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PRS 76

FURTHER ASSESSMENT DATA REPORT

Mound Plant
Miamisburg, OH

Final Rev. 1

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Department of Energy

BWXT of Ohio, Inc.

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Acronyms

bgs	below ground surface
CAR	Corrective Action Report
DCE	dichloroethene
DOE	Department of Energy
FA	Further Assessment
GV	Guideline value
MDA	minimum detectable activity
MS/MSD	matrix spike/matrix spike duplicate
OEPA	Ohio Environmental Protection Agency
PCE	tetrachloroethene
pCi/g	picoCuries per gram
pCi/l	picoCuries per liter
PRS	Potential Release Site
QA/QC	Quality Assurance/Quality Control
SAP	Sampling and Analysis Plan
TCE	trichloroethene
ug/kg	micograms per kilogram
ug/l	micrograms per liter
VOC	volatile organic compound

1.0 INTRODUCTION

This Data Report has been prepared to document the investigation of Potential Release Site (PRS) 76 as part of the Miamisburg Environmental Management Project at the U. S. Department of Energy (DOE) Mound Plant.

1.1 BACKGROUND

PRS 76 is the site of the former Warehouse 9, built as part of the original Mound facility in 1947. Warehouse 9 was a wooden structure with an elevated wooden floor. It was originally used to store cement, but later was used to ship and receive drummed radioactive materials. Warehouse 9 served as the central point of waste shipments until December 1954. In 1955, the warehouse and/or its platform were used for unloading drums for the planned thorium refinery (DOE 1992). Photographs indicate the warehouse was gone by 1962.

1.2 PURPOSE

The purposes of this Further Assessment (FA) Data Report are to:

- document the investigation of PRS 76,
- describe any variances to the Sampling and Analysis Plan (SAP), and
- present the analytical results.

2.0 INVESTIGATIVE ACTIVITIES / SAP VARIANCES

Roy F. Weston, Inc. (WESTON®) was retained by BWXT of Ohio, Inc. to conduct the field investigation of PRS 76. Sampling activities occurred during September and October 1999. The investigation was conducted in accordance with the SAP (included as Appendix A) unless described as a variance herein.

2.1 BORING LOCATIONS

Per the SAP, fifteen borings were surveyed, staked, and identified at the site prior to the start of field activities. All borings were initiated in their designated locations, although two additional borings (offsets) were installed in order to obtain sufficient media for all sampling intervals.

Boring locations are shown on Figures 1 and 2 and coordinates are presented in Table 1. Offset locations are designated with an "a".

Soil classifications recorded during fieldwork are presented on boring logs in Appendix D. With the exception of a nail in B10, no inorganic debris was observed in the fill material beneath the asphalt and sub-base.

2.2 SAMPLE SUMMARY

Table 2 documents the total number of investigative and quality control samples collected during the investigation for each target analysis. The required quality control collection frequencies as defined in the SAP were met. Table 3 presents a sample and interval index.

2.3 SAP VARIANCES

Variances to the SAP are summarized in Table 4. Corrective Action Reports (CARs) are presented in Appendix E.

3.0 RESULTS

WESTON obtained soil analytical results from the subsurface investigation at PRS 76. This section summarizes the analytical results. Copies of the analytical results and data validation forms are available for review.

The following analytical providers were used in support of this investigation:

- Onsite laboratory for gamma spectrometry screenings;
- Recra LabNet for volatile organic analyses; and
- Quanterra – Richland for offsite radioisotopic analyses.

3.1 ONSITE GAMMA SPECTROMETRY SCREENING

Onsite gamma spectrometry screenings were performed on all soil samples. Onsite gamma spec results are tabulated and presented in Table 5. According to the SAP, the need for offsite analysis by gamma spectrometry was contingent upon the results of the onsite gamma

screening. Based on the results of the onsite gamma screening, offsite gamma spectrometry was not pursued.

3.2 OFFSITE RADIOLOGICAL ANALYSIS RESULTS

Based on historical information and previous investigative sampling data, isotopic plutonium and thorium were designated as the primary contaminants of concern. All soil samples were submitted for offsite isotopic plutonium and thorium analyses per Method A-012, Alpha Spectrometry (DOE 1999). Table 6 presents the resulting radiological data, risk-based guideline values (GVs, DOE 1997), and background values for comparison. No results exceeded comparison criteria (GV or GV+background, as applicable).

3.3 VOLATILE ORGANIC ANALYSIS RESULTS

Based on available historic information, the use or storage of organic solvents has not been associated with Warehouse 9. At the request of OEPA, samples were collected and submitted for volatile organic analysis.

Volatile organic analyses were performed on all samples collected. Table 7 presents the analytes detected in the samples and associated comparison criteria. The risk-based guideline values presented in the table represent the 10^{-6} criteria or the Hazard Index=1 criteria if 10^{-6} criteria does not exist for the Construction/Mound Employee Scenario. No results exceeded comparison criteria.

Figure 2 illustrates the maximum concentration of the most predominant volatile organic contaminants identified within the investigational area.

3.4 DATA REVIEW

The requirements of the SAP were met by adhering to the default data validation requirement of 90/10 where 90 percent of the data are reviewed and 10 percent are validated. During data review, key quality control results are assessed to determine whether there are indications the data may be biased and unusable. Data validation is performed to gain a better understanding of the quality of the data received from the laboratory and to assess data usability for critical decision-making. A summary of the data review and validation is presented in Appendix F.

4.0 EVALUATION

Leaching of VOCs to groundwater will be evaluated as an addendum to the PRS 76 Data Package.

5.0 REFERENCES

DOE 1992 Operable Unit 9 Site Scoping Report: Vol. 7 – Waste Management, Final Rev. 0, February 1993.

DOE 1997 Risk-Based Guideline Values, Final, Revision 4, March 1997.

DOE 1999 Mound Methods Compendium, Mound Environmental Management Program, May 2000, Issue 1, MD-80045.

APPENDIX A

SAMPLING & ANALYSIS PLAN

PRS 76
SAMPLING & ANALYSIS PLAN

FINAL
Revision 3

Mound Plant
Miamisburg, OH

September 1999

Department of Energy
Ohio Field Office

Prepared by the Soils Project of
BABCOCK & WILCOX OF OHIO

Sampling and Analysis Plan
For PRS 76

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A Data Quality Objectives

B Field Entry Form

1. INTRODUCTION

The Sampling and Analysis Plan (SAP) has been prepared as part of the Miamisburg Environmental Management Program for Potential Release Site (PRS) 76 at the U.S. Department of Energy (DOE) Mound Plant, Miamisburg, Ohio. The SAP is intended to summarize specific methods and procedures used for fulfilling the Data Quality Objectives (DQO) for PRS 76 investigation.

Cleanup guidelines are presented in this document to help the reviewer assess whether a detected chemical concentration or radionuclide activity is significant. Per CERCLA guidance, contaminant concentrations or activities that are equivalent to a 10^{-6} risk of cancer incidence are used to screen contaminants of concern. Therefore, historical sampling data is compared to the 10^{-6} guideline criteria from Table 4B of the Risk-based Cleanup Guideline Values Report, March, 1997, Appendix B or the most current revision of this document. However, historical plutonium^{238} data will be compared to a 10^{-5} risk based guideline criteria since plutonium^{238} is a primary contaminant at Mound and a pre-agreed cleanup standard of 55 pCi/g (10^{-5}) is already in place.

The following section presents a summary of historical information and previous investigations.

1.1 Historical Information

PRS 76 was the site of the former Warehouse 9, built as part of the original Mound facility in 1947 to store construction materials. It was a wooden structure with an elevated wooden floor. It was originally used to store cement, but later was apparently used to ship and receive drummed radioactive materials. Warehouse 9 served as the central point of waste shipments until December 1954. In 1955, the warehouse and/or its platform were used for unloading thorium drums. The thorium was to be used in the planned thorium refinery. Photographs indicate the warehouse was gone by 1962. It was probably sold for salvage and like many of the old warehouses, the flooring was too contaminated to remove from the site. Though it has not been confirmed, the floor may have been burned in place (DOE 1992b).

Presently, PRS 76 is located in the parking lot east of Building 43 just below the Main Hill on the south side. The surface is paved with asphalt.

1.2 Previous Investigations

WTS Excavation Area Verification Survey

Four borings (identified as 32, 34, 35, and53) were drilled in the vicinity of PRS 76 during the 1986 Waste Transfer System (WTS) Excavation Area Verification Survey. Soil samples were analyzed for Plutonium^{238}. The 10^{-5} risk based guideline criteria for Plutonium^{238} in soil (55 pCi/g) was not exceeded at any of the locations. Detections ranged from 8.3 pCi/g to 27 pCi/g.

OU6, Area 19 and Area 14 Verification Study

Soil samples were collected in the vicinity of PRS 76 during Operable Unit 6, Area 19 and Area 14 verification study of the Waste Transfer Line (WTS) pipeline removal. One boring (19-3M) was drilled along the WTS pipeline adjacent to the historic location of Warehouse 9. The samples were analyzed for VOCs, SVOCs, Metals, and selected radioisotopes. Beryllium and Thorium^{228} were detected above 10^{-6} risk based criteria. The maximum Thorium^{228} activity detected is presented in Table 1.1. Beryllium was detected at concentrations slightly above risk based guideline criteria at two sampling intervals. The detections were not considered significant because they were below background levels for beryllium and both detections were qualified as estimated. The 10^{-6} risk-based guideline criterion for beryllium is 0.7 mg/kg. The background value for comparison to Mound Plant Soils for beryllium is 1.3 mg/kg, according to Table A-3 of the Mound 2000 Residual Risk Evaluation Methodology. No analyses were performed for organic constituents within the footprint of the building. Organics may have been present if the floor of the warehouse had actually been burned in place.

The maximum activities detected for the target radionuclides during the Area 19 and Area 14 Verification Study are summarized in table 1.1. Uranium detections were approximately at or below background values used for comparison to Mound Plant Soils.

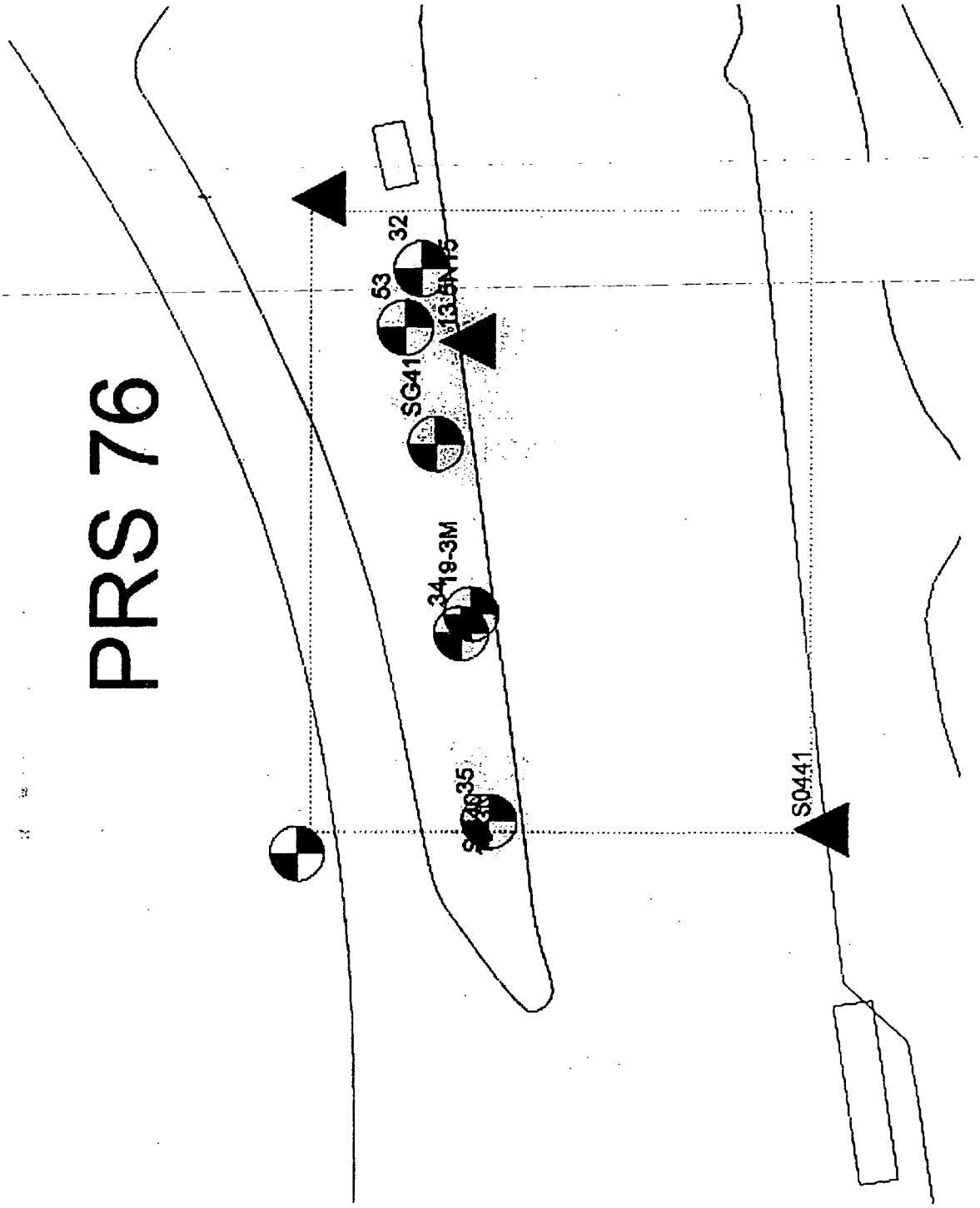
Table 1.1 – Area 19 and Area 14 Verification Study - Maximum Activity Levels

Contaminant	Map Location	Sampling Interval	Maximum Activity Detected (pCi/g)	Guideline Criteria (pCi/g)
Plutonium^{238}	19-3M	3-6 feet	6.82	55 (10^{-5} criteria)
Thorium^{228}	19-3M	8-9 feet	1.35	0.11 (10^{-6} criteria)
Thorium^{230}	19-3M	8-9 feet	1.48	44 (10^{-6} criteria)
Thorium^{232}	19-3M	8-9 feet	1.46	3.0 (ALARA Cleanup)
Uranium^{234}	19-3M	8-9 feet	0.93	37.5 (10^{-6} criteria)
Uranium^{235}	19-3M	8-9 feet	0.12	3.35 (10^{-6} criteria)
Uranium^{238}	19-3M	8-9 feet	1.12	11.0 (10^{-6} criteria)

Soil Gas Survey of Area K

One boring (identified as SG41) was drilled in the vicinity of PRS 76 during the Soil Gas Survey of Area K. Soil samples were analyzed for Benzene and Toluene. Neither analyte was detected above risk-based guideline criteria.

Figure 1.1 – Previous Sampling Locations



2. Data Quality Objectives

The primary objective for sampling PRS 76 is to provide data of sufficient quality for the Core Team to determine if the soils beneath the former Warehouse 9 Building should be considered for remediation due to radionuclide contamination. This objective will be met by collecting soil samples at specific locations and depths, and analyzing soils for radionuclide isotopes. Alpha Spectrometry will be used to analyze for the primary radionuclides of concern, isotopic plutonium, and thorium. While uranium was detected in the vicinity of PRS 76, the detected activities were near background and below guideline criteria; therefore, uranium is not a target of concern. Because this site was used for the storage of radioactive waste, it is possible that other isotopes may be present. If other isotopes are identified during the onsite gamma spectrometry field screening, selected samples may be submitted for offsite gamma spectroscopy analysis.

The resulting analytical data will be evaluated to define the nature and extent of the radionuclides of concern. The level for each target radionuclide will be tabulated against risk-based guideline criteria specified in Table 2.1. Cleanup guidelines are presented in this document to help the reviewer assess whether a detected chemical concentration or radionuclide activity is significant. Per CERCLA guidance, contaminant concentrations or activities that are equivalent to a 10^{-6} risk of cancer incidence are used to screen contaminants of concern. Therefore, historical sampling data is compared to the 10^{-6} guideline criteria from Table 4B of the Risk-based Cleanup Guideline Values Report, March, 1997, Appendix B or the most current revision of this document. However, historical plutonium^{238} data will be compared to a 10^{-5} risk based guideline criteria since plutonium^{238} is a primary contaminant at Mound and a pre-agreed cleanup standard of 55 pCi/g (10^{-5}) is already in place. These screening levels will also be used to set the analytical detection limits.

Table 2.1 – Guideline Criteria Defined by Type of Radionuclide

Radionuclide	Guideline Criteria (pCi/g)
Plutonium^{238}	55 (10^{-5} Risk Criteria)
Plutonium$^{239/240}$	5.5 (10^{-6} Risk Criteria)
Thorium^{228}	0.11 (10^{-6} Risk Criteria)
Thorium^{230}	44 (10^{-6} Risk Criteria)
Thorium^{232}	3.0 (ALARA Cleanup)

At the request of OEPA, each sample will be analyzed for organic volatile compounds.
The Core Team, comprised of DOE/US EPA/OEPA representatives, will ultimately decide if soils require remediation. A summary of the PRS 76 DQO is presented in Appendix A.

3. SAMPLE LOCATION, FREQUENCY, AND DESIGNATION

Prior to the start of the field activities, the sampling locations will be surveyed, staked, and identified at the site. Horizontal locations will be reported in the Ohio State Plane Coordinate System. If any sampling locations are moved during the field investigation, the locations will be re-surveyed.

The following subsections discuss the sampling locations, frequencies, and sample designation scheme.

