6.20	6.36	6.39	6.38	6.21	6.34	6.33	6.33	6.32
TURBIDITY (ntu)	4.5	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
SPEC. COND. (uhmos/cm)	.036	.033	.061	0.073	0.076	0.46	.682	.709	.711	.713
DISSOLVED OXYGEN (mg/L)	4.40	0.53	0.45	0.43	0.42	0.45	2.12	2.00	2.01	1.99
REDOX POTENTIAL	91	54	-40	-49	-49	12	18	42	45	60

SAMPLE OBSERVATIONS:
☑ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☑
SAMPLING: ☑ PERISTALTIC PUMP
☐ SUBMERSIBLE PUMP
☐ BLADDER PUMP
☐ PVC/SILICON TUBING
☐ TEFLON/SILICON TUBING
☐ WATTERA
☐ IN LINE FILTER
☐ PRESS/VAC FILTER
☐ _____

DECON FLUIDS USED
☐ METHANOL
☐ LIQUINOX
☑ POTABLE WATER
☑ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID
☐ _____

WATER LEVEL EQUIPMENT USED
☑ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE
☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☑ V.O.C.	8260C	N	HCL	3x40	☑	

NOTES

- Dedicated tubing used
- 300 mL/min purge volume
- Pump intake @ 42' BTOR.

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Cartredale Manor
JOB NUMBER: 51626.32
DATE: 10-23-02
WELL ID: MW-14M
ACTIVITY
TIME START: 805 END: 855
BOTTLE TIME: 855
SAMPLE ISIS ID: CMS-GW-MW14M-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: L FT (TOR)
HISTORICAL WELL DEPTH: 34 FT (TOR) BGS
PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT
PROTECTIVE CASING / WELL DIFFERENCE: N/A FT
DEPTH TO WATER: 4.41 FT (TOR)
SCREEN LENGTH: 5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 29.5 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 4.91 GAL/VOL
TOTAL VOLUME PURGED: 5.0 GAL
AMBIENT AIR: 0.0 PPM
WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	808	818	828	838	848	850	855
DEPTH TO WATER (ft)	4.50	4.47	4.42	4.43	4.43	4.43	S
PURGE VOLUME (gallons)	400	350	350	350	350	350	A
TEMPERATURE (degrees C)	12.2	11.9	11.9	12.3	12.4	12.3	M
pH (units)	5.18	5.05	5.10	5.12	5.12	5.12	M
TURBIDITY (ntu)	8.4	0	2.1	5.0	5.0	5.0	P
SPEC. COND. (uMS/cm)	.150	.134	0.222	0.223	0.223	0.223	L
DISSOLVED OXYGEN (mg/L)	7.50	7.33	7.80	7.87	7.89	7.91	E
REDOX POTENTIAL	321	330	338	341	345	346	

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☑
SAMPLING: ☑ PERISTALTIC PUMP
☐ SUBMERSIBLE PUMP
☐ BLADDER PUMP
☐ PVC/SILICON TUBING
☐ TEFLON/SILICON TUBING
☐ WATTERA
☐ IN LINE FILTER
☐ PRESS/VAC FILTER

DECON FLUIDS USED
☐ METHANOL
☐ LIQUINOX
☑ POTABLE WATER
☑ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED
☑ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☑ VOC	8260	N	HCL	3x40mL	☑	

NOTES
- Dedicated tubing
- Pump intake @ 32' B.T.O.R.
- flow is 350 mL/min

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 57226-32

DATE: 10/23/02

WELL ID: GEC-6

ACTIVITY TIME: START 0745 END 0930

BOTTLE TIME: 0915

SAMPLE ISIS ID: CMS-GW-GEC6-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	11 FT (TOR)	HISTORICAL WELL DEPTH	11 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	4.89 FT (TOR)	SCREEN LENGTH	10 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 6 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.96 GAL/VOL

TOTAL VOLUME PURGED: 10 GAL

0805 BEGIN PURGING @ 300 mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

OVER ⇒

TIME	0815	0825	0835	0845	0855
DEPTH TO WATER (ft)	4.89	4.89	4.89	4.89	4.89
PURGE ~~VOLUME (gallons)~~ RATE mL/min	300	300	300	300	300
TEMPERATURE (degrees C)	16.6	17.1	17.2	17.3	17.3
pH (units)	6.08	6.10	6.12	6.13	6.13
TURBIDITY (ntu)	4.6	0	0	0	0
SPEC. COND. ~~(uhmos/cm)~~ mS	0.496	0.493	0.490	0.488	0.492
DISSOLVED OXYGEN (mg/L)	0.72	0.49	0.53	0.44	0.33
REDOX POTENTIAL	-39	-26	-17	-1	14

SAMPLE OBSERVATIONS:
- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☐ POTABLE WATER; ☒ DEIONIZED WATER; ☒ HEXANE; ☒ NITRIC ACID

dedicated, disposable only used

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED: ____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120 mL	☒	

NOTES: add'l purge data on reverse

SIGNATURE: [signature]

RECEIVED BY: ____

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor

JOB NUMBER: 57226

DATE: 10-23-02

WELL ID: GEC1-

ACTIVITY TIME: START 940 END 1035

BOTTLE TIME: 1035

SAMPLE ISIS ID: CMS-GW-GEC1-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	14.21 FT (TOR)	HISTORICAL WELL DEPTH	15.0 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT
PROTECTIVE CASING / WELL DIFFERENCE	N/A FT	DEPTH TO WATER	7.81 FT (TOR)	SCREEN LENGTH	10.0 FT
WELL DIAMETER	2 IN	WELL MATERIAL	PVC	HEIGHT OF WATER COLUMN	7.19 FT

☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) × 7.19 = ~1.45 GAL/VOL

TOTAL VOLUME PURGED: 4.9 GAL

AMBIENT AIR: 0.0 PPM

WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	940	950	1000	1010	1020	1025	1030	1035		
DEPTH TO WATER (ft)	7.98	7.91	7.88	7.82	7.83	7.82	7.84	S		
PURGE VOLUME (gallons)	460	350	350	350	350	350	350	A		
TEMPERATURE (degrees C)	14.5	14.7	14.5	14.8	14.7	14.8	14.9	M		
pH (units)	6.64	6.65	6.64	6.60	6.54	6.53	6.55	P		
TURBIDITY (ntu)	715	[illegible]	22.0	14.2	9.6	Ø	Ø	L		
SPEC. COND. (mS/cm)	.714	.698	.697	.692	.689	.688	.687	I		
DISSOLVED OXYGEN (mg/L)	0.56	.46	.44	.44	.42	.42	.42	N		
REDOX POTENTIAL	-86	-75	-72	-64	-57	-58	-55	G		