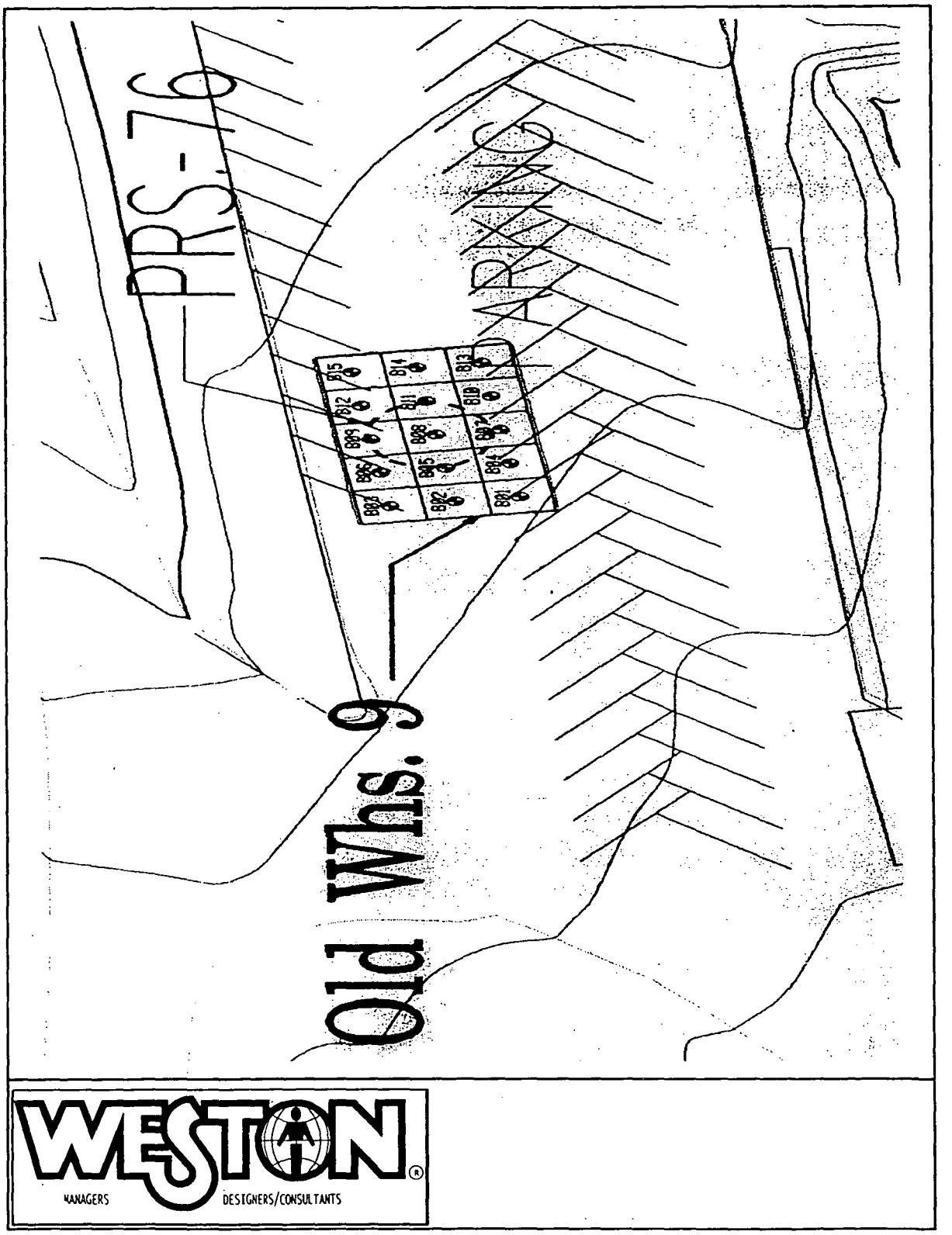
3.1 Sample Location and Frequency

Fifteen soil borings will be located within the historic location of Warehouse 9. A 10-foot by 10-foot square grid within an approximate area of 35 feet by 50 feet will be used to locate the borings. Soil samples will be collected continuously at 4-foot sampling intervals to auger refusal, approximately 12-feet deep. This will result in a total of approximately 45 soil samples. Figure 1-1 shows the boring locations at PRS 76. Table 3.1 presents the horizontal sample location coordinates that will be used by BWO-Mound representatives to locate the soil borings prior to sampling. The sampling procedure is discussed in Section 4.0.

Table 3.1. Survey Coordinates for Sample Locations

Sample Location	Survey Coordinate (X)	Survey Coordinate (Y)
B01	1465119.981	598116.708
B02	1465118.55	598126.607
B03	1465117.12	598136.502
B04	1465129.879	598118.14
B05	1465128.448	598128.037
B06	1465127.018	598137.934
B07	1465139.777	598119.569
B08	1465138.345	598129.467
B09	1465136.914	598139.366
B10	1465149.673	598121.001
B11	1465148.243	598130.898
B12	1465146.811	598140.796
B13	1465159.571	598122.432
B14	1465158.139	598132.33
B15	1465156.709	598142.225

Figure 1-2 PRS 76 Sampling Locations



3.2 Sample Designation

Soil and quality control (QC) samples will be identified and labeled according to procedures in Method: S-028, Sample Control and Documentation, of the Methods Compendium, February 1999 (Revision 5). Sample identification labels will be used for each sample container. Samples will be sealed in containers immediately after collection. Labels will be completed prior to collection to minimize the handling of the sample containers. Each label will include the following information:

- Sample identification
- Time and date of collection
- Parameters to be analyzed
- Sampler's initials

Collected samples will be uniquely identified according to the system PRS76-W-XX-YY-ZZZZZZ, where:

W = QC sample where
0 = no QC sample
1 = field duplicate
2 = equipment rinsate
3 = trip blank

XX = the horizontal grid locator (i.e., B1)
YY = depth in feet (i.e., 00, 04, 08, etc.)
ZZZZZZ = a unique, sequential six digit sampler identifier (i.e., 000001, 000002, etc.) to be used on the laboratory chain of custody

Matrix spike/matrix spike duplicate samples will be specified on the chain-of-custody.

Appendix B presents Table B.1 that shows the field entry form. This form will be used during the investigation to track field information required for the DQO.

4. SAMPLING EQUIPMENT AND PROCEDURES

The investigation SOPs will follow those presented Section 3 of the Methods Compendium, February 1999 (Revision 5.0) and in Appendix A of the Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide, Quality Assurance Project Plan, Final 1995 (QAPP). The following subsections describe the procedures for field sampling, field measurement, and field screening.

4.1 Field Sampling Procedures

The soil samples from each location will be collected using hollow stem auger or comparable drilling techniques, in accordance with manufacturer's procedures. The volatile sample fraction will be taken immediately from the soil recovered from the auger and placed in a bottle. The remaining soil will be placed into a decontaminated stainless steel bowl. The soil will be thoroughly mixed and homogenized in the bowl and all rocks larger than ¼" diameter and all organic material will be removed from the sample medium. Each soil sample will be analyzed for radionuclides and volatile organics. (refer to Section 5 for analyses). Table 4.1 presents the summary description and applicable deviations to the SOPs and methods.

4.2 Field Measurements

Each soil sample will be field screened using a FIDLER and alpha scintillometer for radiological activities by a health physicist. These radiological activities will be appropriately documented in accordance with Compendium Methods S-023 and S-024.

Table 4.1. Summary of Applicable Field QAPP and Compendium SOPs

SOP No. and Title	Procedure Description	Deviations
QAPP SOP 1.15 Guide to Management of Collected IDM	• Follow procedures outlined in the SOP.	• None.
QAPP 1.15a: Guide to Collection of IDM Soils	• Follow procedures outlined in the SOP.	• None.
Q-018 Sample Containers and Preservation	• Follow procedures outlined in the SOP.	• None.
S-020: General Equipment Decontamination	• All downhole equipment will be decontaminated. • All sampling equipment will be decontaminated between sampling intervals and locations.	• Methanol and hexane rinses for the decontamination of sampling equipment will not be required because the target compounds do not contain organic contaminants.
S-023: Total Alpha Surface Contamination Measurements	• Follow procedures outlined in the SOP.	• Record only the detections on the check form. The instrument will be used and calibrated by Mound Health Physicists.
S-024 Near Surface and Soil Sample Screening for Low-Energy Gamma Radiation Using the FIDLER	• Follow procedures outlined in the SOP.	• Record only the detections on the check form. The instrument will be used and calibrated by Mound Health Physicists.
S-026: Soil Boring	• Use hollow stem auger or comparable drilling techniques. • Soil samples will be continuously collected and composited at 4-foot sampling intervals until auger and split-spoon refusal is encountered in each of the 2 sampling locations.	• Abandonment will consist of using a bentonite sealer (i.e., hole plug) for borings less than 15-feet deep • For borings greater than 15-feet deep, the procedures in the SOP will be followed. • After a period of 24 hours, the borings will be checked for settling and the remaining depression will be filled with asphalt patch.
S-028: Sample Control and Documentation	• Follow procedures outlined in the SOP.	• None.
S-029: Guide to Handling, Packaging, and Shipping of Samples	• Follow procedures outlined in the SOP.	• None.

4.3 Containers, Holding Times, and Preservatives

The table below presents the bottle requirements, preservatives, and holding times for the target radionuclides for PRS 76.

Table 4.2 Containers, Holding Times, and Preservatives

Analysis	Method	Matrix	Bottle Type	Minimum Volume	Number of Bottles	Preservative	Holding Time
Volatile Organics	CLP	Water	Septum vial	3 x 40 mL	3	pH<2 with HCl Cool 4° C	14 days
Iso-Plutonium Iso-Thorium	NAS 1965 NAS 1960	Water	Plastic Cubetainer	2x4 liter	1	pH<2 with HNO_3	None
On-Site Gamma Spectrometry	Nuclear Data Inc. 1986	Water	Plastic Cubetainer	750 mL	1	PH<2 with HNO_3	None
Volatile Organics	CLP	Soil	Wide-mouth amber bottle	1 x 4 oz.	1	Cool 4° C	14 days
Iso-Plutonium Iso-Thorium	NAS 1965 NAS 1960	Soil/Solid/ Waste	Wide-mouth Nalgene bottle	750g	1	None	None
On-Site Gamma Spectrometry	Nuclear Data Inc. 1986	Soil/Solid/ Waste	Wide-mouth Nalgene bottle	750g	1	None	None
On-Site Thin Sodium Iodide Detector for Plutonium^{238} and Thorium^{232}	Mound OP 1355	Soil/Solid/ Waste	Wide-mouth plastic bottle or EPA dish	700g	1	None	None

Note: NAS-National Academy of Sciences
Iso-Isotopic

5. ANALYSES

Soil and quality control (QC) samples will be submitted for onsite radionuclide screening and for offsite laboratory analyses in accordance with the procedures in the Methods Compendium.

The following subsections describe the QC samples, procedures for soil field-testing, and the required laboratory analytical methods.

5.1 Soil Field Screening

All soil samples will be submitted to the Mound Laboratory for field screening by Method F-003, Thin Sodium Iodide Detector for Plutonium^{238} and Thorium^{232}, and F-002 Gamma Spectrometry as presented in the Methods Compendium.

5.2 Laboratory Analytical Methods

Radiological Testing

Upon completion of the soil sampling and onsite screening, all soil samples will be submitted to an off-site laboratory for analysis. Alpha Spectrometry will be used to analyze for isotopic plutonium and thorium per Methods Compendium Number A-012. Analysis of other gamma emitting radionuclides will be contingent on the results of the soil field screening by Gamma Spectrometry. It is anticipated that there will be no significant detections made by the Gamma Spectrometry field screening. ***Should a significant detection be found as determined by the project management, and then selected samples may be analyzed off-site by Gamma Spectrometry per Methods Compendium Number A-015.***

Chemical Testing

All samples will be analyzed for CLP volatile organics per Methods Compendium Number A-001.

Data Validation

Ten percent data validation of the analytical results will be required.

5.3 Quality Control Samples

QC samples will be collected as follows:

- field duplicates: 1 for every 10 soil samples collected

- equipment rinsates: 1 for every 20 soil samples collected
- matrix spike: 1 for every 20 soil samples collected
- matrix spike duplicates: 1 for every 20 soil samples collected
- trip blank per volatile shipping container.

QC samples submitted to the off-site laboratory will be evaluated following procedures in the Methods Compendium.

6. REFERENCES

Battelle Independent Verification Study of the WTS Pipeline Removal, 1985-1986.

Department of Energy (DOE 1992a) Operable Unit 9, Site Scoping Report: Vol. 3 – Radiological Site Survey, Dec. 1992.

Department of Energy (DOE 1992b) Operable Unit 9, Site Scoping Report: Vol. 7 – Waste Management, July 1992.

Department of Energy (DOE 1994a) Operable Unit 6 WTS Pipeline Removal Verification Report, Oct. 1994.

Department of Energy (DOE 1994b) Operable Unit 9 Site Scoping Report: Vol. 12 – Site Summary Report, RI/FS, Dec. 1994.

Department of Energy (DOE 1997) Mound 2000 Residual Risk Evaluation Methodology, Jan. 19973

Gilbert, Richard O. Statistical Methods for Environmental Pollution Monitoring New York, NY:Van Nostrand Reinhold, 1987

APPENDIX A

DATA QUALITY OBJECTIVES

SAMPLING AND ANALYSIS PLAN
PRS No. 76
DATA QUALITY OBJECTIVES

1.0 Background

PRS 76 is located in what is now the parking lot east of Building 43 just below the Main Hill on the south side. This was the site of the former Warehouse 9, built as part of the original construction of Mound in 1947 to store construction materials. Warehouse 9 was a wooden structure with an elevated wooden floor. The warehouse was apparently used in the shipment and receipt of drummed radioactive materials. Warehouse 9 served as the central point of waste shipments until December 1954. In 1955 the warehouse and/or its platform were utilized for unloading thorium. Photographs indicate the warehouse was removed by 1962. It was probably sold for salvage and as like many of the old warehouses, the flooring was too contaminated to remove from the site and may have been burned in place (DOE 1992b).

Soil samples were collected in the vicinity of PRS 76 during the WTS Excavation Area Verification Survey, the OU6, Area 19 and Area 14 Verification Study, and the Soil Gas Survey of Area K. The soil samples collected during the WTS Excavation Area Verification Survey were analyzed for Plutonium^{238}. The 10^{-5} risk based guideline criteria for Plutonium^{238} in soil (55 PCi/g) was not exceeded at any of the locations. Plutonium^{238} activities ranged from 8.3 pCi/g to 27 pCi/g. During the Area 19 and Area 14 Verification Study, one boring (19-3M) was drilled along the WTS pipeline adjacent to the historic location of Warehouse 9. Thorium^{228} was detected above the 10^{-6} risk based criteria at one sampling interval. The maximum activity for Thorium^{228} was 1.35 pCi/g. Two qualified detections of beryllium also exceeded the 10^{-6} risk based criteria. The beryllium detections were not considered significant because they were below background levels for beryllium, and both detections were qualified as estimated. The 10^{-6} risk based guideline criteria for benzene and toluene were not exceeded during the Soil Gas Survey of Area K in the boring located in the vicinity of PRS 76.

2.0 DQO Development

Step 1: State the Problem

The primary objective for sampling PRS 76 is to provide data of sufficient quality for the Core Team to determine if the soils beneath the former Warehouse 9 Building should be considered for remediation due to radionuclide contamination.

At the request of OEPA, each sample will be analyzed for organic volatile compounds.

The Core Team, consisting of DOE/US EPA/OEPA representatives, will ultimately decide if soils require remediation.

Step 2: Identify the Decision

The principal study question is to determine what area(s) within PRS 76 boundaries have soil activities of the target radionuclides that exceed the guideline criteria. Two alternative actions could result from resolution of the problem: either the soil concentrations will not exceed guideline criteria resulting in "No Further Action" for soil; or the soil concentrations will exceed guideline criteria resulting in remediation being considered.

Step 3: Identify the Inputs to the Decision

The inputs necessary to resolve the problem will be the activities of plutonium and thorium isotopes in soil samples and their associated guideline criteria.

Cleanup guidelines are presented in this document to help the reviewer assess whether a detected chemical concentration or radionuclide activity is significant. Per CERCLA guidance, contaminant concentrations or activities that are equivalent to a 10^{-6} risk of cancer incidence are used to screen contaminants of concern. Therefore, historical sampling data is compared to the 10^{-6} guideline criteria from Table 4B of the Risk-based Cleanup Guideline Values Report, March, 1997, Appendix B or the most current revision of this document. However, historical plutonium^{238} data will be compared to a 10^{-5} risk based guideline criteria since plutonium^{238} is a primary contaminant at Mound and a pre-agreed cleanup standard of 55 pCi/g (10^{-5}) is already in place. These screening levels will also be used to set the analytical detection limits.

Table A.1 – Guideline Criteria Defined by Type of Radionuclide

Radionuclide	Guideline Criteria (pCi/g)
Plutonium^{238}	55 (10^{-5} Risk Criteria)
Plutonium$^{239/240}$	5.5 (10^{-6} Risk Criteria)
Thorium^{228}	0.11 (10^{-6} Risk Criteria)
Thorium^{230}	44 (10^{-6} Risk Criteria)
Thorium^{232}	3.0 (10^{-6} Risk Criteria)

Based on historical information concerning the practices at the site and prior analytical data, plutonium and thorium have been identified as potential contaminants for this location. Because this site was used for the storage of radioactive waste, it is possible that other isotopes may be present. If other isotopes are identified during the onsite gamma spectrometry field screening, selected samples may be submitted for offsite gamma spectroscopy analysis. Uranium was excluded from the target radionuclide list because activities detected in the OU6 Area 19 and Area 14 Verification Study were approximately at background levels. No chemical contaminants have been identified as target compounds for the site. Beryllium was the only chemical analyte detected above risk-based guideline criteria in the vicinity of PRS 76 during previous investigations. The beryllium detections were not considered significant because they were below background levels for beryllium, and both detections were qualified as estimated. The 10^{-6} risk-based guideline criteria

for beryllium is 0.7 mg/kg. The background value for comparison to Mound Plant Soils for beryllium is 1.3 mg/kg, according to Table A-3 of the Mound 2000 Residual Risk Evaluation Methodology. The existing radiological data does not provide sufficient information in the site area to characterize the soil and resolve the decision statement.