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING		DECON FLUIDS USED	WATER LEVEL EQUIPMENT USED
☑	☑	PERISTALTIC PUMP	☐ METHANOL	☒ ELECTRIC COND. PROBE
☐	☐	SUBMERSIBLE PUMP	☐ LIQUINOX	☐ FLOAT ACTIVATED
☐	☐	BLADDER PUMP	☒ POTABLE WATER	☐ KECK INTERFACE PROBE
☐	☐	PVC/SILICON TUBING	☒ DEIONIZED WATER	☐ _____
☑	☑	TEFLON/SILICON TUBING	☐ HEXANE	
☐	☐	WATTERA	☐ NITRIC ACID	
☐	☐	IN LINE FILTER	☐ _____	
☐	☐	PRESS/VAC FILTER		
		_____		

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☑ VOC	8260C	N	HCL	3x40mL	☒	

NOTES

- Dedicated tubing
- pump intake @ 10.0'
- flow rate 350 mL/min

SIGNATURE: [signature]

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Castrucci

JOB NUMBER: 31226-32

DATE: 10/23/02

WELL ID: CINS - GW - GEC5-03

ACTIVITY

TIME: START 0955 END 1105

BOTTLE TIME: 1050

SAMPLE ISIS ID: GEC-5

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	~15 FT (TOR)	HISTORICAL WELL DEPTH	15 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	8.50 FT (TOR)	SCREEN LENGTH	10 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 6.5 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.04 GAL/VOL

TOTAL VOLUME PURGED: 5 GAL

1005 Begin purging @ 300 mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

OVER →

TIME	1015	1025	1030	1035	1040
DEPTH TO WATER (ft)	8.55	8.55	8.55	8.55	8.55
PURGE ~~VOLUME (gallons)~~ RATE mL/min	300	300	300	300	300
TEMPERATURE (degrees C)	18.4	18.7	18.6	18.5	18.5
pH (units)	6.98	7.02	7.01	7.01	7.01
TURBIDITY (ntu)	62.8	31.4	12.2	4.5	4.8
SPEC. COND. ~~(ohmos/cm)~~ mS	0.477	0.478	0.480	0.480	0.480
DISSOLVED OXYGEN (mg/L)	2.22	2.38	0.79	0.88	0.86
REDOX POTENTIAL	-66	-66	-67	-70	-72

SAMPLE OBSERVATIONS:

- ☐ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☒ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒

- ☐ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☒ NITRIC ACID

WATER LEVEL EQUIPMENT USED

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

dedicated, disposable equipment used

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120 mL	☒	

NOTES: add'l purge data on reverse

SIGNATURE:

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PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226

DATE: 10/23/02

WELL ID: GEC-7

ACTIVITY

TIME: START 0930 END 1125

BOTTLE TIME: 1055

SAMPLE ISIS ID: CMS-GW-GEC7-03 ~~CMS-GW-GEC-7~~ MJP

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 10.11 FT (TOR)

HISTORICAL WELL DEPTH: 12.0 FT (TOR) BG-5

PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT

PROTECTIVE CASING / WELL DIFFERENCE: -0.15 FT

DEPTH TO WATER: 3.93 FT (TOR)

SCREEN LENGTH: 10 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 6.18 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.98 GAL/VOL

TOTAL VOLUME PURGED: ~3.5 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1000	1010	1020	1025	1030	1040	1050	1055
DEPTH TO WATER (ft)	3.99	3.99	3.98	3.98	3.98	3.98	3.98	C
PURGE VOLUME (gallons) ≈	0.1	0.8	1.5	2	2.5	3	3.5	O
TEMPERATURE (degrees C) MJP	~~5.60~~ 12.7	13.6	13.7	13.8	14.1	14.1	14.3	L S
pH (units)	5.80	6.14	6.25	6.34	6.45	6.49	6.48	L A
TURBIDITY (ntu)	16	0	0	0	0	0	0	E M
SPEC. COND. (~~ubmhos/cm~~) mS/cm	0.209	0.438	0.566	0.616	0.637	0.638	0.638	C P
DISSOLVED OXYGEN (mg/L)	0.65	0.0	0.0	0.0	0.0	0.0	0.0	T L
REDOX POTENTIAL mV	91	73	32	-43	-89	-89	-90	E
Rate ml/min	250	250						

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER
		_____

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☐ _____

dedicated tubing

WATER LEVEL EQUIPMENT USED

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260B	No	HCl/ice	3X40ml	☒	

NOTES

No hydro. or sheen on water poured water approx 15' south of well on grassed Dep area.

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor
JOB NUMBER: 51226.32
DATE: 10-28-02

WELL ID: GEC-2.
ACTIVITY TIME: START 1100 END 1140
BOTTLE TIME: 1140

SAMPLE ISIS ID: CMS-GW-GEC2-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 15.09 FT (TOR)
HISTORICAL WELL DEPTH: 14.5 FT (TOR) BGS
PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT
PROTECTIVE CASING / WELL DIFFERENCE: N/A FT

DEPTH TO WATER: 8.90 FT (TOR)
SCREEN LENGTH: 10 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC.

HEIGHT OF WATER COLUMN: 6.6 FT (w/o boiler) x
☒ 0.16 GAL/FT (2 IN)
☐ 0.65 GAL/FT (4 IN)
☐ 1.5 GAL/FT (6 IN)
= N 1.12 GAL/VOL

TOTAL VOLUME PURGED: 3.95 GAL

AMBIENT AIR: 0.0 PPM
WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1100	1110	1120	1125	1130	1135	1140		
DEPTH TO WATER (ft)	8.99	9.18	8.99	8.96	8.92	8.91	S		
PURGE VOLUME (gallons)	400	350	350	350	350	350	A		
TEMPERATURE (degrees C)	17.5	18.3	18.0	18.0	18.1	18.0	M		
pH (units)	6.95	6.97	6.99	6.94	6.93	6.93	P		
TURBIDITY (ntu)	51.0	31.0	22.1	2.9	0.7	3.0	L		
SPEC. COND. (~~mS~~ µS/cm)	.843	.902	.896	.893	.890	.892	E		
DISSOLVED OXYGEN (mg/L)	1.92	.81	.60	.57	.54	.53	N		
REDOX POTENTIAL	-65	-72	-73	-74	-74	-74	A		

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING:
☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐

SAMPLING:
☑ PERISTALTIC PUMP
☐ SUBMERSIBLE PUMP
☐ BLADDER PUMP
☑ PVC/SILICON TUBING
☐ TEFLON/SILICON TUBING
☐ WATTERA
☐ IN LINE FILTER
☐ PRESS/VAC FILTER

DECON FLUIDS USED:
☐ METHANOL
☐ LIQUINOX
☑ POTABLE WATER
☑ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED:
☑ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☑ VOC	8260C	N	HCL	3 x 40mL	☒	

NOTES

- Dedicated tubing
- Flow Rate = 350mL
- Pump intake at 9.5' BTOR.

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PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centralia

JOB NUMBER: 57226-32

DATE: 10/23/02

WELL ID: GEC-4

ACTIVITY TIME: START 1240 END 1355

BOTTLE TIME: 1335

SAMPLE ISIS ID: CMS-GW-GEC4-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 14.5 FT (TOR)

HISTORICAL WELL DEPTH: 15 FT (TOR)

PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT

DEPTH TO WATER: 7.55 FT (TOR)

SCREEN LENGTH: 10 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 7 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.12 GAL/VOL

TOTAL VOLUME PURGED: 6 GAL

1250 Begin purging at 400mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1300	1310	1320	1325	1330
DEPTH TO WATER (ft)	7.57	7.57	7.57	7.57	7.57
PURGE ~~VOLUME (gallons)~~ RATE mL/min	400	400	400	400	400
TEMPERATURE (degrees C)	17.5	18.2	18.4	18.4	18.5
pH (units)	6.90	7.00	6.99	6.99	6.98
TURBIDITY (ntu)	210	21.6	4.9	4.6	~~[illegible]~~ 4.5
SPEC. COND. (~~umhos~~ mS/cm)	0.511	0.512	0.510	0.510	0.510
DISSOLVED OXYGEN (mg/L)	2.51	1.31	0.19	0.16	0.17
REDOX POTENTIAL	-51	-73	-72	-74	-74

SAMPLE OBSERVATIONS:

- ☐ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☐ POTABLE WATER; ☒ DEIONIZED WATER; ☐ HEXANE; ☐ NITRIC ACID; ☒ dedicated, disposable tubing used

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED: ____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120mL	☒	

NOTES

SIGNATURE: [signature]

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HARDING ESE, INC.

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226

DATE: 10/23/02

WELL ID: MW06S

ACTIVITY TIME: START 1240 END 1400

BOTTLE TIME: 1350

SAMPLE ISIS ID: CMS-GW-MW06S-03

[X] QC SAMPLES COLLECTED

DUPLICATE ID: CMS-DU-102302A-03

MS ID: \

MSD ID: \

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 8.85 FT (TOR)

HISTORICAL WELL DEPTH: 9.0 FT (TOR) 8.65

PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT

PROTECTIVE CASING / WELL DIFFERENCE: -0.36 FT

DEPTH TO WATER: 5.94 FT (TOR)

SCREEN LENGTH*: 5 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 2.91 FT x [X] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 0.47 GAL/VOL

TOTAL VOLUME PURGED: ≈ 3 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 8.1 PPM

PURGE DATA

TIME	1305	1315	1325	1335	1340	1345	1350
DEPTH TO WATER (ft)	6.01	6.01	6.01	6.01	6.01	6.01	C
PURGE VOLUME (gallons) ≈	0.1	1.0	1.5	2.0	2.5	3.0	O
TEMPERATURE (degrees C)	14.58	14.84	14.97	15.75	15.76	15.77	L S
pH (units)	6.82	7.00	7.07	7.24	7.23	7.23	E A
TURBIDITY (ntu)	0	0	0	0	0	0	C M
SPEC. COND. (mS/cm)	0.756	0.800	0.815	0.829	0.821	0.821	P
DISSOLVED OXYGEN (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	L
REDOX POTENTIAL	-156	-171	-171	-176	-177	-177	E
RATE ml/min	260	260	260	260	260	260	

SAMPLE OBSERVATIONS:

- [X] CLEAR to slight yellow
- [ ] CLEAR
- [ ] COLORED _____
- [ ] COLORED _____
- [ ] CLOUDY _____
- [ ] TURBID _____
- [ ] ODOR _____
- [ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: [X]

SAMPLING: [X] PERISTALTIC PUMP; [ ] SUBMERSIBLE PUMP; [ ] BLADDER PUMP; [ ] PVC/SILICON TUBING; [ ] TEFLON/SILICON TUBING; [ ] WATTERA; [ ] IN LINE FILTER; [ ] PRESS/VAC FILTER; [ ] _____

DECON FLUIDS USED: [ ] METHANOL; [ ] LIQUINOX; [ ] POTABLE WATER; [X] DEIONIZED WATER; [ ] HEXANE; [ ] NITRIC ACID; [ ] _____

dedicated tubing

WATER LEVEL EQUIPMENT USED: [X] ELECTRIC COND. PROBE; [ ] FLOAT ACTIVATED; [ ] KECK INTERFACE PROBE; [ ] _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
[X] VOCs	8260B	No	HCl	3x40 ml	[X]	
Field Dup →	8260B	No	HCl	3x40ml	[X]	

NOTES

* NOTE this is a flush well, it is noted as being a stick up well on the MW summary table.
Hdspc = 11.2, No sheen, drummed water.

SIGNATURE: [signature]

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PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Cantredale Manor

JOB NUMBER: 51226.32

DATE: 10-23-02

WELL ID: [redacted] - [redacted] - MW15D

ACTIVITY TIME: START 1255 END 1400

BOTTLE TIME: 1400

SAMPLE ISIS ID: CMS-GW-MW15D-03

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 53.18 FT (TOR)

HISTORICAL WELL DEPTH: 53.1 FT (TOR) BGS

PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT

DEPTH TO WATER: 7.42 FT (TOR)

SCREEN LENGTH: 5 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 45.68 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = ~7.61 GAL/VOL

TOTAL VOLUME PURGED: 7.81 GAL

AMBIENT AIR: 0.0 PPM

WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1255	1305	1315	1325	1335	1340	1345	1350	1355	1400
DEPTH TO WATER (ft)	7.49	7.53	7.51	7.41	7.39	7.41	7.41	7.41	7.41	S
PURGE ~~VOLUME (gallons)~~ Rate mL/min	450	450	450	350	350	350	350	350	350	A
TEMPERATURE (degrees C)	14.1	14.2	13.5	13.0	13.2	13.2	13.3	13.3	13.2	M
pH (units)	6.89	6.74	6.56	5.92	5.81	5.77	5.70	5.61	5.60	P
TURBIDITY (ntu)	10.6	5.2	0.7	Ø	Ø	Ø	Ø	Ø	Ø	C
SPEC. COND. (~~mS~~ S/cm)	.399	.383	.380	.378	.380	.380	.387	.397	.397	I
DISSOLVED OXYGEN (mg/L)	7.71	6.98	7.14	4.81	4.61	4.05	4.09	4.19	4.16	N
REDOX POTENTIAL	161	178	192	235	249	255	267	270	277	G