Step 4: Define the Boundaries of the Study

The soil samples will be collected from the site and analyzed for the specified parameters. The site is approximately 210 feet east of Building 43 and 160 feet north of Building 63. The site is considered the dimensions of Warehouse 9, which were approximately 35 feet by 50 feet. A 10-foot by 10-foot square grid will be used to locate the soil borings. A total of 15 sampling locations will result. The grid spacing was statistically calculated assuming a 10% chance of not finding (90% chance of finding) contaminated soil with a radius of 10-feet.

The soil analytical data is assumed to represent current and future activities of the target radionuclides at the site. The radionuclide activities in soil should not be affected by seasonal variations or current operations. Sampling is not time critical.

A practical consideration that may interfere with the study will be the location of underground utilities. Each sampling location will be examined for proximity to utilities. When the sampling objectives permit, those locations that are within 5-feet of underground utilities may be moved up to 5-feet from the underground utilities to assure that plant operations or safety are not adversely affected.

Step 5: Develop a Decision Rule

The soil data will be presented to the Core Team to determine if the PRS is **not** a site problem-This initial step may be straightforward and obvious. There are a number of criteria and tools that the Core Team uses, including whether the maximum concentrations of the target compounds are less than or equal to Mound risk-based guideline criteria. The Core Team designates a PRS that is not a site problem as No Further Assessment (NFA). Alternatively, they may designate it for Further Assessment (FA) or Removal Action (RA). In order to facilitate the Core Team decision, the data will be presented in tabular format. Values that exceed risk based guideline values or Applicable or Relevant and Appropriate Requirements (ARARs) will be clearly flagged for the Core Team's attention.

Step 6: Specify Limits on Decision Errors

The possible decision errors are: (a) deciding that remediation should not be considered when it truly should; and (b) deciding that remediation is to be considered when it is not needed. The consequence for each of these decision errors is that in (a) the contaminated soil will not be removed and human health will be endangered (i.e., this is the more severe decision error); and (b) additional time and energy will be spent considering remediation, which can be viewed positively in that it shows that the overriding concern is for protecting human health (i.e., the consequences are far less severe than the consequences of decision error (a).

In problems that concern human health risk or regulatory compliance, the decision error for the most adverse potential consequences should be defined as the null hypothesis. The null hypothesis along with the false positive/negative errors is as follows:

Null Hypothesis, H_0 = Soil contamination exists and remediation will be considered (The concentration of an individual soil sample is above a specified action level, e.g., thorium is above 0.85 pCi/g in association with the other isotopes).

False positive error = remediation is not considered when it is needed.

False negative error = remediation would be considered when it is not needed.

The gray area is a range of concentrations where the consequences of decision errors are important. The impact of over estimating the concentration is that remediation is considered when it is not needed. This represents a considerable gray area because guideline criteria represent a cancer risk of 10^{-6} and US EPA guidelines do not recommend remediation until concentrations are above 10^{-4}. The gray area for PRS 76 is proposed arbitrarily and conservatively as the action level plus or minus 10% of the expected range for each parameter. The probability limits to points above and below the gray area that reflect the probability for the occurrence of decision errors is as follows:

False positive error: A rate of 10% for the probability of a false positive is deemed acceptable.

False negative error: A rate of 20% for the probability of a false negative is deemed acceptable.

Step 7: Optimize the Design

The optimized design is presented in the sampling plan.

APPENDIX B

FIELD ENTRY FORM

Table B.1 - Potential Release Site 76 - Field Entry Form

(a) Sample Location Code PRS76-W-XXX-YY	(b) Sequential Sample Id ZZZZZZ	(c) Area Description	(d) Matrix	(e) QC Type	(f) Sample Date	(g) Collection Time	(h) Submit all		
							On-Site Rad. Screening	Isotopic Plutonium	Isotopic Thorium

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Notes:

(a) Sample Location Code:	This column is a descriptive sample identifier, where: PRS 76 - W-XX-YY-ZZZZZZ W = quality control samples where: 0 = no QC sample 1 = field duplicate 2 = equipment rinsate 3 = matrix spike 4 = matrix spike/laboratory duplicate XX = horizontal grid locator (i.e. B1) YY= depth in feet (i.e. 00, 04, 08, etc.) ZZZZZZ = a unique, sequential six digit sampler identifier (i.e.000001, 000002, etc.) to be used on the laboratory chain of custody
(b) Sequential Sample Id:	This column (ZZZZZZ) is a unique, sequential six digit sampler identifier.
(c) Area Description:	This column pertains to a description of the area and is limited to 50 characters.
(d) Survey Coordinate (X):	This column represents the X survey coordinate. Do not complete if the sample location was moved prior to soil sampling.
(e) Survey Coordinate (Y):	This column represents the Y survey coordinate. Do not complete if the sample location was moved prior to soil sampling.
(f) Matrix:	S = soil W = water
(g) QC Type:	FD = field duplicate ER = equipment rinsate MS = matrix spike MS/DUP = matrix spike/laboratory duplicate
(h) Sample Date:	Date sample was collected.
(i) Collection Time:	Time sample was collected.
(j) The next columns represent the samples submitted for onsite and offsite analyses (see Section 5.0).	Fill in the date that the samples were submitted for analyses.

APPENDIX B

TABLES

Table 1: Boring Coordinates

Boring Location	Survey Coordinate (X)	Survey Coordinate (Y)
B01	1465119.484	598116.593
B02	1465118.066	598125.843
B03	1465117.742	598136.024
B03a	1465119.043	598136.542
B04	1465129.664	598117.035
B05	1465128.303	598126.910
B06	1465127.480	598137.504
B07	1465139.396	598118.814
B08	1465137.390	598128.683
B09	1465136.477	598137.811
B10	1465148.704	598119.989
B11	1465147.583	598129.848
B12	1465146.165	598139.173
B13	1465158.236	598121.444
B13a	1465155.610	598121.538
B14	1465156.243	598132.129
B15	1465155.327	598142.209

Note : locations as resurveyed subsequent to fieldwork.

Table 2: Sample and QC Summary

Analysis	# Investigative Samples (soil)	# Field Duplicates (soil)	# Samples identified for MS/MSD (soil)	# Equipment Rinsates (water)	# Trip Blanks (water)
VOCs	88+	9	5	5	4
Radioisotopes	82	9	5	5	0

Note:

+ includes an additional 6 VOC analyses that were performed but not required. The results of the analyses are presented (Sample ID: 000028, 000084, 000090, 000097, 000098, and 000105).

VOCs – volatile organic compounds

Table 3: Sample and Interval Index

All soil samples submitted for onsite gamma screening, offsite VOC, and offsite alpha spectrometry analyses unless otherwise noted. Onsite screening is not required for the release of QA/QC water samples.

Sample ID	Boring	Interval (ft bgs)	Matrix	Comments
000001	B15	0-4	soil	
000002	B15	4-8	soil	
000003	B15	8-12	soil	
000004	B15	12-16	soil	
000005	B15	16-20	soil	
000006			water	trip blank for VOCs
000007	B12	0-4	soil	
000008	B12	4-8	soil	
000009	B12	4-8	soil	duplicate of 000008
000010	B12	8-12	soil	
000011	B12	12-16	soil	
000012	B12	16-20	soil	
000013	B12	16-20	soil	duplicate of 000012
000014	B12	20-24	soil	
000015	B09	0-4	soil	
000016	B09	4-8	soil	
000017	B09	8-12	soil	
000018	B09	12-16	soil	extra aliquot also submitted for MS/MSD
000019	B09	16-20	soil	
000020	B09	20-21	soil	
000021			water	field/equipment rinse blank
000022	B06	0-4	soil	
000023	B06	4-8	soil	
000024	B06	8-12	soil	
000025	B06	8-12	soil	duplicate of 000024
000026	B06	12-16	soil	
000027			water	trip blank for VOCs
000028	B03	0-4	soil	Boring was offset (B03a) and all intervals were collected in the offset. Result from 0-4 ft bgs reported for both B03 and B03a.
000029			water	trip blank for VOCs
000030	B01	0-4	soil	
000031	B01	4-8	soil	
000032	B01	8-12	soil	
000033	B01	8-12	soil	duplicate of 000032
000034	B01	12-16	soil	
000035	B01	16-20	soil	extra aliquot also submitted for MS/MSD
000036			water	field/equipment rinse blank
000037	B04	0-4	soil	
000038	B04	4-8	soil	
000039	B04	8-12	soil	

Table 3: Sample and Interval Index

All soil samples submitted for onsite gamma screening, offsite VOC, and offsite alpha spectrometry analyses unless otherwise noted. Onsite screening is not required for the release of QA/QC water samples.

Sample ID	Boring	Interval (ft bgs)	Matrix	Comments
000040	B04	12-16	soil	
000041	B04	16-20	soil	
000042	B04	16-20	soil	duplicate of 000041
000043	B04	20-22	soil	
000044	B07	0-4	soil	
000045	B07	4-10	soil	
000046	B07	10-12	soil	
000047	B07	12-16	soil	
000048	B07	16-20	soil	
000049			water	field/equipment rinse blank
000050	B10	0-4	soil	
000051	B10	4-8	soil	
000052	B10	8-12	soil	
000053	B10	12-16	soil	
000054	B10	12-16	soil	duplicate of 000053
000055	B10	16-20	soil	
000056	B10	20-24	soil	
000057	B10	24-26	soil	
000058	B13	0-4	soil	
000059	B13	4-8	soil	
000060	B13	8-12	soil	extra aliquot also submitted for MS/MSD
000061	B13	12-16	soil	
000062			water	trip blank for VOCs
000063	B13a	16-20	soil	
000064	B13a	20-24	soil	
000065	B13a	20-24	soil	duplicate of 000064
000066	B02	0-4	soil	
000067	B02	4-8	soil	
000068	B02	8-12	soil	
000069	B02	12-16	soil	extra aliquot also submitted for MS/MSD
000070	B02	16-20	soil	
000071	B02	20-24	soil	
000072	B05	0-4	soil	
000073	B05	4-8	soil	
000074	B05	8-12	soil	
000075	B05	12-16	soil	
000076	B05	16-20	soil	
000077	B05	20-24	soil	
000078			water	field/equipment rinse blank
000079	B08	0-4	soil	

Table 3: Sample and Interval Index

All soil samples submitted for onsite gamma screening, offsite VOC, and offsite alpha spectrometry analyses unless otherwise noted. Onsite screening is not required for the release of QA/QC water samples.

Sample ID	Boring	Interval (ft bgs)	Matrix	Comments
000080	B08	4-8	soil	
000081	B08	8-12	soil	
000082	B08	12-16	soil	
000083	B08	16-20	soil	
000084	B08	20-24	soil	Beyond depth required. Not submitted for offsite rad.
000085	B11	0-4	soil	
000086	B11	4-8	soil	
000087	B11	8-12	soil	
000088	B11	12-16	soil	
000089	B11	16-20	soil	
000090	B11	20-24	soil	Beyond depth required. Not submitted for offsite rad.
000091	B14	0-4	soil	
000092	B14	4-8	soil	duplicate of 000093
000093	B14	4-8	soil	
000094	B14	8-12	soil	
000095	B14	12-16	soil	
000096	B14	16-20	soil	
000097	B14	20-24	soil	Beyond depth required. Not submitted for offsite rad.
000098	B14	24-28	soil	Beyond depth required. Not submitted for offsite rad.
000099	B03a	0-4	soil	
000100	B03a	4-8	soil	extra aliquot also submitted for MS/MSD
000101	B03a	8-12	soil	
000102	B03a	8-12	soil	duplicate of 000101
000103	B03a	12-16	soil	
000104	B03a	16-20	soil	
000105	B03a	20-22	soil	Beyond depth required. Not submitted for offsite rad.
000106			water	field/equipment rinse blank

Note: (ft bgs) - feet below ground surface
a - offset

Table 4: SAP Variances

Subject	Variance
Total Sampling Depth	The SAP required the installation of fifteen borings to auger refusal, estimated at 12-feet deep. Field conditions proved bedrock to be much deeper than 12 feet. The corrective action was that drilling would continue to a depth of 4 feet below natural soil. Site geology was recorded on boring logs to document designation of natural soil. *CAR 001*
Boring Offset	Boring B03 was advanced to 6 feet prior to drill rig mechanical problems and eventually the release of the drilling company. Two weeks later, the boring was offset and samples were collected. Results from both borings are provided for completeness. *CAR 003*
Sampling Intervals	The SAP required soil samples to be collected continuously at 4-foot sampling intervals. Due to miscommunication of a no recovery interval from 4-6 feet bgs, the intervals from 6-8 and 8-10 feet bgs were combined. The sample from 6-10 feet bgs (Sample 000045) was submitted for analysis. The next sample collected (Sample 000046) contained only the interval from 10-12 feet bgs. *CAR 004*
Boring Offset	A boulder was encountered in B13. Neither auger nor split spoon techniques could advance past the boulder and instead pushed the boulder down as the drilling advanced. As a result, B13 was offset in order to collect the missed sample intervals. The offset boring (B13a) was sampled only for the missed intervals. *CAR 005*
Sample Designation	Offset borings were not anticipated and therefore not addressed in the sample naming scheme. Offset borings were identified by adding an "a" to the primary boring identification. *CAR 006*
CAR 001 Total Depth Requirement	Due to practical considerations, the total depth drilled on the following borings deviated from requirement of 4 feet below the fill/till interface: Boring Depth Below Interface • B01 - 5 feet • B04 - 4.5 feet • B05 - 6 feet • B06 - 3.5 feet • B07 - 5.5 feet • B10 - 6 feet • B13a - 5.5 feet *CAR 007*
CAR 001 Total Depth Requirement	Because the fill/till interface was not identifiable to the field geologist in boring B12, drilling advanced to refusal at a depth of 22 feet bgs. *CAR 008*
CAR 001 Total Depth Requirement	Four borings (B03a, B08, B11, B14) were overdrilled and samples were collected at natural depths greater than 4 feet from the fill/till interface. Although not required by the SAP, these samples (000084, 000090, 000097, 000098, 000105) were analyzed for onsite gamma spectrometry and offsite VOCs with results reported herein. *CAR 009*

Table 4: SAP Variances (continued)

Subject	Variance
Onsite Analyses	Per the SAP, all soil samples were to be submitted to the Mound Laboratory for field screening by Method F-003, "Thin Sodium Iodide Detector for Plutonium-238 and Thorium-232," and F-002 "Gamma Spectrometry" as presented in the Methods Compendium (DOE 1999a). Screening by F-003 for plutonium-238 and thorium-232 is no longer common practice for the onsite laboratory and was not performed.
Surveying	Survey coordinates for offset borings were estimated based upon approximate offset direction and distance. Offset sampling locations were not resurveyed as required by the SAP

Table 5: Onsite Gamma Spectrometry Screening Results (pCi/g)

If activity<MDA, results are qualified at the MDA

		Analyte:	Co-60		Cs-137		Pb-210		Ra-226		Ac-227		Am-241		Th-230		Th-232		Pu-238	
		Background:	Not Computed		0.42		1.2 (3)		2.0		0.11 (3)		Not Detected		1.9		1.4		0.13	
		Guideline Value (GV)	0.09 (1)		0.42 (1)		1.65 (2)		0.13 (1)		1 (1)		4.95 (1)		0.12 (2)		0.09 (2)		55 (4)	
Sample ID	Boring	Interval	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity*	MDA*	activity*	MDA*	activity*	MDA*
000001	B15	0-4	0.03	0.06	0.01	0.06	**1.68**	1.00	1.54	1.14	0.32	0.35	0.00	0.12	3.56	10.72	0.63	0.18	2.50	14.99
000002	B15	4-8	0.01	0.07	0.00	0.08	0.70	1.19	**2.27**	1.21	0.08	0.42	0.02	0.13	2.86	12.07	0.38	0.25	0.00	22.28
000003	B15	8-12	0.00	**0.09**	0.00	0.08	0.00	**1.77**	**2.26**	1.40	0.16	0.50	0.06	0.16	0.00	17.38	0.6	0.27	0.00	40.73
000004	B15	12-16	0.07	0.04	0.00	0.06	0.53	1.04	0.85	1.27	0.16	0.36	0.00	0.12	0.15	11.43	0.55	0.21	0.00	17.82
000005	B15	16-20	0.08	**0.16**	0.00	0.14	0.00	**2.46**	0.00	**2.85**	0.53	0.62	0.02	0.25	0.00	25	0.93	0.33	0.00	78.5
000007	B12	0-4	0.00	0.07	0.01	0.05	0.62	0.47	0.88	0.66	0.05	0.20	0.00	0.06	3.27	5.02	0.57	0.17	2.70	12.15
000008	B12	4-8	**0.09**	0.05	0.03	0.05	0.49	0.90	1.03	1.06	0.00	0.33	0.02	0.10	6.67	9.31	0.53	0.16	0.00	15.63
000009	B12	4-8	0.00	0.07	0.00	0.09	0.00	1.32	0.98	1.26	0.00	0.44	0.07	0.11	2.08	11.97	0.45	0.26	0.00	34.8
000010	B12	8-12	0.00	0.07	0.00	0.05	0.54	0.47	1.34	0.70	0.00	0.25	0.03	0.05	0.00	5.7	0.45	0.15	6.49	11.9
000011	B12	12-16	0.00	0.06	0.00	0.04	0.00	0.94	1.50	0.90	0.18	0.26	0.00	0.10	0.26	8.72	0.33	0.14	3.09	22.64
000012	B12	16-20	0.04	0.06	0.01	0.06	1.58	1.09	1.11	1.28	0.08	0.41	0.00	0.15	0.00	13.97	0.81	0.24	0.00	38.01
000013	B12	16-20	0.00	0.05	0.00	0.05	**1.81**	0.94	1.73	1.04	0.31	0.31	0.06	0.11	14.67	9.52	0.59	0.17	10.07	31.34
000014	B12	20-24	0.00	0.04	0.02	0.03	1.14	0.84	**2.14**	0.90	0.00	0.30	0.05	0.10	0.00	10.46	0.44	0.14	19.12	29.9
000015	B09	0-4	0.00	**0.09**	0.10	0.04	0.99	0.97	1.74	1.14	0.00	0.38	0.04	0.11	0.00	13.3	0.72	0.19	0.00	33.31
000016	B09	4-8	0.04	**0.10**	0.00	0.10	0.38	0.99	1.43	1.30	0.00	0.48	0.02	0.10	0.00	11.35	0.26	0.58	0.00	22.23
000017	B09	8-12	0.04	0.06	0.00	0.07	0.00	1.63	0.66	1.92	0.07	0.51	0.00	0.21	11.87	14.39	0.68	0.29	0.00	51.8
000018	B09	12-16	0.00	**0.11**	0.00	0.10	0.00	**1.86**	1.74	1.76	0.00	0.73	0.00	0.23	0.00	18.73	0.55	0.28	0.62	48.29
000019	B09	16-20	0.00	**0.09**	0.04	0.07	0.14	1.44	0.99	1.75	0.00	0.56	0.00	0.15	1.09	15.34	0.53	0.22	0.00	50.38
000020	B09	20-21	0.06	0.02	0.00	0.11	0.34	1.03	0.97	1.31	0.00	0.44	0.02	0.11	4.88	9.92	0.65	0.36	0.00	30.2
000022	B06	0-4	0.00	**0.22**	0.00	0.13	1.44	0.85	1.87	1.26	0.00	0.57	0.00	0.16	0.00	13.63	0.52	0.59	2.32	29.72
000023	B06	4-8	0.00	0.08	0.00	0.13	0.87	**1.78**	**2.91**	1.65	0.75	0.43	0.00	0.25	0.22	18.68	0.66	0.39	0.00	57.78
000024	B06	8-12	0.05	**0.12**	0.00	0.11	1.17	**1.66**	**2.17**	2.00	0.00	0.70	0.11	0.20	11.39	18	0.55	0.31	0.00	58
000025	B06	8-12	0.03	**0.13**	0.00	0.11	0.45	1.01	1.04	1.47	0.13	0.38	0.00	0.11	2.96	8.82	0.53	0.31	0.00	26.77
000026	B06	12-16	0.00	**0.10**	0.00	0.07	0.00	**1.78**	0.47	1.97	0.10	0.53	0.03	0.17	1.61	16.37	0.45	0.28	0.00	48.12
000028	B03	0-4	0.03	0.03	0.11	0.07	**2.50**	0.86	**2.92**	1.89	0.00	0.75	0.00	0.22	0.00	25.99	0.69	0.33	0.00	75.68
000030	B01	0-4	0.01	0.03	0.03	0.04	0.51	0.57	0.85	0.71	0.03	0.21	0.03	0.07	4.68	5.95	0.16	0.14	0.00	19.53
000031	B01	4-8	0.00	0.05	0.03	0.04	0.24	0.44	1.55	0.48	0.00	0.18	0.00	0.05	1.49	4.61	0.68	0.14	6.03	9.97