SAMPLE OBSERVATIONS:

- ☑ CLEAR
- ☐ CLEAR
- ☐ COLORED _____
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☑	☑	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER
☐	☐	_____

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☒ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☐ _____

WATER LEVEL EQUIPMENT USED

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

		METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒	VOC	8260	N	HCL	3x40mL	☒	

NOTES

- Dedicated tubing only
- Pump intake @ 50.0' BTOR
- Flow rate 450 mL/min. - reduced 350 mL/min at 1315

SIGNATURE: [signature]

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FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/23/02

WELL ID: MW-07S

ACTIVITY TIME: START 1400 END 1530

BOTTLE TIME: 1520

SAMPLE ISIS ID: CMS-GW-MW07S-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	7.8 FT (TOR)	HISTORICAL WELL DEPTH	7.8 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	4.25 FT (TOR)	SCREEN LENGTH	4 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 3.5 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.56 GAL/VOL

TOTAL VOLUME PURGED: 6 GAL

1410 BEGIN PURGING @ 250 mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1420	1430	1440	1450	1500
DEPTH TO WATER (ft)	4.30	4.30	4.30	4.31	4.30
PURGE ~~VOLUME (gallons)~~ RATE mL/min	250	250	250	250	250
TEMPERATURE (degrees C)	15.0	15.1	15.2	15.2	15.2
pH (units)	6.65	6.62	6.59	6.57	6.56
TURBIDITY (ntu)	72.0	66.9	18.9	3.1	1.0
SPEC. COND. (~~uhmos~~ mS/cm)	1.39	1.03	0.723	1.548	0.572
DISSOLVED OXYGEN (mg/L)	1.49	1.47	0.21	0.05	0.01
REDOX POTENTIAL	-93	-72	-70	-67	-65

SEE BACK

SAMPLE OBSERVATIONS:

- ☐ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☒ TURBID Slightly
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒

- ☐ PERISTALTIC PUMP
- ☐ SUBMERSIBLE PUMP
- ☐ BLADDER PUMP
- ☐ PVC/SILICON TUBING
- ☐ TEFLON/SILICON TUBING
- ☐ WATTERA
- ☐ IN LINE FILTER
- ☐ PRESS/VAC FILTER

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☒ NITRIC ACID

WATER LEVEL EQUIPMENT USED

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120 mL	☒	

NOTES: add'l purge data on reverse

SIGNATURE:

RECEIVED BY:

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor
JOB NUMBER: 51226.22
DATE: 10-23-02
WELL ID: MW-07D
ACTIVITY TIME START: 1425 END: 1530
BOTTLE TIME: 1530
SAMPLE ISIS ID: CMS-GW-MW07D-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 57.3 FT (TOR)
HISTORICAL WELL DEPTH: 58 FT (TOR)
PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT
PROTECTIVE CASING / WELL DIFFERENCE: N/A FT
DEPTH TO WATER: 3.68 FT (TOR)
SCREEN LENGTH: 5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 54.32 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 9.05 GAL/VOL
TOTAL VOLUME PURGED: 7.05 GAL
AMBIENT AIR: 0.0 PPM
WELL MOUTH: 0.0 PPM

PURGE DATA

TIME	1425	1435	1445	1455	1505	1515	1520	1525	1530	
DEPTH TO WATER (ft)	3.76	3.82	3.76	3.76	3.77	3.79	3.79	3.79	S	
PURGE VOLUME (gal) Rate 350 ml/min	450	350	350	350	350	350	350	350	N	
TEMPERATURE (degrees C)	12.5	12.2	12.1	11.9	11.9	11.9	11.9	11.9	A	
pH (units)	6.33	6.29	6.24	6.05	5.93	5.87	5.89	5.93	P	
TURBIDITY (ntu)	4.5	0.6	0.7	1.1	8.0	2.7	2.9	4.7	C	
SPEC. COND. (uhmos/cm)	.238	.238	.237	.235	.227	.227	.225	.224	I	
DISSOLVED OXYGEN (mg/L)	6.88	6.68	6.61	6.71	6.86	6.84	6.85	6.91	N	
REDOX POTENTIAL	245	250	254	269	278	286	284	283	G	

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING / SAMPLING:
☒ PERISTALTIC PUMP
☐ SUBMERSIBLE PUMP
☐ BLADDER PUMP
☐ PVC/SILICON TUBING
☐ TEFLON/SILICON TUBING
☐ WATTERA
☐ IN LINE FILTER
☐ PRESS/VAC FILTER

DECON FLUIDS USED:
☐ METHANOL
☐ LIQUINOX
☒ POTABLE WATER
☒ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED:
☒ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCL	3 x 40ml	☒	

NOTES

- Dedicated tubing only
- Flow rate purge 350 ml/min
- Pump intake at 55'

SIGNATURE:
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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226

DATE: 10/23/02

WELL ID: MW 11B

ACTIVITY

TIME START: 1530 END: 1735

BOTTLE TIME: 1700

SAMPLE ISIS ID: CMS-GW-MW11B-03

[X] QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID: CMS-GW-MW11B-03

MSD ID: CMS-GW-MW11B-03

* 9 total VOAs all same ID, w/ Note on chain indicating MS/MSD

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 89.85 FT (TOR)

HISTORICAL WELL DEPTH: 89.5 FT (TOR) DGS

PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT

PROTECTIVE CASING / WELL DIFFERENCE: -0.16 FT

DEPTH TO WATER: 24.03 FT (TOR)

SCREEN LENGTH: No Screen ~~open~~ 89.5 FT

WELL DIAMETER: 2" IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 65.62 FT x [X] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 10.53 GAL/VOL

TOTAL VOLUME PURGED: 4.2 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	1600	1610	1620	1630	1640	1650	1655	1700
DEPTH TO WATER (ft)	24.12	24.12	24.12	24.12	24.12	24.12	24.12	CLEAR
PURGE VOLUME (gallons)	~0.3	0.9	2.1	2.7	3	3.5	4.2	CLEAR
TEMPERATURE (degrees C)	12.10	11.73	11.66	11.71	11.75	11.79	11.79	SAMPLE
pH (units)	5.56	5.30	5.29	5.55	5.71	5.61	5.65	
TURBIDITY (ntu)	0	0	0	0	0	0	0	
SPEC. COND. mS/cm	0.037	0.035	0.034	0.097	0.099	0.099	0.105	
DISSOLVED OXYGEN (mg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
REDOX POTENTIAL	106	116	111	-56	-67	-67	-68	
RATE ml/min	300	300	300	300	300	300	300	