Table 5: Onsite Gamma Spectrometry Screening Results (pCi/g)

If activity<MDA, results are qualified at the MDA

		Analyte:	Co-60		Cs-137		Pb-210		Ra-226		Ac-227		Am-241		Th-230		Th-232		Pu-238	
		Background:	Not Computed		0.42		1.2 (3)		2.0		0.11 (3)		Not Detected		1.9		1.4		0.13	
		Guideline Value (GV)	0.09 (1)		0.42 (1)		1.65 (2)		0.13 (1)		1 (1)		4.95 (1)		0.12 (2)		0.09 (2)		55 (4)	
Sample ID	Boring	Interval	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity*	MDA*	activity*	MDA*	activity*	MDA*
000032	B01	8-12	0.01	0.03	0.00	0.04	0.69	0.65	1.20	0.76	0.00	0.26	0.01	0.07	0.00	7.25	0.49	0.12	0.00	21.22
000033	B01	8-12	0.03	0.03	0.00	0.04	1.33	0.87	**2.20**	0.91	0.04	0.36	0.06	0.10	11.83	8.78	0.63	0.19	0.00	31.51
000034	B01	12-16	0.01	0.05	0.02	0.04	0.45	0.83	1.98	0.82	0.00	0.28	0.00	0.09	0.00	9.55	0.36	0.13	0.00	25.02
000035	B01	16-20	0.00	0.05	0.00	0.03	0.37	0.42	1.52	0.50	0.03	0.17	0.02	0.04	1.16	4.21	0.51	0.11	0.00	10.05
000037	B04	0-4	0.00	**0.12**	0.04	0.08	0.54	0.73	0.83	1.23	0.00	0.36	0.01	0.08	2.63	7.2	0.18	0.33	19.37	14.05
000038	B04	4-8	0.02	0.08	0.02	0.08	0.51	**1.80**	1.38	1.78	0.00	0.62	0.20	0.12	0.00	20.69	0.32	0.38	0.00	53.77
000039	B04	8-12	0.03	**0.09**	0.00	0.09	0.15	1.06	**2.25**	0.96	0.00	0.38	0.00	0.12	0.00	11.74	0.15	0.41	15.23	12.73
000040	B04	12-16	0.03	**0.09**	0.03	0.08	0.00	**1.98**	2.11	1.72	0.24	0.54	0.05	0.18	0.00	22.45	0.31	0.35	11.53	44.83
000041	B04	16-20	0.00	**0.11**	0.00	0.09	0.30	0.97	1.80	1.05	0.00	0.41	0.04	0.09	0.00	9.34	0.57	0.36	0.38	18.71
000042	B04	16-20	0.00	**0.11**	0.03	0.06	0.83	**1.79**	0.16	1.98	0.21	0.54	0.20	0.13	0.00	15.75	0.45	0.32	13.38	41.43
000043	B04	20-22	0.00	**0.12**	0.06	0.07	0.00	**2.02**	1.27	1.62	0.32	0.53	0.07	0.17	18.33	10.59	0.14	0.44	16.41	41.85
000044	B07	0-4	0.01	**0.12**	0.00	0.10	0.27	0.86	1.37	1.01	0.00	0.40	0.01	0.10	1.70	9.87	0.52	0.37	9.38	17.38
000045	B07	4-10	0.02	**0.11**	0.04	0.09	0.22	**1.98**	1.06	**2.24**	0.17	0.66	0.09	0.19	23.72	16.33	0.88	0.36	0.82	58.54
000046	B07	10-12	0.02	**0.16**	0.00	0.13	1.55	**2.09**	**2.23**	1.47	0.38	0.57	0.07	0.18	7.31	17.94	0.49	0.45	0.00	65.45
000047	B07	12-16	0.04	0.02	0.00	0.10	0.88	0.84	0.80	1.45	0.10	0.39	0.00	0.12	11.08	7.92	0.39	0.42	13.49	15.64
000048	B07	16-20	0.00	**0.12**	0.00	0.10	0.86	1.40	0.32	1.91	0.00	0.56	0.06	0.15	0.00	20.38	0.26	0.35	45.45	33.34
000050	B10	0-4	0.00	**0.12**	0.02	0.10	1.05	1.06	2.08	1.17	0.23	0.44	0.07	0.14	1.49	16.11	0.42	0.4	12.93	43.57
000051	B10	4-8	0.00	**0.09**	0.04	0.09	0.00	1.28	1.04	1.39	0.04	0.47	0.00	0.13	6.08	10.22	0.46	0.32	0.00	33.44
000052	B10	8-12	0.00	**0.11**	0.00	0.09	0.00	**1.91**	1.52	1.79	0.00	0.76	0.00	0.20	7.65	17.97	0.55	0.34	0.00	63.45
000053	B10	12-16	0.05	**0.09**	0.00	0.15	**2.19**	1.24	0.35	**2.18**	0.04	0.65	0.06	0.18	5.93	19.07	0.11	0.57	34.10	39.06
000054	B10	12-16	0.02	**0.09**	0.00	0.09	0.57	0.95	2.09	1.04	0.00	0.45	0.00	0.13	0.00	11.26	0.76	0.23	22.98	20.72
000055	B10	16-20	0.00	**0.09**	0.00	0.10	0.83	1.23	0.75	1.95	0.57	0.38	0.00	0.23	0.00	17.66	0.3	0.31	14.58	44.14
000056	B10	20-24	0.05	**0.09**	0.00	0.14	1.09	1.44	**2.47**	2.02	0.45	0.56	0.00	0.23	0.00	20.15	0.44	0.43	0.00	52.9
000057	B10	24-26	0.00	0.06	0.00	0.05	0.96	0.55	1.95	0.78	0.00	0.24	0.00	0.07	0.00	6.77	0.53	0.21	10.16	11.9
000058	B13	0-4	0.00	**0.14**	0.11	0.06	0.33	0.66	0.64	1.07	0.05	0.28	0.00	0.09	0.00	8	0.32	0.24	0.00	19.31
000059	B13	4-8	0.05	0.02	0.00	0.08	0.23	**1.83**	**2.68**	1.73	0.40	0.52	0.07	0.17	0.00	18.01	0.65	0.33	0.00	56.85
000060	B13	8-12	0.01	**0.12**	0.07	0.06	0.71	**1.82**	0.83	2.09	0.00	0.81	0.14	0.16	2.76	19.13	0.37	0.55	0.00	56.9

Table 5: Onsite Gamma Spectrometry Screening Results (pCi/g)

If activity<MDA, results are qualified at the MDA

		Analyte:	Co-60		Cs-137		Pb-210		Ra-226		Ac-227		Am-241		Th-230		Th-232		Pu-238	
		Background:	Not Computed		0.42		1.2 (3)		2.0		0.11 (3)		Not Detected		1.9		1.4		0.13	
		Guideline Value (GV)	0.09 (1)		0.42 (1)		1.65 (2)		0.13 (1)		1 (1)		4.95 (1)		0.12 (2)		0.09 (2)		55 (4)	
Sample ID	Boring	Interval	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity*	MDA*	activity*	MDA*	activity*	MDA*
000061	B13	12-16	0.00	**0.09**	0.00	0.10	0.00	**1.71**	2.11	1.42	0.00	0.62	0.05	0.17	0.01	16.38	0.31	0.31	0.00	50.34
000063	B13a	16-20	0.05	0.07	0.00	0.08	1.27	1.43	0.86	2.09	0.80	0.25	0.09	0.18	0.00	19.13	0.3	0.44	0.00	57.09
000064	B13a	20-24	0.01	**0.09**	0.00	0.09	0.51	1.48	1.72	1.94	0.00	0.56	0.00	0.17	10.81	13.88	0.22	0.43	10.66	39.64
000065	B13a	20-24	0.00	**0.10**	0.00	0.09	0.00	**1.67**	1.29	1.57	0.00	0.53	0.00	0.17	7.80	13.56	0.51	0.16	20.17	34.33
000066	B02	0-4	0.05	0.08	0.03	0.12	0.96	1.44	0.91	1.96	0.02	0.62	0.03	0.18	12.12	13.39	0.57	0.34	0.00	56.54
000067	B02	4-8	0.00	**0.13**	0.00	0.11	0.00	1.30	1.25	2.02	0.35	0.56	0.00	0.23	0.00	20.65	0.75	0.32	0.00	56.01
000068	B02	8-12	0.00	**0.16**	0.04	0.06	1.50	**1.65**	0.00	**2.61**	0.19	0.63	0.00	0.26	8.73	17.84	0.67	0.31	6.07	61.07
000069	B02	12-16	0.00	**0.12**	0.03	0.07	0.97	0.99	1.20	1.04	0.00	0.39	0.00	0.11	0.00	9.92	0.36	0.3	0.00	26.65
000070	B02	16-20	0.02	0.07	0.00	0.11	1.42	1.47	0.35	2.09	0.00	0.71	0.00	0.23	0.00	19.93	0.68	0.25	0.00	49.99
000071	B02	20-24	0.00	**0.12**	0.00	0.10	**2.42**	0.79	2.03	1.76	0.15	0.57	0.00	0.21	0.00	20.62	0.48	0.36	0.00	59.01
000072	B05	0-4	0.03	**0.09**	0.06	0.08	0.37	0.83	1.13	1.19	0.00	0.44	0.00	0.11	2.85	9.76	0.81	0.05	5.96	18.57
000073	B05	4-8	0.00	**0.12**	0.05	0.07	0.95	0.90	1.38	1.29	0.31	0.34	0.00	0.12	4.46	10.21	0.44	0.4	0.00	27.45
000074	B05	8-12	0.01	**0.11**	0.00	0.12	0.00	**1.78**	0.39	2.03	0.43	0.48	0.00	0.21	0.00	19.62	0.37	0.38	2.42	50.87
000075	B05	12-16	0.00	**0.14**	0.00	0.11	0.64	**1.70**	**2.24**	1.78	0.55	0.52	0.15	0.17	8.43	17.24	0.68	0.24	0.00	66.44
000076	B05	16-20	0.00	**0.13**	0.04	0.06	0.38	0.78	0.66	1.26	0.17	0.33	0.00	0.10	0.58	9.58	0.33	0.32	2.78	18.43
000077	B05	20-24	0.00	**0.11**	0.02	0.07	1.41	1.33	1.98	1.72	0.00	0.63	0.00	0.22	7.97	15.85	0.75	0.24	0.00	57.94
000079	B08	0-4	0.00	**0.11**	0.08	0.08	0.07	1.57	1.04	1.60	0.31	0.54	0.04	0.17	1.88	17.42	0.4	0.34	0.00	63.15
000080	B08	4-8	0.04	**0.09**	0.04	0.05	0.60	0.97	1.69	0.96	0.00	0.43	0.00	0.11	0.00	10.11	0.65	0.22	0.00	25.85
000081	B08	8-12	0.04	0.02	0.00	0.10	0.41	0.99	0.68	1.18	0.22	0.34	0.04	0.10	0.00	11.92	0.52	0.36	0.00	24.27
000082	B08	12-16	0.04	**0.10**	0.00	0.13	1.55	1.45	1.81	1.80	0.48	0.58	0.00	0.22	13.20	16.48	0.67	0.33	11.00	53.47
000083	B08	16-20	0.00	**0.10**	0.00	0.10	0.84	0.70	0.92	1.16	0.00	0.48	0.00	0.11	7.39	8.28	0.57	0.18	0.00	21.11
000084	B08	20-24	0.00	**0.10**	0.00	0.09	0.76	1.48	**2.75**	1.54	0.53	0.41	0.07	0.16	13.00	14.16	0.39	0.25	14.10	34.43
000085	B11	0-4	0.06	0.02	0.10	0.01	0.86	0.63	1.06	1.28	0.15	0.31	0.09	0.08	1.44	8.33	0.54	0.28	10.92	15.25
000086	B11	4-8	**0.09**	0.03	0.05	0.07	1.06	**2.00**	1.93	**2.37**	0.17	0.74	0.00	0.24	5.85	20.69	0.61	0.51	0.00	69.15
000087	B11	8-12	0.00	**0.19**	0.00	0.10	0.00	1.10	1.45	1.19	0.01	0.45	0.08	0.08	4.04	9.9	0.72	0.24	9.96	20.64
000088	B11	12-16	0.00	**0.16**	0.05	0.10	0.00	**2.40**	0.82	**2.30**	0.26	0.67	0.00	0.10	2.74	20.29	0.63	0.37	0.00	74.19
000089	B11	16-20	0.00	**0.16**	0.06	0.01	0.73	0.90	0.67	1.27	0.00	0.39	0.00	0.12	0.76	10.74	0.57	0.35	0.00	25.31

Table 5: Onsite Gamma Spectrometry Screening Results (pCi/g)

If activity<MDA, results are qualified at the MDA

		Analyte:	Co-60		Cs-137		Pb-210		Ra-226		Ac-227		Am-241		Th-230		Th-232		Pu-238	
		Background:	Not Computed		0.42		1.2 (3)		2.0		0.11 (3)		Not Detected		1.9		1.4		0.13	
		Guideline Value (GV)	0.09 (1)		0.42 (1)		1.65 (2)		0.13 (1)		1 (1)		4.95 (1)		0.12 (2)		0.09 (2)		55 (4)	
Sample ID	Boring	Interval	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity	MDA	activity*	MDA*	activity*	MDA*	activity*	MDA*
000090	B11	20-24	0.00	**0.12**	0.00	0.12	1.60	1.60	1.32	1.98	0.04	0.69	0.09	0.18	19.87	15.99	0.69	0.32	12.20	47.88
000091	B14	0-4	0.03	0.08	0.05	0.06	0.65	0.73	0.80	1.03	0.16	0.31	0.00	0.12	0.00	10.74	0.65	0.2	5.10	17.24
000092	B14	4-8	0.00	**0.14**	0.05	0.11	0.03	**1.85**	0.66	**2.40**	0.00	0.75	0.00	0.28	0.87	19.2	0.72	0.41	0.00	77.97
000093	B14	4-8	0.00	**0.18**	0.04	0.09	0.42	0.94	1.97	1.13	0.19	0.39	0.03	0.12	0.00	11.87	0.61	0.38	0.00	30.32
000094	B14	4-8	0.06	0.03	0.02	0.12	0.70	**1.95**	**2.65**	**2.16**	0.00	0.74	0.00	**28.00**	10.94	18.39	0.54	0.62	0.00	58.06
000095	B14	8-12	0.00	**0.10**	0.00	0.10	0.42	1.05	1.47	1.21	0.18	0.45	0.02	0.11	1.17	10.23	0.47	0.41	2.83	23.44
000096	B14	16-20	0.02	**0.14**	0.00	0.16	1.39	**2.12**	0.91	**2.58**	0.15	0.71	0.00	0.24	0.00	28.81	0.51	0.44	0.00	82.57
000097	B14	20-24	0.01	0.06	0.00	0.09	0.00	**2.43**	1.07	2.11	0.34	0.54	0.10	0.19	0.00	20.66	0.9	0.13	50.70	60.18
000098	B14	24-28	0.04	**0.09**	0.00	0.10	0.00	**3.00**	**2.32**	**2.23**	0.03	0.76	0.06	0.24	0.00	25.58	0.68	0.34	24.86	86.72
000099	B03a	0-4	0.00	**0.14**	0.00	0.15	0.00	**2.30**	**3.30**	1.69	0.00	0.77	0.00	0.27	0.00	22.65	0.25	0.42	0.00	65.47
000100	B03a	4-8	0.05	0.03	0.00	0.09	0.14	1.33	1.48	1.33	0.19	0.38	0.02	0.13	5.35	9.25	0.26	0.42	9.96	25.66
000101	B03a	8-12	0.00	**0.11**	0.00	0.11	0.00	1.26	1.80	1.35	0.00	0.45	0.00	0.14	0.26	12.17	0.3	0.48	0.00	27.34
000102	B03a	8-12	0.00	**0.18**	0.00	0.13	**2.03**	**1.88**	0.23	**2.41**	0.00	0.75	0.08	0.18	0.00	24.54	0.25	0.53	0.00	53
000103	B03a	12-16	0.02	0.02	0.02	0.10	0.00	1.20	1.71	1.31	0.10	0.40	0.00	0.12	5.91	11.16	0.48	0.34	0.00	27.79
000104	B03a	16-20	0.02	**0.16**	0.02	0.12	1.17	**1.91**	1.56	**2.21**	0.13	0.68	0.19	0.19	0.00	24.81	0.69	0.28	0.00	67.17
000105	B03a	20-22	0.03	**0.10**	0.00	0.12	0.00	1.13	1.34	1.42	0.04	0.50	0.09	0.10	0.00	12.39	0.72	0.43	0.00	31.87

Note:

* MDA and activities are not highlighed in bold since data is superceded by offsite results.

Bold in an activity column indicates the result was greater than the MDA and exceeded the comparison criteria

Bold in a MDA column indicates the MDA was equal to or greater than the comparison criteria

The comparison criteria is equal to:

- the GV if the GV is greater than background
- the GV plus background if GV is less than background

All background and GVs are referenced as presented in DOE 1997 or DOE 1999b unless otherwise noted.

(1) These GVs are based on the more restrictive of the Construction Worker and Site Employee Values

(2) These GVs are based on the more restrictive of the Construction Worker and Site Employee Values. These values were calculated using methodology contained in DOE 1997, but were performed subsequent to its publication.

(3) These radionuclides have comparatively short half-lives and are deduced to be in secular equilibrium with the parent radionuclide. Thus the backgound value measured for the parent is considered to be the appropriate value for these as well. The validity of using this method for background determination for other radionuclides will be assessed on a case by case basis.

(4) These values represent the 10-5 risk value

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000001	B15	0-4	0.222	0.0243	0.0286 U	0.0286	0.589 J	0.0509	0.531 J	0.0223	0.42 J	0.0223
000002	B15	4-8	0.0306 U	0.0306	0.0262 U	0.0262	0.548 J	0.0513	0.488 J	0.0221	0.438 J	0.0221
000003	B15	8-12	0.0313 U	0.0313	0.0265 U	0.0265	0.585 J	0.0371	0.549 J	0.0226	0.415 J	0.0152
000004	B15	12-16	0.0288 U	0.0288	0.0138 U	0.0138	0.64	0.0482	0.362 J	0.0228	0.526 J	0.0228
000005	B15	16-20	0.0265 U	0.0265	0.0224 U	0.0224	0.681	0.0540	0.37 J	0.0298	0.622	0.0241
000007	B12	0-4	0.41	0.00910	0.00908 U	0.00908	0.578 J	0.0534	0.391 J	0.0239	0.563 J	0.0239
000008	B12	4-8	0.041	0.0182	0.0103 U	0.0103	0.449 J	0.0350	0.377 J	0.0144	0.398 J	0.0144
000009	B12	4-8	0.0278	0.0188	0.0392 U	0.0392	0.602	0.0194	0.512 J	0.0121	0.557 J	0.0179
000010	B12	8-12	0.0268 U	0.0268	0.0316 U	0.0316	0.436 J	0.0554	0.394 J	0.0248	0.37 J	0.0167
000011	B12	12-16	0.0357 U	0.0357	0.0306 U	0.0306	0.454 J	0.0658	0.41 J	0.0224	0.466 J	0.0150
000012	B12	16-20	0.0216 U	0.0216	0.0215 U	0.0215	0.61	0.0557	0.411 J	0.0241	0.522 J	0.0212
000013	B12	16-20	0.0179 U	0.0179	0.0101 U	0.0101	0.671	0.0694	0.35 J	0.0232	0.639	0.0156
000014	B12	20-24	0.0186	0.0168	0.0168 U	0.0168	0.685	0.0600	0.476 J	0.0251	0.444 J	0.0221
000015	B09	0-4	0.601	0.0186	0.0155	0.0105	0.702	0.0456	0.475 J	0.0236	0.63	0.0208
000016	B09	4-8	0.0636	0.0221	0.029 U	0.0290	0.631	0.0495	0.499 J	0.0312	0.374 J	0.0222
000017	B09	8-12	0.0322 U	0.0322	0.026 U	0.0260	0.552 J	0.0558	0.685	0.0266	0.546 J	0.0234
000018	B09	12-16	0.0368 U	0.0368	0.0224 U	0.0224	0.387 J	0.0576	0.495 J	0.0249	0.392 J	0.0220

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000019	B09	16-20	0.0255 U	0.0255	0.0109 U	0.0109	0.501 J	0.0489	0.358 J	0.0147	0.45 J	0.0219
000020	B09	20-21	0.0327 U	0.0327	0.0277 U	0.0277	0.662	0.0371	0.421 J	0.0254	0.538 J	0.0224
000022	B06	0-4	0.0399	0.0154	0.0154 U	0.0154	0.688	0.0348	0.58 J	0.0212	0.449 J	0.0143
000023	B06	4-8	0.0662	0.0189	0.0107 U	0.0107	0.603	0.0541	0.5 J	0.0266	0.495 J	0.0158
000024	B06	8-12	0.00826 U	0.00826	0.0146 U	0.0146	0.522 J	0.0554	0.529 J	0.0239	0.482 J	0.0161
000025	B06	8-12	0.0152 U	0.0152	0.02 U	0.0200	0.448 J	0.0722	0.488 J	0.0243	0.471 J	0.0164
000026	B06	12-16	0.0163 U	0.0163	0.0192 U	0.0192	0.37 J	0.0587	0.5 J	0.0257	0.394 J	0.0227
000030	B01	0-4	0.323	0.00795	0.0088 J	0.00795	0.48 J	0.0488	0.385 J	0.0256	0.576 J	0.0225
000031	B01	4-8	0.026	0.00879	0.0183 U	0.0183	0.76	0.0524	0.365 J	0.0295	0.69	0.0238
000032	B01	8-12	0.00847 U	0.00847	0.015 U	0.0150	0.704	0.0543	0.504 J	0.0251	0.529 J	0.0251
000033	B01	8-12	0.0155 U	0.0155	0.0222 U	0.0222	0.674	0.0368	0.599 J	0.0153	0.582 J	0.0153
000034	B01	12-16	0.0176 U	0.0176	0.0176 U	0.0176	0.4 J	0.0549	0.624	0.0249	0.39 J	0.0168
000035	B01	16-20	0.0144 U	0.0144	0.017 U	0.0170	0.463 J	0.0643	0.418 J	0.0228	0.339 J	0.0153
000037	B04	0-4	0.717	0.00833	0.0731	0.0147	0.493 J	0.0511	0.471 J	0.0287	0.529 J	0.0232
000038	B04	4-8	0.0567	0.00960	0.0223 U	0.0223	0.79	0.0527	0.463 J	0.0239	0.659	0.0239
000039	B04	8-12	0.0126 U	0.0126	0.0126 U	0.0126	0.563 J	0.0398	0.569 J	0.0166	0.361 J	0.0166
000040	B04	12-16	0.0313 U	0.0313	0.0177 U	0.0177	0.444 J	0.0575	0.451 J	0.0256	0.28 J	0.0172

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000041	B04	16-20	0.0189 U	0.0189	0.0107 U	0.0107	0.454 J	0.0631	0.542 J	0.0223	0.393 J	0.0150
000042	B04	16-20	0.00819 U	0.00819	0.0191 U	0.0191	0.457 J	0.0469	0.547 J	0.0225	0.335 J	0.0225
000043	B04	20-22	0.0266 U	0.0226	0.047 U	0.0470	0.523 J	0.0132	0.678	0.0124	0.417 J	0.0124
000044	B07	0-4	0.225	0.0218	0.0454 U	0.0454	0.819	0.0514	0.474 J	0.0222	0.75	0.0222
000045	B07	4-10	0.0337 U	0.0337	0.0133 U	0.0133	0.787	0.0554	0.59 J	0.0267	0.626	0.0158
000046	B07	10-12	0.0224 U	0.0224	0.019 U	0.0190	0.672	0.0504	0.522 J	0.0304	0.426 J	0.0229
000047	B07	12-16	0.027 U	0.0270	0.0476 U	0.0476	0.736	0.0608	0.54 J	0.0154	0.483 J	0.0154
000048	B07	16-20	0.0155 U	0.0115	0.024 U	0.0240	0.528 J	0.0378	0.538 J	0.0262	0.418 J	0.0231
000050	B10	0-4	0.336	0.0113	0.0234 U	0.0234	1.17	0.0609	0.624	0.0268	1.01	0.0180
000051	B10	4-8	0.0406	0.0165	0.00931 U	0.00931	1.14	0.0558	0.44 J	0.0284	1	0.0250
000052	B10	8-12	0.0102 U	0.0102	0.0102 U	0.0102	0.616	0.0556	0.537 J	0.0240	0.435 J	0.0240
000053	B10	12-16	0.0564 U	0.0564	0.027 U	0.0270	0.537 J	0.0602	0.631	0.0153	0.501 J	0.0153
000054	B10	12-16	0.0434 U	0.0434	0.0434 U	0.0434	0.544 J	0.0372	0.524 J	0.0258	0.553 J	0.0227
000055	B10	16-20	0.0373 U	0.0373	0.0123 U	0.0123	0.474 J	0.0647	0.612	0.0271	0.323 J	0.0271
000056	B10	20-24	0.0265 U	0.0265	0.0379 U	0.0379	0.538 J	0.0605	0.647	0.0266	0.429 J	0.0179
000057	B10	24-26	0.0158 U	0.0158	0.0158 U	0.0158	0.533 J	0.0555	0.582 J	0.0244	0.413 J	0.0165
000058	B13	0-4	0.048 U	0.0480	0.0271 U	0.0271	0.875	0.0716	0.731	0.0245	1.11	0.0165

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000059	B13	4-8	0.0294 U	0.0294	0.0294 U	0.0294	1.07	0.0746	0.685	0.0256	0.679	0.0172
000060	B13	8-12	0.0429 U	0.0429	0.0242 U	0.0242	0.745	0.0620	0.558 J	0.0272	0.665	0.0239
000061	B13	12-16	0.0332 U	0.0332	0.0252 U	0.0252	0.471 J	0.0593	0.548 J	0.0158	0.519 J	0.0158
000063	B13a	16-20	0.0161	0.0145	0.0145 U	0.0145	0.476 J	0.0635	0.463 J	0.0326	0.328 J	0.0287
000064	B13a	20-24	0.0274 U	0.0274	0.0131 U	0.0131	0.357 J	0.0534	0.493 J	0.0333	0.247 J	0.0237
000065	B13a	20-24	0.053 U	0.0530	0.0295 U	0.0295	0.402 J	0.0612	0.521 J	0.0276	0.336 J	0.0186
000066	B02	0-4	0.0776	0.0191	0.0338 U	0.0338	0.842	0.0808	0.385 J	0.0287	0.642	0.0193
000067	B02	4-8	0.0231	0.00892	0.0158 U	0.0158	0.827	0.0690	0.735	0.0191	0.557 J	0.0284
000068	B02	8-12	0.0227 U	0.0227	0.0299 U	0.0299	0.434 J	0.0496	0.468 J	0.0242	0.324 J	0.0242
000069	B02	12-16	0.0126 U	0.0126	0.0126 U	0.0126	0.356 J	0.0505	0.477 J	0.0288	0.346 J	0.0232
000070	B02	16-20	0.0544 U	0.0544	0.0343 U	0.0343	0.337 J	0.0575	0.438 J	0.0260	0.355 J	0.0175
000071	B02	20-24	0.0225 U	0.0225	0.0297 U	0.0297	0.378 J	0.0464	0.527 J	0.0291	0.325 J	0.0196
000072	B05	0-4	0.118	0.0139	0.0139 U	0.0139	1.01	0.0534	0.77	0.0271	0.86	0.0239
000073	B05	4-8	0.0608	0.0399	0.0338 U	0.0338	0.72	0.0595	0.662	0.0151	0.673	0.0151
000074	B05	8-12	0.0147 U	0.0147	0.0305 U	0.0305	0.692	0.0388	0.634	0.0269	0.517 J	0.0237
000075	B05	12-16	0.0208 U	0.0208	0.0208 U	0.0208	0.567 J	0.0136	0.63	0.0127	0.466 J	0.0127
000076	B05	16-20	0.0253 U	0.0253	0.0217 U	0.0217	0.478 J	0.0495	0.56 J	0.0251	0.324 J	0.0221

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000077	B05	20-24	0.0207 U	0.0207	0.0207 U	0.0207	0.488	0.0530	0.495 J	0.0222	0.462 J	0.0222
000079	B08	0-4	0.0886	0.0171	0.00967 U	0.00967	0.727	0.0613	0.568 J	0.0234	0.76	0.0157
000080	B08	4-8	0.0437 U	0.0437	0.0247 U	0.0247	0.669	0.0375	0.494 J	0.0260	0.556 J	0.0229
000081	B08	8-12	0.0243 U	0.0243	0.0206 U	0.0206	0.598 J	0.0558	0.508 J	0.0250	0.466 J	0.0168
000082	B08	12-16	0.02 U	0.0200	0.0133 U	0.0113	0.499 J	0.0569	0.466 J	0.0250	0.398 J	0.0168
000083	B08	16-20	0.0205 U	0.0205	0.0205 U	0.0205	0.557 J	0.0181	0.578 J	0.0114	0.434 J	0.0170
000085	B11	0-4	0.0785	0.0118	0.0118 U	0.0118	0.77	0.0128	0.51 J	0.0120	0.657	0.0120
000086	B11	4-8	0.0544 U	0.0544	0.0179 U	0.0179	0.816	0.0191	0.468 J	0.0121	0.588 J	0.0179
000087	B11	8-12	0.067 U	0.0670	0.0508 U	0.0508	0.681	0.0126	0.535 J	0.0118	0.457 J	0.0118
000088	B11	12-16	0.0221 U	0.0221	0.0187 U	0.0187	0.472 J	0.0498	0.479 J	0.0258	0.389 J	0.0227
000089	B11	16-20	0.0242 U	0.0242	0.0242 U	0.0242	0.678	0.0580	0.505 J	0.0239	0.529 J	0.0239
000091	B14	0-4	0.271	0.0118	0.0247 U	0.0247	0.669	0.0787	0.451 J	0.0398	0.635	0.0236
000092	B14	4-8	0.241	0.0104	0.0183 U	0.0183	0.549 J	0.0636	0.524 J	0.0243	0.573 J	0.0163
000093	B14	4-8	0.0454	0.0184	0.0264 U	0.0264	0.806	0.0386	0.35 J	0.0268	0.596 J	0.0236
000094	B14	4-8	0.0273 U	0.0273	0.036 U	0.0360	0.527 J	0.0484	0.493 J	0.0236	0.422 J	0.0236
000095	B14	8-12	0.0139 U	0.0139	0.0138 U	0.0138	0.6	0.0578	0.618	0.0254	0.366 J	0.0171

Table 6: Offsite Radiological Analytical Results (pCi/g)

		Analyte:	Plutonium-238		Plutonium-239/240		Thorium-228		Thorium-230		Thorium-232	
		Background:	0.13		0.18		1.5		1.9		1.4	
		Guideline Value (GV)	55 (1)		5.5 (2)		3 (2)		0.12 (3)		0.09 (3)	
Sample ID	Boring	Interval	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA	Activity	MDA
000096	B14	16-20	0.0199 U	0.0199	0.0122 U	0.0112	0.474 J	0.0178	0.516 J	0.0113	0.353 J	0.0168
000099	B03a	0-4	0.368	0.00933	0.00933 U	0.00933	0.752	0.0602	0.384 J	0.0344	0.661	0.0277
000100	B03a	4-8	0.136	0.0105	0.022 U	0.0220	0.492 J	0.0573	0.505 J	0.0264	0.472 J	0.0264
000101	B03a	8-12	0.0278 U	0.0278	0.0278 U	0.0278	0.466 J	0.0522	0.458 J	0.0250	0.371 J	0.0250
000102	B03a	8-12	0.03	0.0203	0.0359 U	0.0359	0.534 J	0.0534	0.445 J	0.0305	0.293 J	0.0246
000103	B03a	12-16	0.0171 U	0.0171	0.0302 U	0.0302	0.414 J	0.0567	0.442 J	0.0266	0.396 J	0.0266
000104	B03a	16-20	0.03 U	0.0300	0.0144 U	0.0144	0.359 J	0.0374	0.456 J	0.0158	0.327 J	0.0158

Note:
interval depths given in feet below ground surface
* indicates depulicate soil sample
MDA - minimum detectable activity
U - indicates the result was less than or not detected at the MDA.
J - sample result is greater than the MDA but less than the contract required reporting limit.
The comparison criteria is equal to:
- the GV if the GV is greater than background
- the GV plus background if GV is less than background

All background and GVs are referenced as presented in the DOE 1997 or DOE 1999b unless otherwise noted.
(1) 10^{-5} risk value
(2) 10^{-6} risk value
(3) More restrictive of the contruction worker and site employee 10^{-6} risk values as calculated using the methodology contained in DOE 1997, performed subsequent to its publication.