SAMPLE OBSERVATIONS:

- [ ] CLEAR
- [X] CLEAR
- [ ] COLORED _____
- [ ] COLORED _____
- [ ] CLOUDY _____
- [ ] TURBID _____
- [ ] ODOR _____
- [ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: [X]

SAMPLING:
- [X] PERISTALTIC PUMP
- [ ] SUBMERSIBLE PUMP
- [ ] BLADDER PUMP
- [ ] PVC/SILICON TUBING
- [ ] TEFLON/SILICON TUBING
- [ ] WATTERA
- [ ] IN LINE FILTER
- [ ] PRESS/VAC FILTER
- [ ] _____

DECON FLUIDS USED:
- [ ] METHANOL
- [ ] LIQUINOX
- [ ] POTABLE WATER
- [X] DEIONIZED WATER
- [ ] HEXANE
- [ ] NITRIC ACID
- [ ] _____

dedicated tubing

WATER LEVEL EQUIPMENT USED:
- [X] ELECTRIC COND. PROBE
- [ ] FLOAT ACTIVATED
- [ ] KECK INTERFACE PROBE
- [ ] _____

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
[X] Study Sample	8260B	N	HCl/ice	9x40ml	[X]	
[X] MS					[ ]	
[X] MSD					[ ]	

NOTES

Hdspc 280ppm, No screen, containerize water. Note: PID may be malfunct. Recalibrated, but inconsistent readings may be due to cold temps.

~~poured water 15' North of well on grass.~~ WATP

SIGNATURE: [signature]

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Will still containerize the 4 gallons.

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/23/02

WELL ID: MW-11M

ACTIVITY TIME: START 1545 END 1730

BOTTLE TIME: 1705

SAMPLE ISIS ID: CMS-GW-MW11M-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: ~42 FT (TOR)

HISTORICAL WELL DEPTH: 42 FT (TOR)

PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT

DEPTH TO WATER: 23.62 FT (TOR)

SCREEN LENGTH: 6 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 18 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 2.88 GAL/VOL

TOTAL VOLUME PURGED: 6 GAL

1600 BEGIN PURGING @ 350mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

SEE BACK →

TIME	1610	1620	1630	1635	1640
DEPTH TO WATER (ft)	23.64	23.64	23.64	23.64	23.64
PURGE ~~VOLUME (gallons)~~	350	350	350	350	350
TEMPERATURE (degrees C)	12.0	11.8	11.8	11.8	11.8
pH (units)	6.21	5.30	5.20	5.19	5.18
TURBIDITY (ntu)	0	0	0	0	0
SPEC. COND. (~~mhos~~ mS/cm)	0.256	0.325	0.329	0.328	0.330
DISSOLVED OXYGEN (mg/L)	12.48	12.75	12.47	12.46	12.44
REDOX POTENTIAL	146	256	288	297	307

SAMPLE OBSERVATIONS:
- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☐ POTABLE WATER; ☒ DEIONIZED WATER; ☐ HEXANE; ☐ NITRIC ACID; ☒ dedicated, disposable tubing used

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED: ____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260	N	HCl	120 mL	☒	

NOTES: Add'l purge data on back

Containerized purge water had PID headspace of 28.3 ppm. Transported to CMS & added to liquid drum

SIGNATURE: [signature]

RECEIVED BY: ____

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226-32
DATE: 10/24/02
WELL ID: MW-12D
ACTIVITY TIME: START 0730 END 0900
BOTTLE TIME: 0825
SAMPLE ISIS ID: CMS-GW-MW12D-03

[X] QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID: CMS-GW-MW12D-03
MSD ID: CMS-GW-MW12D-03

SAME SAMPLE ID, 3x VOLUME

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 47.5 FT (TOR)
HISTORICAL WELL DEPTH: 44 FT (TOR)
PROTECTIVE CASING STICKUP (FROM GROUND): 2.75 FT
PROTECTIVE CASING / WELL DIFFERENCE: 0.35 FT
DEPTH TO WATER: 14.36 FT (TOR)
SCREEN LENGTH: 5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 30 FT x [X] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 4.80 GAL/VOL
TOTAL VOLUME PURGED: 7 GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

0740 Begin purging at 400 mL/min

PURGE DATA

TIME	0750	0800	0810	0815	0820
DEPTH TO WATER (ft)	14.36	14.36	14.36	14.36	14.36
PURGE ~~VOLUME (gallons)~~ RATE mL/min	400	400	400	400	400
TEMPERATURE (degrees C)	11.4	11.8	11.9	11.9	11.9
pH (units)	5.19	5.51	5.57	5.55	5.53
TURBIDITY (ntu)	0	0	0	0	0
SPEC. COND. (~~umhos~~ mS/cm)	0.327	0.361	0.366	0.366	0.366
DISSOLVED OXYGEN (mg/L)	5.31	6.49	6.83	7.00	7.11
REDOX POTENTIAL	324	314	316	318	322

SAMPLE OBSERVATIONS:
[P] CLEAR
[ ] CLEAR
[ ] COLORED
[ ] COLORED
[ ] CLOUDY
[ ] TURBID
[ ] ODOR
[ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: [X]
SAMPLING: [X] PERISTALTIC PUMP
[ ] SUBMERSIBLE PUMP
[ ] BLADDER PUMP
[ ] PVC/SILICON TUBING
[ ] TEFLON/SILICON TUBING
[ ] WATTERA
[ ] IN LINE FILTER
[ ] PRESS/VAC FILTER

DECON FLUIDS USED:
[ ] METHANOL
[ ] LIQUINOX
[ ] POTABLE WATER
[X] DEIONIZED WATER
[ ] HEXANE
[ ] NITRIC ACID
[X] dedicated, disposable tubing used

WATER LEVEL EQUIPMENT USED:
[X] ELECTRIC COND. PROBE
[ ] FLOAT ACTIVATED
[ ] KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
[X] VOC	8260	N	HCl	120 mL	[X]	

NOTES

SIGNATURE:
RECEIVED BY:

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale
JOB NUMBER: 51226
DATE: 10/24/02
WELL ID: MW-12B
ACTIVITY TIME START: 0730 END: 0850
BOTTLE TIME: 0835
SAMPLE ISIS ID: CMS-GW-MW12B-03