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000001	000002	000003	000004	000005	000007	000008	000009*
		Boring ID:	B15	B15	B15	B15	B15	B12	B12	B12
		Interval:	0-4	4-8	8-12	12-16	16-20	0-4	4-8	4-8
Chloromethane	NS		11 U	11 U	11 U	11 U	12 U	12 U	12 U	12 U
Vinyl Chloride	NS		11 U	2J	11 U	2 J	12 U	12 U	13 (J)	12 U
Methylene Chloride	NS		9 (U)	12 (U)	27 (U)	24 (U)	29 (U)	12 (U)	11 (U)	15 (U)
Acetone	21,000,000		11 (U)	11 (U)	14 (U)	11 (U)	12 (U)	13 (U)	11 (U)	12 (U)
Carbon Disulfide	280,000		6 U	6 U	2 J	1 J	6 U	6 U	6 U	6 U
1,1-Dichloroethene	NS		6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		190 JD	200 JD	6 U	4 J	6 U	7	160 (J)	8 (J)
Chloroform	NS		6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Butanone	9,300,000		11 (U)	11 (U)	11 (U)	11 (U)	11 (U)	11 (U)	12 (U)	12 (U)
1,2-Dichloropropane	NS		6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene	125,000		9,600 D	6,300 D	6 J	83	4 J	1000 D	3,400 D(J)	880 D(J)
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Benzene	32,000		6 U	6 U	6 U	6 U	2 J	6 U	6 U	6 U
4-Methyl-2-pentanone	700,000		11 U	11 U	11 U	11 U	12 U	12 U	12 U	12 U
2-Hexanone	NS		11 U	11 U	11 U	11 U	12 U	12 U	12 U	12 U
Tetrachloroethene	2,100,000		24,000 D	15,000 D	4 J	55	5 J	7,000 D	2,900 D(J)	1,600 D(J)
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Toluene	250,000		69	78	6 U	1 J	2 J	8	7 (J)	4 J (J)
Ethylbenzene	480		5 J	5 J	6 U	6 U	6 U	1 J	6 U	6 U
Xylene (total)	430,000,000		22	22	6 U	6 U	6 U	8	1 J (J)	6 U
1,1,2-Trichlorotrifluoroethane	NS		2 JB	2 JB	1 J	6 U	6 U	6 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000010	000011	000012	000013*	000014	000015	000016	000017
		Boring ID:	B12	B12	B12	B12	B12	B09	B09	B09
		Interval:	8-12	12-16	16-20	16-20	20-24	0-4	4-8	8-12
Chloromethane	NS		11 U	11 U	11 U	11 U	11 U	1400 U	1400 U	11 U
Vinyl Chloride	NS		11 U	11 U	11 U	11 U	11 U	1400 U	1400 U	5 J
Methylene Chloride	NS		14 (U)	22 (U)	21 (U)	14 (U)	15 (U)	960 (U)	640 (U)	12 (U)
Acetone	21,000,000		11 (U)	12 (U)	11 (U)	11 (U)	10 JB	1400 U	1400 U	11 (U)
Carbon Disulfide	280,000		2 J	2 J	1 J	6 U	5 J	690 U	680 U	2 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
1,2-Dichloroethene (total)	4,300,000		6 U	6 U	6 U	6 U	6 U	200 J	680 U	1 J
Chloroform	NS		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
2-Butanone	9,300,000		11 (U)	11 (U)	11 (U)	11 (U)	11 (U)	1400 (U)	1400 (U)	11 (U)
1,2-Dichloropropane	NS		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
Trichloroethene	125,000		1 J	2 J	6 U	6 U	2 J	5,100	3,600	24
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
Benzene	32,000		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
4-Methyl-2-pentanone	700,000		11 U	11 U	11 U	11 U	11 U	1400 U	1400 U	11 U
2-Hexanone	NS		11 U	11 U	11 U	11 U	11 U	1400 U	1400 U	11 U
Tetrachloroethene	2,100,000		2 J	2 J	6 U	6 U	4 J	40,000 D	17,000	11
1,1,2,2-Tetrachloroethane	NS		1 J	6 U	6 U	6 U	6 U	690 U	680 U	6 U
Toluene	250,000		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
Ethylbenzene	480		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
Xylene (total)	430,000,000		6 U	6 U	6 U	6 U	6 U	690 U	680 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	6 U	6 U	6 U	230 J	680 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000018	000019	000020	000022	000023	000024	000025*	000026
		Boring ID:	B09	B09	B09	B06	B06	B06	B06	B06
		Interval:	12-16	16-20	20-21	0-4	4-8	8-12	8-12	12-16
Chloromethane	NS		11 U	11 U	11 U	1400 U	1400 U	12 U	11 U	11 U
Vinyl Chloride	NS		11 U	11 U	11 U	1400 U	1400 U	25	11 U	11 U
Methylene Chloride	NS		17 (U)	20 (U)	23 (U)	730 (U)	790 (U)	15 (U)	18 (U)	15 (U)
Acetone	21,000,000		11 (U)	11 (U)	11 (U)	1400 U	1400 U	12 U	11 (U)	11 (U)
Carbon Disulfide	280,000		6 U	2 J	8	700 U	690 U	6 U	6 U	2 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		6 U	6 U	6 U	700 U	200 J	5 J	2 J	6 U
Chloroform	NS		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
2-Butanone	9,300,000		11 (U)	11 (U)	11 (U)	1400 (U)	1400 (U)	11 (U)	11 (U)	11 (U)
1,2-Dichloropropane	NS		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
Trichloroethene	125,000		6 U	4 J	7	900	3,800	46	33	10
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
Benzene	32,000		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
4-Methyl-2-pentanone	700,000		11 U	11 U	11 U	1400 U	1400 U	12 U	11 U	11 U
2-Hexanone	NS		11 U	3 J	11 U	1400 U	1400 U	12 U	11 U	11 U
Tetrachloroethene	2,100,000		6 U	4 J	6	4,400	8,900	3 J	4 J	2 J
1,1,2,2-Tetrachloroethane	NS		6 U	1 J	6 U	700 U	690 U	6 U	6 U	6 U
Toluene	250,000		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
Ethylbenzene	480		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
Xylene (total)	430,000,000		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	6 U	700 U	690 U	6 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000030	000031	000032	000033*	000034	000035	000037	000038
		Boring ID:	B01	B01	B01	B01	B01	B01	B04	B04
		Interval:	0-4	4-8	8-12	8-12	12-16	16-20	0-4	4-8
Chloromethane	NS		10 U	12 U	13 U	2 J	11 U	11 U	10 U	12 U
Vinyl Chloride	NS		10 U	12 U	13 U	12 U	11 U	11 U	10 U	12 U
Methylene Chloride	NS		14 (U)	15 (U)	17 (U)	14 (U)	18 (U)	41 (U)	18 (U)	19 (U)
Acetone	21,000,000		16 (U)	19 (U)	23 (U)	19 (U)	11 (U)	16 (U)	12 (U)	16 (U)
Carbon Disulfide	280,000		5 U	6 U	6 U	6 U	6 U	1 J	5 U	6 U
1,1-Dichloroethene	NS		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
1,2-Dichloroethene (total)	4,300,000		5 U	85	79	80	120	2 J	5 U	62
Chloroform	NS		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
2-Butanone	9,300,000		10 (U)	12 (U)	13 (U)	12 (U)	11 (U)	11 (U)	10 (U)	12 (U)
1,2-Dichloropropane	NS		5 U	6 U	6 U	6 U	3 J	6 U	5 U	6 U
Trichloroethene	125,000		5 U	19	36	65	5,500 D	17	3 J	38
1,1,2-Trichloroethane	NS		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
Benzene	32,000		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
4-Methyl-2-pentanone	700,000		10 U	12 U	13 U	12 U	11 U	11 U	10 U	12 U
2-Hexanone	NS		10 U	12 U	13 U	12 U	11 U	11 U	10 U	12 U
Tetrachloroethene	2,100,000		5 U	6 J	18	39	5,900 D	83	11	10
1,1,2,2-Tetrachloroethane	NS		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
Toluene	250,000		5 U	6 U	1 J	6 U	4 J	2 J	1 J	1 J
Ethylbenzene	480		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
Xylene (total)	430,000,000		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		5 U	6 U	6 U	6 U	6 U	6 U	5 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000039	000040	000041	000042*	000043	000044	000045	000046
		Boring ID:	B04	B04	B04	B04	B04	B07	B07	B07
		Interval:	8-12	12-16	16-20	16-20	20-22	0-4	4-10	10-12
Chloromethane	NS		12 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U
Vinyl Chloride	NS		12 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U
Methylene Chloride	NS		18 (U)	19 (U)	21 (U)	23 (U)	10 (U)	19 (U)	10 (U)	21 (U)
Acetone	21,000,000		12 (U)	11 (U)	13 (U)	11 (U)	11 (U)	11 (U)	26 (U)	11 (U)
Carbon Disulfide	280,000		6 U	6 U	8 (J)	5 J (J)	2 J	6 U	6 U	6 U
1,1-Dichloroethene	NS		6 U	1 J	5 U	2 J	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		97	580 JD	1 J	53	6 U	6 U	2 J	8
Chloroform	NS		6 U	1 J	5 U	6 U	6 U	6 U	6 U	6 U
2-Butanone	9,300,000		12 (U)	11 U	10 (U)	11 (U)	11 (U)	11 (U)	11 (U)	11 (U)
1,2-Dichloropropane	NS		6 U	8	5 U	1 J (J)	6 U	6 U	6 U	6 U
Trichloroethene	125,000		120 D	17,000 D	6	480 D	2 J	1 J	18	130
1,1,2-Trichloroethane	NS		6 U	12	5 U	1 J	6 U	6 U	6 U	8
Benzene	32,000		6 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	700,000		12 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U
2-Hexanone	NS		12 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U
Tetrachloroethene	2,100,000		310 D	260,000 D	12 (J)	340 D (J)	4 J	3 J	130	2,600 D
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U
Toluene	250,000		1 J	2 J	1 J (J)	6 U	6 U	2 J	6 U	1 J
Ethylbenzene	480		6 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U
Xylene (total)	430,000,000		6 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000047	000048	000050	000051	000052	000053	000054*	000055
		Boring ID:	B07	B07	B10	B10	B10	B10	B10	B10
		Interval:	12-16	16-20	0-4	4-8	8-12	12-16	12-16	16-20
Chloromethane	NS		12 U	11 U	11 U	64 U	43 U	50 U	56 U	45 U
Vinyl Chloride	NS		2 J	3 J	11 U	64 U	43 U	50 U	56 U	45 U
Methylene Chloride	NS		16 (U)	18 (U)	10 (U)	82 (U)	66 (U)	70 (U)	28 (U)	31 (U)
Acetone	21,000,000		12 (U)	12 (U)	11 (U)	90 (U)	13 (U)	50 (U)	56 (U)	45 (U)
Carbon Disulfide	280,000		2 J	5 J	6 U	8 J	22 U	25 U	28 U	9 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	32 U	22 U	25 U	28 U	22 U
1,2-Dichloroethene (total)	4,300,000		120 JD	77	6 U	32 U	580	750	83	37
Chloroform	NS		6 U	6 U	6 U	32 U	22 U	25 U	28 U	22 U
2-Butanone	9,300,000		12 U	11 (U)	11 (U)	64 (U)	43 (U)	50 (U)	56 U	45 U
1,2-Dichloropropane	NS		7	6 U	6 U	32 U	22 U	9 J	28 U	22 U
Trichloroethene	125,000		580 JD	330 JD	6 U	15 J	570 JD	3,600 D	1,300 D	230
1,1,2-Trichloroethane	NS		3 J	24	6 U	32 U	22 U	25 U	28 U	22 U
Benzene	32,000		6 U	6 U	6 U	32 U	22 U	25 U	28 U	22 U
4-Methyl-2-pentanone	700,000		12 U	11 U	11 U	64 U	43 U	50 U	56 U	45 U
2-Hexanone	NS		12 U	11 U	5 J	64 U	43 U	50 U	56 U	45 U
Tetrachloroethene	2,100,000		3,200 D	3,200 D	2 J	9 J	1,400 D	3,600 D	1,800 D	74
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	6 U	32 U	4 J	25 U	28 U	22 U
Toluene	250,000		1 J	1 J	6 U	7 J	10 J	9 J	28 U	22 U
Ethylbenzene	480		6 U	6 U	6 U	32 U	22 U	25 U	28 U	22 U
Xylene (total)	430,000,000		6 U	6 U	1 J	6 J	22 U	25 U	28 U	22 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	6 U	32 U	22 U	25 U	28 U	22 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000056	000057	000058	000059	000060	000061	000063	000064
		Boring ID:	B10	B10	B13	B13	B13	B13	B13a	B13a
		Interval:	20-24	24-26	0-4	4-8	8-12	12-16	16-20	20-24
Chloromethane	NS		10 U	12 U	13 U	12 U	12 U	42 U	11 U	11 U
Vinyl Chloride	NS		10 U	12 U	13 U	12 U	12 U	42 U	11 U	11 U
Methylene Chloride	NS		12 (U)	14 (U)	12 (U)	13 (U)	11 (U)	40 (U)	15 (U)	10 (U)
Acetone	21,000,000		10 (U)	32	15 (U)	12 (U)	15 (U)	42 (U)	17 (U)	12 (U)
Carbon Disulfide	280,000		5 U	9	6 U	6 U	6 U	21 U	3 J	2 J
1,1-Dichloroethene	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		5 U	7	6 U	8	21	150	6 U	6 U
Chloroform	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
2-Butanone	9,300,000		10 U	12 (U)	13 (U)	12 (U)	12 (U)	42 U	11 (U)	11 U
1,2-Dichloropropane	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
Trichloroethene	125,000		5 U	28	2 J	2 J	33	650	1 J	8
1,1,2-Trichloroethane	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
Benzene	32,000		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
4-Methyl-2-pentanone	700,000		10 U	12 U	13 U	12 U	12 U	42 U	11 U	11 U
2-Hexanone	NS		10 U	12 U	13 U	12 U	12 U	42 U	11 U	11 U
Tetrachloroethene	2,100,000		5 U	8	10	9	21	91	6 U	24
1,1,2,2-Tetrachloroethane	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
Toluene	250,000		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
Ethylbenzene	480		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
Xylene (total)	430,000,000		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		5 U	6 U	6 U	6 U	6 U	21 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000065*	000066	000067	000068	000069	000070	000071	000072
		Boring ID:	B13a	B02	B02	B02	B02	B02	B02	B05
		Interval:	20-24	0-4	4-8	8-12	12-16	16-20	20-24	0-4
Chloromethane	NS		11 U	13 U	12 U	56 U	56 U	50 U	11 U	13 U
Vinyl Chloride	NS		11 U	9 J	12 U	56 U	56 U	50 U	11 U	57
Methylene Chloride	NS		25 (U)	8 (U)	9 (U)	65 (U)	68 (U)	72 (U)	16 (U)	16 (U)
Acetone	21,000,000		11 JB	210 B	140 B	56 U	56 (U)	50 (U)	11 (U)	230 B
Carbon Disulfide	280,000		3 J	1 J	2 J	28 U	28 U	6 J	4 J	3 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		6 U	6 U	47	300	28 U	10 J	6 U	8
Chloroform	NS		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
2-Butanone	9,300,000		11 U	49	32	56 (U)	56 (U)	50 U	11 (U)	72 B
1,2-Dichloropropane	NS		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
Trichloroethene	125,000		2 J	6 U	7	410 JD	390	210	1 J	6 U
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
Benzene	32,000		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
4-Methyl-2-pentanone	700,000		11 U	13 U	12 U	56 U	56 U	50 U	11 U	13 U
2-Hexanone	NS		11 U	13 U	12 U	56 U	56 U	50 U	11 U	13 U
Tetrachloroethene	2,100,000		6 U	6 U	2 J	4,200 D	97	43	6 U	6 U
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
Toluene	250,000		6 U	6 U	6 U	28 U	28 U	25 U	6 U	3 J
Ethylbenzene	480		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
Xylene (total)	430,000,000		6 U	6 U	6 U	28 U	28 U	25 U	6 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		2 J	6 U	6 U	28 U	28 U	25 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000073	000074	000075	000076	000077	000079	000080	000081
		Boring ID:	B05	B05	B05	B05	B05	B08	B08	B08
		Interval:	4-8	8-12	12-16	16-20	20-24	0-4	4-8	8-12
Chloromethane	NS		57 U	51 U	55 U	12 U	55 U	12 U	1400 U	1400 U
Vinyl Chloride	NS		57 U	51 U	55 U	10 J	55 U	64	1400 U	1400 U
Methylene Chloride	NS		63 (U)	26 (U)	89 (U)	16 (U)	76 (U)	10 (U)	1100 (U)	1100 (U)
Acetone	21,000,000		51 (U)	51 (U)	55 (U)	12 (U)	55 (U)	25 (U)	1400 (U)	1400 U
Carbon Disulfide	280,000		28 U	26 U	5 J	8	7 J	1 J	690 U	690 U
1,1-Dichloroethene	NS		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
1,2-Dichloroethene (total)	4,300,000		15 J	13 J	260	10	28 U	41	470 J	1200
Chloroform	NS		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
2-Butanone	9,300,000		57 (U)	51 U	55 (U)	12 U	55 U	12 (U)	1400 (U)	1400 (U)
1,2-Dichloropropane	NS		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
Trichloroethene	125,000		440	1,600 D	5,300 JD	98 D	28 U	2 J	4,700	24,000 D
1,1,2-Trichloroethane	NS		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
Benzene	32,000		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
4-Methyl-2-pentanone	700,000		57 U		55 U	12 U	55 U	12 U	1400 U	1400 U
2-Hexanone	NS		57 U	51 U	55 U	12 U	55 U	12 U	1400 U	1400 U
Tetrachloroethene	2,100,000		5,500 D	4,900 D	130,000 D	71	28 U	6 J	62,000 D	74,000 D
1,1,2,2-Tetrachloroethane	NS		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
Toluene	250,000		6 J	26 U	13 J	6 U	28 U	2 J	690 U	690 U
Ethylbenzene	480		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
Xylene (total)	430,000,000		28 U	26 U	28 U	6 U	28 U	6 U	690 U	690 U
1,1,2-Trichlorotrifluoroethane	NS		28 U	26 U	28 U	1 J	28 U	6 U	690 U	690 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000082	000083	000084	000085	000086	000087	000088	000089
		Boring ID:	B08	B08	B08	B11	B11	B11	B11	B11
		Interval:	12-16	16-20	20-24	0-4	4-8	8-12	12-16	16-20
Chloromethane	NS		12 U	11 U	12 U	50 U	55 U	35 U	43 U	42 U
Vinyl Chloride	NS		1 J	11 U	12 U	38 J	34 J	100	43 U	42 U
Methylene Chloride	NS		17 (U)	13 (U)	11 (U)	66 (U)	66 (U)	43 (U)	64 (U)	59 (U)
Acetone	21,000,000		12 (U)	11 (U)	17 (U)	140 (U)	55 (U)	35 (U)	43 (U)	42 (U)
Carbon Disulfide	280,000		4 J	2 J	2 J	11 J	28 U	18 U	8 J	13 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	25 U	28 U	18 U	22 U	21 U
1,2-Dichloroethene (total)	4,300,000		8	6 U	6 U	1,700 D	3,000 JD	2,600 JD	9 J	61
Chloroform	NS		6 U	6 U	6 U	25 U	28 U	4 J	22 U	21 U
2-Butanone	9,300,000		12 U	11 U	12 U	50 U	55 U	35 U	43 (U)	42 (U)
1,2-Dichloropropane	NS		6 U	6 U	6 U	25 U	28 U	12 J	22 U	21 U
Trichloroethene	125,000		94	1 J	1 J	65	11,000 JD	23,000 D	150	3,200 JD
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	25 U	32	32	22 U	21 U
Benzene	32,000		6 U	6 U	6 U	25 U	28 U	18 U	22 U	21 U
4-Methyl-2-pentanone	700,000		12 U	11 U	12 U	50 U	55 J	84	43 U	42 U
2-Hexanone	NS		12 U	11 U	12 U	50 U	55 U	35 U	43 U	42 U
Tetrachloroethene	2,100,000		120	7	5 J	58	60,000 D	19,000 D	46	370
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	6 U	25 U	28 U	18 U	22 U	21 U
Toluene	250,000		6 U	6 U	6 U	230	380	410	4 J	7 J
Ethylbenzene	480		6 U	6 U	6 U	38	38	5 J	22 U	21 U
Xylene (total)	430,000,000		6 U	6 U	6 U	220	220	10 J	22 U	21 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	6 U	25 U	28 U	18 U	22 U	21 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000090	000091	000092*	000093	000094	000095	000096	000097
		Boring ID:	B11	B14	B14	B14	B14	B14	B14	B14
		Interval:	20-24	0-4	4-8	4-8	4-8	8-12	16-20	20-24
Chloromethane	NS		11 U	12 U	12 U	12 U	56 U	10 U	11 U	10 U
Vinyl Chloride	NS		11 U	8 J	2 J	12 U	56 U	10 U	11 U	10 U
Methylene Chloride	NS		27 (U)	21 (U)	17 (U)	13 (U)	28 (U)	33 (U)	26 (U)	17 (U)
Acetone	21,000,000		32 B	180 B	81 B	94 B	56 (U)	26 (U)	39 B	24 (U)
Carbon Disulfide	280,000		1 J	4 J	1 J	6 U	28 U	4 J	3 J	2 J
1,1-Dichloroethene	NS		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
1,2-Dichloroethene (total)	4,300,000		3 J	13	62	59	730	100	59	4 J
Chloroform	NS		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
2-Butanone	9,300,000		11 U	47	19 (U)	23	56 (U)	10 (U)	11 (U)	10 (U)
1,2-Dichloropropane	NS		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
Trichloroethene	125,000		47	1 J	7	6	1,900 D	170	67	10
1,1,2-Trichloroethane	NS		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
Benzene	32,000		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
4-Methyl-2-pentanone	700,000		11 U	12 U	12 U	12 U	56 U	10 U	11 U	10 U
2-Hexanone	NS		11 U	12 U	12 U	12 U	56 U	10 U	11 U	10 U
Tetrachloroethene	2,100,000		17	1 J	7	7	22,000 D	89	34	11
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	6 U	6 U	28 U	5 U	6 U	5 U
Toluene	250,000		1 J	140	57	40	54	5 U	6 U	1 J
Ethylbenzene	480		6 U	28	17	11	70	5 U	6 U	5 U
Xylene (total)	430,000,000		6 U	71	45	30	65	5 U	6 U	5 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	6 U	6 U	28 U		6 U	5 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000098	000099[1]	000100	000101	000102*	000103	000104	000105
		Boring ID:	B14	B03a	B03a	B03a	B03a	B03a	B03a	B03a
		Interval:	24-28	0-4	4-8	8-12	8-12	12-16	16-20	20-22
Chloromethane	NS		12 U	12 U	56 U	52 U	51 U	12 U	11 U	12 U
Vinyl Chloride	NS		12 U	12 U	56 U	52 U	51 U	12 U	11 U	12 U
Methylene Chloride	NS		19 (U)	11 (U)	31 (U)	38 (U)	30 (U)	37 (U)	39 (U)	13 (U)
Acetone	21,000,000		19 (U)	35 B	56 (U)	52 (U)	51 (U)	21 (U)	41 B	23 (U)
Carbon Disulfide	280,000		4 J	6 U	28 U	26 U	26 U	6 U	2 J	6 U
1,1-Dichloroethene	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	4,300,000		4 J	10	37	25 J	38	6 U	6 U	6 U
Chloroform	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
2-Butanone	9,300,000		12 U	7 (U)	56 U	52 (U)	51 (U)	12 U	11 U	12 U
1,2-Dichloropropane	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
Trichloroethene	125,000		11	55	1100	4,800 D	6700 D	4 J	2 J	2 J
1,1,2-Trichloroethane	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
Benzene	32,000		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
4-Methyl-2-pentanone	700,000		12 U	12 U	56 U	52 U	51 U	12 U	11 U	12 U
2-Hexanone	NS		12 U	12 U	56 U	52 U	51 U	12 U	11 U	12 U
Tetrachloroethene	2,100,000		19	75	5,300 D	870	660	6 U	3 J	1 J
1,1,2,2-Tetrachloroethane	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
Toluene	250,000		6 U	6 U	28 U	26 U	26 U	6 U	6 U	1 J
Ethylbenzene	480		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
Xylene (total)	430,000,000		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U
1,1,2-Trichlorotrifluoroethane	NS		6 U	6 U	28 U	26 U	26 U	6 U	6 U	6 U

Table 7: Volatile Organic Analytical Results (µg/kg)

Analyte	Mound Risk-Based Guideline Criteria	Sample ID:	000028[1]
		Boring ID:	B03
		Interval:	0-4
Chloromethane	NS		1,368 U
Vinyl Chloride	NS		1,368 U
Methylene Chloride	NS		634 JB
Acetone	21,000,000		1,368 U
Carbon Disulfide	280,000		648 U
1,1-Dichloroethene	NS		648 U
1,2-Dichloroethene (total)	4,300,000		186 J
Chloroform	NS		648 U
2-Butanone	9,300,000		364 JB
1,2-Dichloropropane	NS		648 U
Trichloroethene	125,000		1,849
1,1,2-Trichloroethane	NS		648 U
Benzene	32,000		648 U
4-Methyl-2-pentanone	700,000		1368 U
2-Hexanone	NS		1368 U
Tetrachloroethene	2,100,000		3,523
1,1,2,2-Tetrachloroethane	NS		648 U
Toluene	250,000		648 U
Ethylbenzene	480		648 U
Xylene (total)	430,000,000		648 U
1,1,2-Trichlorotrifluoroethane	NS		648 U

Notes:

Interval depth in feet below ground surface

[1]Interval reported in 000028 is duplicated in 000099.

* - represents a duplicate soil sample

U - indicates not detected at or above the laboratory reporting limit. The associated numerical value is the sample quantitation limit.

B - indicates analyte was found in the associated blank

J - indicates an estimated value below the specified detection limit

D - compound identified in an analysis at a secondary dilution factor

(U) - indicates qualified non-detect due to systematic blank contamination. Qualification assigned during data review.

(J) - indicates qualified estimated during data review.

Bold indicates detected above guideline criteria

APPENDIX C

FIGURES

Figure 1: PRS 76 Boring Locations

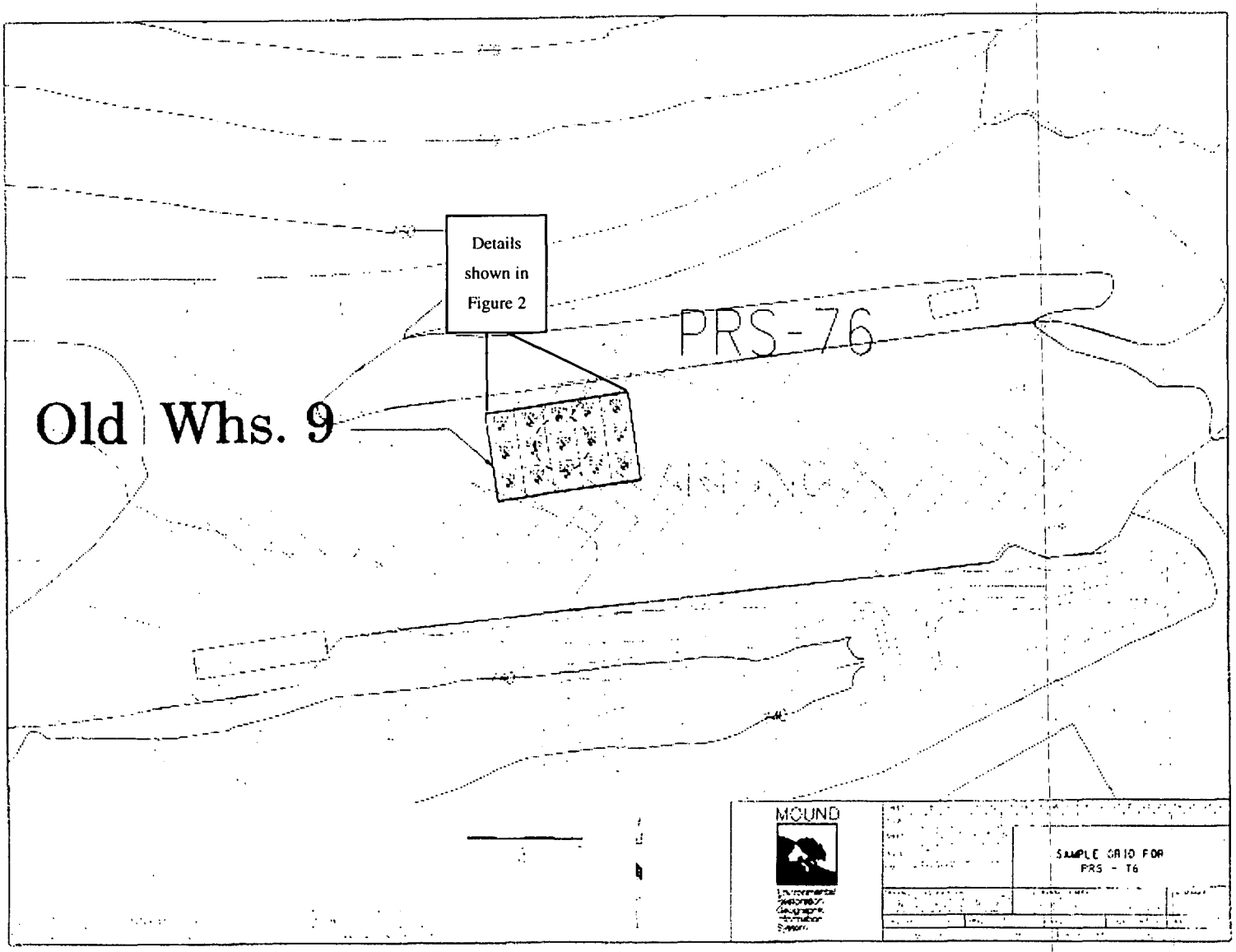
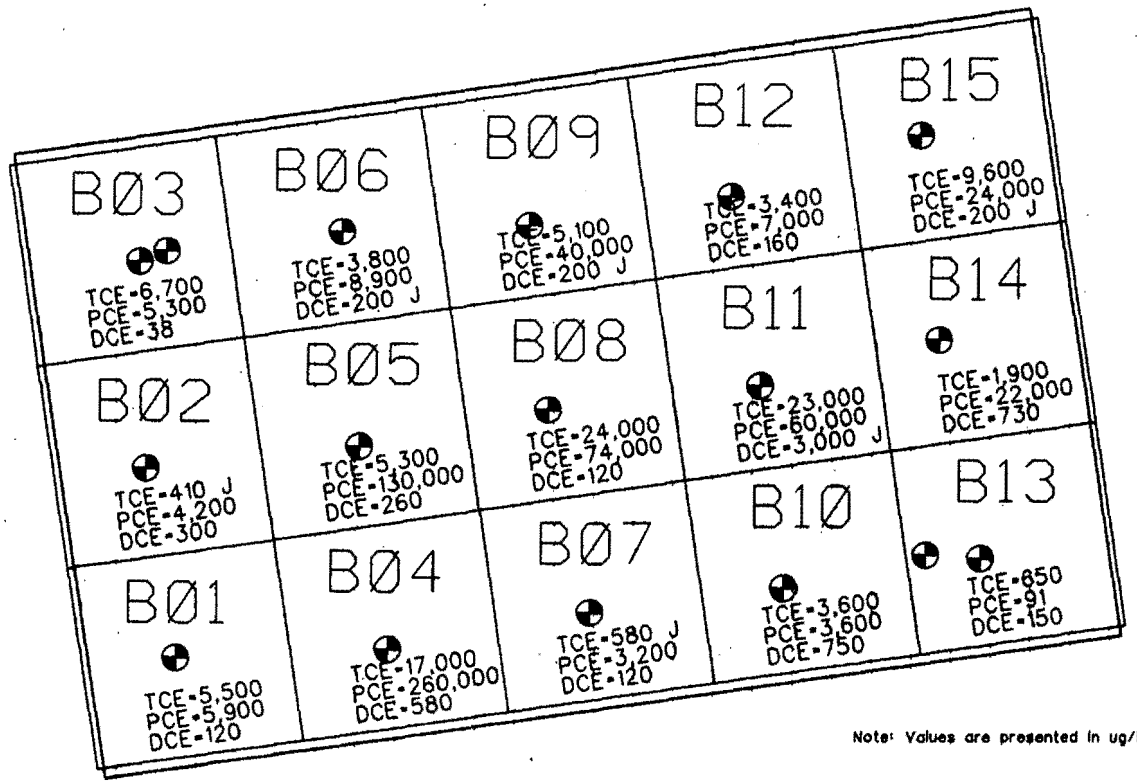


Figure 2: Maximum VOC Concentrations (µg/kg)



Note: Values are presented in ug/Kg

Note:

TCE - trichloroethene

PCE - tetrachloroethene

DCE - 1.2-dichloroethene

0 20 40
Scale (ft)

ISS	DATE	REVISION	BY	CHKR	ENG	UPMEC	APVD	#
0	06/15/99	PRELIMINARY ISSUE	KRW					

MOUND

SAMPLE GRID FOR PRS - 76

UNCLASSIFIED

PRS76_GRID.DGN

STE ER-015 GRAPH 1 OF 1

MD-REL-06/15/99 MSTATION 5.0

APPENDIX D

BORING LOGS

WESTON MANAGERS DESIGNERS/CONSULTANTS

B01

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/11/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		0.8	15, 16, 25, 36	
2	999			FILL: SAND AND GRAVEL (20% coarse, 30% fine subang), brn, dry, loose, no plasticity
		0.4	15, 28, 34, 34	
4	997			FILL: SILTY CLAY with 20% ang gravel, brn, moist, firm, low plasticity, iron oxidation
		1.3	20, 13, 18, 22	
6	995			coarse gravel, fine gray mottling, soft to firm, medium plasticity, no iron oxidation
		1.6	20, 16, 17, 21	
8	993			10% fine subang to subrounded gravel, soft, no mottling
		1.6	12, 14, 18, 36	
10	991			20% coarse ang gravel, gradual change to light brn color, firm, low plasticity, iron oxidation
		1.8	24, 50, 44, 54	
12	989			FILL: GRAVELLY SILTY CLAY (15% coarse ang gravel, 20% fine subang gravel), brn, moist, firm, low plasticity
		1.8	14, 40, 20, 38	
14	987			
		1.7	5, 15, 15, 24	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B01

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/11/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985	1.9	18, 44, 44, 50	TILL: LOAMY SAND, brn, moist to wet, loose, no plasticity; at 15.5 feet 0.5 foot of silty clay, brn, moist, firm, low plasticity
18	983	1.8	8, 20, 50/4	TILL: GRAVELLY SILTY CLAY (20% subang to ang gravel), gray, moist, firm, low plasticity 1-inch sand seam
20	981			End of Boring 20 feet
22	979			
24	977			
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B02

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	
Sampling Method	: Split Spoon	Elevation (TOC)	

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		0.9	8, 14, 28, 24	
2	999			FILL: SILTY CLAY with 20% coarse ang gravel, brn, moist, firm, low plasticity
		1.3	7, 7, 8, 14	
4	997			green-brn 5% fine subang gravel, brn with fine gray mottling
		1.9	7, 7, 14, 28	
6	995			
		0.8	14, 14, 48, 42	
8	993			10% fine subang gravel, light brn, no mottling coarse ang. gravel, light brn with fine gray mottling, iron oxidation
		1.8	7, 18, 30, 45	
10	991			
		1.3	15, 28, 50/4	
12	989			FILL: GRAVELLY SILTY CLAY (5% coarse rounded gravel and 20% fine to coarse subang gravel), brn, moist, firm, low plasticity, iron oxidation
		1.7	11, 28, 22, 26	
14	987			FILL: SILTY CLAY with 10% coarse subrounded to subang gravel, gray, moist, firm, low plasticity
		1.9	10, 28, 32, 50/5	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B02