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 105.00 FT (TOR)
HISTORICAL WELL DEPTH: 102.5 FT (TOR) BV-3
PROTECTIVE CASING STICKUP (FROM GROUND): 2.35 FT
PROTECTIVE CASING / WELL DIFFERENCE: -0.23 FT
DEPTH TO WATER: 14.14 FT (TOR)
SCREEN LENGTH: No screen open 525-102.5
WELL DIAMETER: 2" IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 90.86 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 14.5 GAL/VOL
TOTAL VOLUME PURGED: GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

TIME	0740	0750	0800	0810	0820	0830	0835	
DEPTH TO WATER (ft)	14.58	14.67	14.68	14.67	14.67	14.67	C	
PURGE VOLUME (gallons) ≈	0.1	1	1.4	2.3	3	3.1	O	
TEMPERATURE (degrees C)	10.28	12.09	12.06	11.90	11.99	11.98	L	
pH (units)	7.29	7.70	7.67	7.89	8.14	8.15	L	
TURBIDITY (ntu)	0	0	0	0	0	0	E	S
SPEC. COND. (~~uS/cm~~ mS/cm)	0.320	0.310	0.312	0.311	0.306	0.306	C	A
DISSOLVED OXYGEN (mg/L)	1.96	0.11	0.09	0.0	0.0	0.0	T	M
REDOX POTENTIAL	91	6	3	-40	-94	-93		P
RATE ml/min	180	230	230	230				L
							E	

SAMPLE OBSERVATIONS:
☒ CLEAR
☐ CLEAR
☐ COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒
SAMPLING: ☒ PERISTALTIC PUMP
☐ SUBMERSIBLE PUMP
☐ BLADDER PUMP
☐ PVC/SILICON TUBING
☐ TEFLON/SILICON TUBING
☐ WATTERA
☐ IN LINE FILTER
☐ PRESS/VAC FILTER

DECON FLUIDS USED
☐ METHANOL
☐ LIQUINOX
☐ POTABLE WATER
☒ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID
Dedicated tubing

WATER LEVEL EQUIPMENT USED
☒ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260B	No	HCl/ice	3x40ml	☒	

NOTES

Headspace = 0 ppm, poured water out Approx 10' south of well in leaves.
No sheen, Volume ≈ 3-3.5 gal.

SIGNATURE: [signature]
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HARDING ESE, INC.

PAGE 1 OF 1

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/24/02

WELL ID: GEC-3

ACTIVITY TIME: START 0925 END 1030

BOTTLE TIME: 1020

SAMPLE ISIS ID: CMS-GW-GEC3-03

☐ QC SAMPLES COLLECTED — DUPLICATE ID: ; MS ID: ; MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	10 FT (TOR)	HISTORICAL WELL DEPTH	15 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	8.18 FT (TOR)	SCREEN LENGTH	5 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 7 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.12 GAL/VOL

TOTAL VOLUME PURGED: 4 GAL

0935 BEGIN PURGING @ 300mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

TIME	0945	0955	1000	1005	1010
DEPTH TO WATER (ft)	8.18	8.18	8.18	8.18	8.18
PURGE VOLUME (gallons)	300	300	300	300	300
TEMPERATURE (degrees C)	16.5	16.6	16.6	16.7	16.7
pH (units)	7.00	7.02	7.02	7.03	7.04
TURBIDITY (ntu)	3.9	3.4	2.9	2.8	2.9
SPEC. COND. (uhmos/cm)	0.647	0.648	0.650	0.650	0.650
DISSOLVED OXYGEN (mg/L)	7.63	4.77	4.18	3.67	3.69
REDOX POTENTIAL	-51	-54	-55	-57	-58

SAMPLE OBSERVATIONS:
- ☐ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☒ CLOUDY slightly
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
	☒	PERISTALTIC PUMP
		SUBMERSIBLE PUMP
		BLADDER PUMP
		PVC/SILICON TUBING
		TEFLON/SILICON TUBING
		WATTERA
		IN LINE FILTER
		PRESS/VAC FILTER

DECON FLUIDS USED
- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID
- ☒ dedicated, disposable tubing

WATER LEVEL EQUIPMENT USED
- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED: ____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120mL	☒	

NOTES

dtw	RATE	TEMP	pH	TURB	COND	DO	REDOX
8.18	300	16.7	7.04	2.8	0.649	3.66	-57

1015

PID headspace of purge water = 15.5 ppm

water trimmed

SIGNATURE: [signature]

RECEIVED BY: ____

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HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centre dale
JOB NUMBER: 51226
DATE: 10/24/02
WELL ID: MW01S
ACTIVITY
TIME START: 0925 END: 1045
BOTTLE TIME: 1035
SAMPLE ISIS ID: CMS-GW-MW01S

☐ QC SAMPLES COLLECTED
DUPLICATE ID:
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 11.02 FT (TOR)
HISTORICAL WELL DEPTH: 8.1 FT ~~(TOR)~~ 8.35
PROTECTIVE CASING STICKUP (FROM GROUND): 3.26 FT
PROTECTIVE CASING / WELL DIFFERENCE: -0.24 FT
DEPTH TO WATER: 4.33 FT (TOR)
SCREEN LENGTH: ≈ 4.5 FT
WELL DIAMETER: 2 IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 6.69 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.07 GAL/VOL
TOTAL VOLUME PURGED: ~ ~~4.8~~ 4.8 (MSP) GAL
AMBIENT AIR: 0 PPM
WELL MOUTH: 0 PPM

PURGE DATA

TIME	0940	0950	1000	1010	1020	1030	1035
DEPTH TO WATER (ft)	4.36	4.36	4.36	4.36	4.36	4.36	C
PURGE VOLUME (gallons) ~	0.3	1.0	2.0	2.8	3.8	4.8	O
TEMPERATURE (degrees C)	13.80	13.79	14.08	14.08	14.08	14.07	L
pH (units)	6.54	6.51	6.60	6.63	6.75	6.75	E
TURBIDITY (ntu)	6	1	0	0	0	0	L
SPEC. COND. (~~uhmos/cm~~ mS/cm)	0.511	0.586	0.589	0.593	0.596	0.596	T
DISSOLVED OXYGEN (mg/L)	1.33	1.76	1.10	1.06	0.97	0.98	
REDOX POTENTIAL	-131	-138	-157	-170	-195	-194	

RATE ml/min 300 310

SAMPLE OBSERVATIONS:
☐ CLEAR
☐ CLEAR
☒ COLORED RUSTY COLORED
☐ COLORED
☐ CLOUDY
☐ TURBID
☐ ODOR
☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒
SAMPLING: ☒ PERISTALTIC PUMP
SUBMERSIBLE PUMP
BLADDER PUMP
PVC/SILICON TUBING
TEFLON/SILICON TUBING
WATTERA
IN LINE FILTER
PRESS/VAC FILTER

DECON FLUIDS USED
☐ METHANOL
☐ LIQUINOX
☐ POTABLE WATER
☒ DEIONIZED WATER
☐ HEXANE
☐ NITRIC ACID

dedicated tubing

WATER LEVEL EQUIPMENT USED
☒ ELECTRIC COND. PROBE
☐ FLOAT ACTIVATED
☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260B	No	HCl / ice	3X 40 ml	☒	

NOTES

SIGNATURE: [signature]
RECEIVED BY:

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale

JOB NUMBER: 51226-32

DATE: 10/24/02

WELL ID: MW-11S

ACTIVITY

TIME START 1045 END 1200

BOTTLE TIME: 1145

SAMPLE ISIS ID: CMS-GW-MW11S-C3

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 26 FT (TOR)

HISTORICAL WELL DEPTH: 25 FT (TOR)

PROTECTIVE CASING STICKUP (FROM GROUND): N/A FT

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT

DEPTH TO WATER: 24.32 FT (TOR)

SCREEN LENGTH: ~~10~~ 5 FT

WELL DIAMETER: 2 IN

WELL MATERIAL: PVC

HEIGHT OF WATER COLUMN: 1.7 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 0.272 GAL/VOL

TOTAL VOLUME PURGED: 3 GAL

1100 BEGIN PURGING @ 150 mL/min

AMBIENT AIR: 0 PPM

WELL MOUTH: 5.7 PPM

PURGE DATA

TIME	1110	1120	1130	1135	1140
DEPTH TO WATER (ft)	24.38	24.37	24.37	24.37	24.37
PURGE ~~VOLUME (gallons)~~ RATE mL/min	150	150	150	150	150
TEMPERATURE (degrees C)	12.8	12.7	12.7	12.7	12.7
pH (units)	5.67	5.60	5.59	5.59	5.59
TURBIDITY (ntu)	5.0	0	0	0	0
SPEC. COND. (~~uS~~ mS/cm)	0.404	0.393	0.393	0.392	0.392
DISSOLVED OXYGEN (mg/L)	13.76	13.81	13.88	13.83	13.86
REDOX POTENTIAL	255	280	291	297	294

SAMPLE OBSERVATIONS:

- ☒ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☐ TURBID
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: ☒

SAMPLING: ☒ PERISTALTIC PUMP; ☐ SUBMERSIBLE PUMP; ☐ BLADDER PUMP; ☐ PVC/SILICON TUBING; ☐ TEFLON/SILICON TUBING; ☐ WATTERA; ☐ IN LINE FILTER; ☐ PRESS/VAC FILTER

DECON FLUIDS USED: ☐ METHANOL; ☐ LIQUINOX; ☐ POTABLE WATER; ☒ DEIONIZED WATER; ☐ HEXANE; ☐ NITRIC ACID; ☒ disposable, dedicated tubing used

WATER LEVEL EQUIPMENT USED: ☒ ELECTRIC COND. PROBE; ☐ FLOAT ACTIVATED; ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOC	8260	N	HCl	120mL	☒	

NOTES

SIGNATURE:

RECEIVED BY:

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centre Dale
JOB NUMBER: 51226
DATE: 10/29/02
WELL ID: MW05S
ACTIVITY TIME START: 1120 END: 1400
BOTTLE TIME: 1345
SAMPLE ISIS ID: CMS-GW-MW05S-03

[X] QC SAMPLES COLLECTED
DUPLICATE ID: CMS-DU-102902A-03 3x40ml
MS ID:
MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH: 9.15 FT (TOR)
HISTORICAL WELL DEPTH: 8 FT (BGS)
PROTECTIVE CASING STICKUP (FROM GROUND): Flush FT
PROTECTIVE CASING / WELL DIFFERENCE: -0.25 FT
DEPTH TO WATER: 7.43 FT (TOR)
SCREEN LENGTH: 4.9 FT
WELL DIAMETER: 2" IN
WELL MATERIAL: PVC
HEIGHT OF WATER COLUMN: 1.72 FT x [X] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 0.28 GAL/VOL
TOTAL VOLUME PURGED: 1.1 litres ~~GAL~~
AMBIENT AIR: 0 PPM
WELL MOUTH: 341 PPM

PURGE DATA

TIME	1145	1220	1345		
DEPTH TO WATER (ft)	Dried up	8.99	C		
PURGE VOLUME (~~gallons~~) litres	1/3 litre	.8 litre	O		
TEMPERATURE (degrees C)	14.92	16.59	L	S	
pH (units)	7.52	7.55	L	A	
TURBIDITY (ntu)	0	0	E	M	
SPEC. COND. (~~umhos/cm~~) mS/cm	0.288	0.288	C	P	
DISSOLVED OXYGEN (mg/L)	11.39	8.64	T	L	
REDOX POTENTIAL	-93	-109		E	
RATE ml/min	90ml/min	90ml/min			

SAMPLE OBSERVATIONS:
[X] CLEAR
[ ] CLEAR
[ ] COLORED
[ ] COLORED
[ ] CLOUDY
[ ] TURBID
[ ] ODOR
[ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: [X]
SAMPLING: [X] PERISTALTIC PUMP
[ ] SUBMERSIBLE PUMP
[ ] BLADDER PUMP
[ ] PVC/SILICON TUBING
[ ] TEFLON/SILICON TUBING
[ ] WATTERA
[ ] IN LINE FILTER
[ ] PRESS/VAC FILTER

DECON FLUIDS USED:
[ ] METHANOL
[ ] LIQUINOX
[ ] POTABLE WATER
[X] DEIONIZED WATER
[ ] HEXANE
[ ] NITRIC ACID
dedicated tubing

WATER LEVEL EQUIPMENT USED:
[X] ELECTRIC COND. PROBE
[ ] FLOAT ACTIVATED
[ ] KECK INTERFACE PROBE

NUMBER OF FILTERS USED:

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
[X] VOCs	8260B	No	HCl/ice	6x40ml (includes duplicate)	[X]	

NOTES: Began purging, well purged dry @ 120ml/min. Well recovered to 7.87' BTOR, purged @ 90ml/min (approx. lower limit of pump) and well purged dry again. Again well purged dry, intake is @ bottom of well @ 9.15' BTOR.

SIGNATURE: [signature]
RECEIVED BY:

~~Rest~~

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HARDING ESE, INC.

OVER

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: CMJ

JOB NUMBER: 51226 R1

DATE: 11/21/02

WELL ID: CMS-GW-MW035-03

ACTIVITY

TIME: START 0900 END 1100

BOTTLE TIME: 1040

SAMPLE ISIS ID:

☐ QC SAMPLES COLLECTED

DUPLICATE ID:

MS ID:

MSD ID:

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	11.8 FT (TOR)	HISTORICAL WELL DEPTH	12 FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	3.1 FT	PROTECTIVE CASING / WELL DIFFERENCE	0.13 FT
DEPTH TO WATER	4.29 FT (TOR)	SCREEN LENGTH	10 FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 7.5 FT x ☒ 0.16 GAL/FT (2 IN) ☐ 0.65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) = 1.2 GAL/VOL

TOTAL VOLUME PURGED: 2.8 GAL

AMBIENT AIR: 0 PPM

WELL MOUTH: 0 PPM

PURGE DATA

BEGIN PURGE AT 0925

TIME	0930	0935	0940	0945	0950
DEPTH TO WATER (ft)	4.52	4.51	4.52	4.52	4.52
PURGE ~~VOLUME (gallons)~~ RATE mL/min	200	200	200	200	200
TEMPERATURE (degrees C)	8.91	9.02	9.07	9.23	9.28
pH (units)	6.41	6.49	6.53	6.57	6.62
TURBIDITY (ntu)	2.9	2.2	2.4	2.3	2.6
SPEC. COND. (~~umhos~~ mS/cm)	0.133	0.127	0.128	0.129	0.132
DISSOLVED OXYGEN (mg/L)	0.96	0.70	0.64	0.59	0.69
REDOX POTENTIAL	-5	-64	-75	-90	-95

SAMPLE OBSERVATIONS:

- ☐ CLEAR
- ☐ CLEAR
- ☐ COLORED
- ☐ COLORED
- ☐ CLOUDY
- ☒ TURBID Slightly
- ☐ ODOR
- ☐ OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☒	☒	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BLADDER PUMP
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	WATTERA
☐	☐	IN LINE FILTER
☐	☐	PRESS/VAC FILTER

DECON FLUIDS USED

- ☐ METHANOL
- ☐ LIQUINOX
- ☐ POTABLE WATER
- ☒ DEIONIZED WATER
- ☐ HEXANE
- ☐ NITRIC ACID

WATER LEVEL EQUIPMENT USED

- ☒ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE

NUMBER OF FILTERS USED

DEDICATED, DISPOSABLE TUBING USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☒ VOCs	8260	N	HCl	120 mL	☒	

NOTES

SIGNATURE: [illegible]

RECEIVED BY:

OVER

HARDING ESE, INC.

FIELD DATA RECORD - GROUNDWATER SAMPLING

PROJECT: Centredale Manor
JOB NUMBER: 51226-R1
DATE: 11/21/02
WELL ID: CMS-MW05S-03
ACTIVITY TIME: START 1140 END 1400
BOTTLE TIME: 1220
SAMPLE ISIS ID:

[X] QC SAMPLES COLLECTED
DUPLICATE ID: CMS-GW-MW05S-DU
MS ID: CMS-GW-MW05S-MS
MSD ID: CMS-GW-MW05S-MSD

WATER LEVEL / WELL DATA

MEASURED WELL DEPTH	9.25 FT (TOR)	HISTORICAL WELL DEPTH	— FT (TOR)	PROTECTIVE CASING STICKUP (FROM GROUND)	N/A FT	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT
DEPTH TO WATER	6.33 FT (TOR)	SCREEN LENGTH	— FT	WELL DIAMETER	2 IN	WELL MATERIAL	PVC

HEIGHT OF WATER COLUMN: 3 FT x [ ] 0.16 GAL/FT (2 IN) [ ] 0.65 GAL/FT (4 IN) [ ] 1.5 GAL/FT (6 IN) = 0.48 GAL/VOL

TOTAL VOLUME PURGED: 0.9 GAL

AMBIENT AIR: PPM

WELL MOUTH: PPM

PURGE DATA

BEGIN PURGING AT 1155

TIME	1205	1210	1215		
DEPTH TO WATER (ft)	6.50	6.96	7.14		
PURGE ~~VOLUME (gallons)~~ RATE mL/min	150	150	150		
TEMPERATURE (degrees C)	13.63	14.03	14.19		
pH (units)	7.03	7.03	7.03		
TURBIDITY (ntu)	0	0	0		
SPEC. COND. (~~umhos/cm~~ mS/cm)	0.258	0.268	0.269		
DISSOLVED OXYGEN (mg/L)	10.41	7.62	7.64		
REDOX POTENTIAL	89	81	83		

SAMPLE OBSERVATIONS:
- [X] CLEAR
- [ ] CLEAR
- [ ] COLORED _____
- [ ] COLORED _____
- [ ] CLOUDY _____
- [ ] TURBID _____
- [ ] ODOR _____
- [ ] OTHER (see notes)

EQUIPMENT DOCUMENTATION

PURGING: [X]

SAMPLING:
- [ ] PERISTALTIC PUMP
- [ ] SUBMERSIBLE PUMP
- [ ] BLADDER PUMP
- [ ] PVC/SILICON TUBING
- [ ] TEFLON/SILICON TUBING
- [ ] WATTERA
- [ ] IN LINE FILTER
- [ ] PRESS/VAC FILTER
- _____

DECON FLUIDS USED:
- [ ] METHANOL
- [ ] LIQUINOX
- [ ] POTABLE WATER
- [X] DEIONIZED WATER
- [ ] HEXANE
- [ ] NITRIC ACID
- _____

WATER LEVEL EQUIPMENT USED:
- [X] ELECTRIC COND. PROBE
- [ ] FLOAT ACTIVATED
- [ ] KECK INTERFACE PROBE
- _____

NUMBER OF FILTERS USED _____

DEDICATED DISPOSABLE TUBING USED

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
~~[X] 8260 VOC~~	~~8260~~	~~N~~	~~HCl~~	~~120mL~~	~~[X]~~	
[X] DIOXIN/FURAN		N		2500mL	[X]	DU / MS / MSD

DIOXIN/FURAN ONLY!

NOTES: WELL IS DRAWING DOWN, AND ~2 WELL VOLUMES PURGED. BEGIN SAMPLING TO AVOID PUMPING WELL DRY

SIGNATURE: [signature]

RECEIVED BY: _____