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			bm (potentially fall in) gray
		0.7	13, 50/3	
18	983			FILL: SILTY GRAVELLY CLAY (20% coarse ang gravel, 20% fine subang gravel), gray, moist to dry, firm, no plasticity
		0.5	30, 50/3	
20	981			TILL: GRAVELLY SILTY CLAY (15% fine subrounded gravel) with 5% coarse sand, gray, moist, soft, low to med plasticity
		2	8, 8, 14, 18	
22	979			No sand at 22 feet
		1.8	5, 11, 15, 28	
24	977			
				End of boring 24 feet
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B03

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/28/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
2	999	1.6		FILL: SILTY CLAY with 15% fine subang gravel, 10% coarse subang gravel, brn, moist, firm, low plasticity
4	997	1.8	5, 27, 33, 30	
6	995			End of Boring 6 feet due to rig break-down
8	993			
10	991			
12	989			
14	987			
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B03a

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/15/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	
0	1001		asphalt.
			sand and gravel sub-base.
		1.8	FILL: SILTY CLAY with 20% gravel, brn, moist, stiff, low to med plasticity
2	999		black and brown, moist to dry
		1.8	
4	997		
			iron oxidation, yel-brn and brn
6	995		10% gravel, brn, moist, med plasticity
		1.8	
8	993		
		1.8	
10	991		
		1.3	
12	989		
		0.8	
14	987		
		1.3	TILL: SILTY CLAY with small gravel, gray, moist, stiff, med plasticity
16			

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B03a

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/15/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	
16	985	1.8	
18	983	0	No recovery
20	981		TILL: SILTY CLAY with 30% saturated sand pockets/layers, gray, wet, very stiff, med to high plasticity
22	979		
			End of boring at 22 feet
24	977		
26	975		
28	973		
30	971		
32			

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B04

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/11/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
		0.8	17, 36, 30, 40	FILL: SAND AND GRAVEL (40%), brn, dry, loose, no plasticity
2	999			
		0.5	18, 50/3	
4	997			FILL: SILTY GRAVELLY CLAY (30% coarse ang. gravel, 20% find ang. gravel), brn, moist, firm, low plasticity
		1.2	7, 12, 11, 9	
6	995			FILL: SANDY GRAVELLY CLAY with silt (10% coarse ang gravel, 30% fine subang gravel), brn with dk brn mottling, moist, soft, low plasticity
		1.7	7, 12, 16, 22	
8	993			
		1.8	10, 20, 25, 30	5 inches of coarse ang gravel
10	991			FILL: SILTY CLAY with 30% fine subang gravel, brn, moist, soft to firm, low plasticity 30% fine subang gravel
		1.9	20, 24, 26, 30	coarse brn sand silty clay with 20% fine subang gravel
12	989			FILL: SILTY SANDY CLAY with 20% fine subang gravel, 10% coarse subang gravel, brn, moist, soft, loose to low plasticity
		1.4	44, 50/5	
14	987			red-brn mottling, firm, low plasticity
		2	18, 20, 28, 48	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B04

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/11/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985	1.8	16, 30, 40, 50	
18	983	1.8	20, 38, 36, 40	TILL: SILTY GRAVELLY CLAY (40% fine subang gravel) gray, moist, firm, low plasticity TILL: SILTY CLAY with 20% fine subang to subrounded gravel, brn to 18.5 feet then gray, moist, hard, low plasticity
20	981	1.8	12, 14, 18, 20	No gravel, firm
22	979			
				End of Boring 22 feet
24	977			
26	975			
28	973			
30	971			
32				

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B05

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		1	10, 12, 16, 12	petroleum-like odor
2	999			FILL: GRAVELLY SILTY CLAY (30% coarse ang gravel), green-gray, moist, firm, low plasticity
		1.1	7, 9, 18, 21	FILL: CLAY with 10% fine subang gravel, green-gray, moist, soft to firm, med plasticity
4	997			FILL: SILTY CLAY with 10% fine subang gravel, brn with gray mottling, firm, low plasticity
		1.3	10, 20, 22, 20	
6	995			20% v. coarse ang gravel, iron oxidation, no mottling
		2	14, 16, 28, 36	
8	993			10% coarse ang gravel, 10% fine to coarse subrounded gravel, gray mottling
		1.8	20, 22, 27, 36	
10	991			
		0.5	40, 50/5	
12	989			no mottling
		1	15, 50/5	
14	987			
		0.3	40, 50/3	
16				

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WESTON

B05

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			
		0	25, 35, 30, 22	No recovery
18	983			
		2	17, 16, 28, 25	TILL: GRAVELLY SILTY CLAY (15% fine subrounded to subang gravel), 1 inch coarse sand pocket, gray, moist, soft, med platicity
20	981			
		0.3	10, 14, 15, 28	laminated fine sand/silty clay/fine sand
22	979			
		2	8, 11, 45, 50/5	
24	977			Shale
				End of boring at 24 feet bgs
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B06

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/28/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
2	999	1.3	6, 16, 22, 24	FILL: SILTY CLAY with 10% fine subang gravel, 5% coarse subang gravel, brn, moist, firm, low plasticity, iron oxidation
4	997	1.2	13, 15, 35, 50	FILL: GRAVELLY SILTY CLAY with 10% coarse subang gravel, 20% fine subang gravel, brn with red brn mottling, moist, firm, low plasticity, iron oxidation
6	995	1.6	3, 14, 26, 20	
8	993	1.8	3, 19, 24, 28	
10	991	1.8	10, 15, 25, 42	
12	989	1.5	6, 18, 25, 44	TILL: GRAVELLY SILTY CLAY (20% fine subang gravel), gray, moist, firm, low plasticity
14	987	1.5	10, 10, 15, 18	firm to soft
16	985			
18				

End of boring at 16 feet

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B07

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
		1.3	4, 9, 10, 20	
2	999			FILL: SILTY CLAY with 20% ang to subang gravel, dark brn, moist, firm, low plasticity, 2 inch layer of coarse ang gravel at 1.75 feet, green-gray at 1.8 feet
		0.8	4, 15, 39, 52	FILL: SAND AND GRAVEL (coarse sand with 20% coarse and 20% fine subang gravel) brn, dry, loose, no plasticity
4	997			No recovery
		1.8	50/1	
6	995			FILL: SILTY CLAY dark brn with light brn mottling, moist, soft, low plasticity
		0.5	15, 18, 25	FILL: SILTY SANDY CLAY with 30% coarse subang gravel, brn
8	993			FILL: SILTY CLAY, brn with green-gray mottling, moist, firm, low plasticity
		1.9	10, 20, 50/5	
10	991			20% subrounded coarse gravel, iron oxidation
		1.9	5, 20, 40, 40, 40	
12	989			fine subang gravel, soft
		0.5	45, 50/3	
14	987			
		1.1	45, 50/3	TILL: LOAM, brn, moist, firm, low plasticity
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B07

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001		Recovery (feet)	Blow Count (per 6 inch)	
16	985				
			1.5	16, 32, 50/4	TILL: GRAVELLY SITLY CLAY (15% coarse rounded gravel, 30% angular rock fragments), gray brn, moist, firm, low plasticity
18	983				
			1.3	22, 50/3	brn with fine red-brn mottling, 30% coarse subang to subrounded gravel, no rock fragments)
20	981				
					End of Boring 20 feet
22	979				
24	977				
26	975				
28	973				
30	971				
32					

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B08

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/14/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		1	16, 14, 26, 22	FILL: SAND with 10% gravel, dry, loose
2	999			
		1	8, 10, 15, 22	FILL: SILTY CLAY with small gravel, moist, stiff
4	997			
				light brn with light green mottling, iron oxidation
6	995	2	13, 35, 40, 27	
				30% large gravel, no rion oxidation, no mottling
8	993			
10	991	1.3	26, 32, 40, 28	
12	989			
		2	36, 50/6	10% small gravel
14	987			
		0.5	50/4	
16				5% gravel, brn-gray

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WESTON MANAGERS DESIGNERS/CONSULTANTS

B08

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/14/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			TILL: SILTY CLAY, gray, slightly moist, v. stiff
		1.3	30, 50, 48, 48	
18	983			
		1	8, 12, 14, 16	
20	981			moist to wet
		1	8, 15, 12, 14	
22	979			TILL: CLAYEY SAND with 5% gravel, wet, hard
		1	30, 50/6	
24	977			shale
				End of boring 24 feet
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B09

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/27/99 to 09/28/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		1.1	12, 18, 14, 23	FILL: SILTY CLAY with 20% coarse ang gravel, light brn, dry, loose, no plasticity
2	999			15% fine subang gravel, moist, firm, low plasticity
		1.2	4, 18, 27, 37	
4	997			soft
		0.3	3, 4, 12, 18	
6	995			10% fine subang gravel and 10% coarse subang gravel, firm
		1.5	8, 39, 41, 54	
8	993			
		0.3	3, 5, 70/3	rock blocked spoon advancement
10	991			15% coarse subang gravel, red brn mottling, hard, iron oxidation
		1.5	12, 33, 59, 44	
12	989			10% fine subang gravel
		0.8	12, 74/3	
14	987			10% fine subang gravel and 10% coarse subang gravel, brn, firm
		1.6	23, 9, 13, 24	
16				

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WESTON MANAGERS DESIGNERS/CONSULTANTS

B09

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/27/99 to 09/28/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			soft
		1.3	5, 10, 13, 16	TILL: LOAMY SAND, brn, moist, loose to soft, no plasticity
18	983			SILTY CLAY with 15% shale fragments, brn, moist, firm, low plasticity
		1.5	3, 18, 30, 29	0.5 foot loamy sand seam
20	981			25% coarse subang limestone gravel
		0.6	7, 17	
22	979			End of boring at 21 feet
24	977			
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B10

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
		1.5	7, 14, 11, 9	FILL: CLAYEY SAND AND GRAVEL (coarse subrounded), 5% blue gray clay, brn, moist, soft, low plasticity, petroleum-like odor
2	999			v. moist, no odor
		0.8	10, 10, 10, 7	
4	997			FILL: SANDY SILTY CLAY with 10% fine subang gravel, 5% coarse subang gravel, brn, v. moist, soft, low plasticity, nail found in sample
		1.7	6, 20, 5, 10	
6	995			FILL: SILTY CLAY with 10% fine subang gravel, brn, moist, soft, low to med plasticity
		2	10, 11, 11, 20	
8	993			10% coarse subang gravel, red-brn mottling, firm
		1.4	10, 26, 30, 30	
10	991			iron oxidation
		1.8	14, 30, 32, 36	
12	989			10% coarse subang to subrounded gravel, 10% fine subang gravel
		1.8	16, 22, 36, 50	
14	987			
		0.4	50/3	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B10

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			20% coarse subang gravel, 10% fine subrounded gravel
		1.5	8, 16, 28, 32	
18	983			
		0.7	50/5	
20	981			TILL: SILTY CLAY with 20% subrounded gravel, moist, soft, low to no plasticity, brn-gray
		0.7	15, 22, 26, 22	
22	979			TILL: SILTY GRAVELLY CLAY (10% coarse subrounded gravel, 10% fine subang gravel) moist soft, low plasticity, brn-gray
		2	6, 10, 13, 16	
24	977			
		0.5	50/4	
26	975			
				End of boring at 26 feet
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B11

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/14/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt brn sandy clay sub-base
		1.3	14, 14, 12, 16	FILL: SILTY CLAY, greenish gray with red-brn layering, dry, stiff, low to med plasticity
2	999			no layering
		1.5	10, 11, 34, 21	
4	997			with small gravel clasts with fresh faces, yel-brn to brn mottling, low plasticity
		2	16, 20, 20, 38	
6	995			v. stiff
		1.7	26, 28, 30, 50/4	
8	993			
		2	25, 30, 45, 40	
10	991			moist
		0.8	50/9	
12	989			very stiff
		1	12, 50, 50	
14	987			TILL: SILTY CLAY with small gravel, gray, moist, stiff, med plasticity
		0.8	40, 50/4	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B11

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/14/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			gray-brn
		1.3	14, 40, 28, 30	
18	983			
		0.5		
20	981			TILL: SANDY CLAY with sand pockets and small gravel, gray, moist, stiff, low to medium plasticity
22	979			
				SHALE: cobbles, wet
24	977			
				End of boring at 24 feet
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B12

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/29/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 inch	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
		1.3	11, 14, 11, 18	FILL: SILTY CLAY with 10% ang coarse gravel, light brn, moist, soft, low plasticity
2	999			iron oxidation
		1	10, 21, 25, 30	
4	997			intermixed gray silty clay, soft to firm
		1.3	12, 28, 39, 31	
6	995			30% v. coarse subang gravel, light brn, firm
		1.6	9, 19, 26, 39	
8	993			
		1.6	17, 35, 50, 6	
10	991			10% fine subang gravel, gray
		1.5	8, 17, 14, 20	
12	989			brn, soft
		1.8	6, 7, 14, 26	
14	987			20% coarse subang gravel, 2" layer of loam
		0.7	5, 16, 31, 34	
16				

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WESTON MANAGERS DESIGNERS/CONSULTANTS

B12

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 09/29/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 inch	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			10% fine subang gravel, firm
		1	4, 11, 34, 47	
18	983			gray brn
		1.3	27, 21, 26, 32	
20	981			
		1.3	12, 35, 50	
22	979	0.6	50/4	SHALE
24	977			
26	975			
28	973			
30	971			
32				

End of boring at 22 feet

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B13

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 inch	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt gravel sub-base
		1	5, 12, 8, 12	FILL: CLAYEY SAND AND GRAVEL (fine subang), brn, moist, loose to soft, no plasticity, iron oxidation
2	999			FILL: SILTY CLAY with 10% sand, 20% coarse ang gravel, brn, moist, soft, low plasticity
		1.3	10, 36, 50/5	
4	997			No recovery
		0	10, 13, 13, 10	
6	995			FILL: SILTY CLAY with 40% v. coarse ang gravel, brn, moist, firm, low plasticity
		0.7	17, 18, 29, 20	
8	993			10% coarse subang gravel, light brn with gray mottling
		1.3	8, 30, 32, 30	
10	991			stick/root within soil
		1.3	18, 20, 50/5	
12	989			no mottling
		1.1	20, 50/5	
14	987			
		0.5	50/5	
16				

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WESTON MANAGERS DESIGNERS/CONSULTANTS

B13

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/12/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 inch	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001		Recovery (feet)	Blow Count (per 6 inch)	
16	985				
			0	15, 50/4	
18	983				fall in, just pushing boulder from 16 feet down
			0.2	36, 50/4	
20	981				
			0.3	30, 36, 50/4	
22	979				
24	977				
					End of boring 24 feet due to boulder
26	975				
28	973				
30	971				
32					

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B13a

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001		Recovery (feet)	Blow Count (per 6 inch)	
0	1001				Not sampled
2	999				
4	997				
6	995				
8	993				
10	991				
12	989				
14	987		1	36, 45, 50/4	FILL: GRAVEL (v. coarse, ang) with 40% silty sandy clay, gray with brn mottling, moist to dry, stiff, low plasticity
16					

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B13a

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/13/99	Company Rep.	: L. Funk
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985	1.8	35, 48, 50, 46	FILL: SILTY GRAVELLY CLAY (30% coarse ang to subang gravel, 10% fine subang gravel), brn-gray, moist to dry, stiff, low plasticity
18	983	1.7	28, 35, 32, 41	TILL: GRAVELLY SILTY CLAY with 20% coarse subang to subrounded gravel, gray, moist, firm, low plasticity
20	981	1.3	5, 13, 19, 19	(5% coarse subang gravel, 20% fine subang gravel)
22	979	2	5, 7, 11, 15	TILL: SILTY CLAY with 10% fine subang to subrounded gravel, gray, moist, soft, low to med plasticity
24	977			End of boring at 24 feet
26	975			
28	973			
30	971			
32				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B14

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/15/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
0	1001			asphalt sand and gravel sub-base
		1	10, 22, 12, 20	
				FILL: SILTY CLAY, brn, dry, soft to stiff, low to med plasticity with 10% limestone gravel, brn and gray, stiff
2	999			
		0.7	12, 12, 20, 22	
4	997			
		1.2	10, 12, 22, 14	
6	995			
		1.9	16, 12, 22, 32	
8	993			with 5% small gravel
		1.7	34, 30, 32, 34	
10	991			v. stiff, dry to moist
		1.7	10, 35, 45, 50/3	
12	989			
		0.8	50/3	
14	987			
		1.3	6, 34, 30, 32	
16				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

B14

BWXT- Mound
Department of Energy Ohio Field Office
Miamisburg, Ohio

Date Completed	: 10/15/99	Company Rep.	: D. MacLemore
Hole Diameter	: 4.25 in.	Northing Coord.	:
Drilling Method	: H.S.A.	Easting Coord.	:
Sampling Method	: Split Spoon	Elevation (TOC)	:

Feet	1001	Recovery (feet)	Blow Count (per 6 inch)	
16	985			TILL: SILTY CLAY with 10% gravel, gray, dry to moist, stiff, med plasticity
		0.5	25, 22, 28, 30	
18	983			with 10% sand and 10% gravel, brn-gray, med to high plasticity
		1.7		
20	981			0.5 foot fine sand layer, wet, loose, no plasticity
		1.3		TILL: SANDY CLAY (20% sand) with sand pockets, gray, stiff, med to high plasticity
				0.5 foot fine sand layer, wet, loose, no plasticity
22	979			10% gravel, wet, med to high plasticity
		1.7	38, 48, 28, 50/6	
24	977			15% small gravel, wet, v. stiff, low to med plasticity
26	975			10% gravel, dry, hard, med plasticity
			60/8	
28	973			
				End of boring at 28 feet
30	971			
32				

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APPENDIX E

CORRECTIVE ACTION REPORTS

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS-76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	10/08/99
CAR No:	001	**Revision:**	0

Requirement: SAP required the installation of fifteen soil borings collected continuously at 4-foot sampling intervals to auger refusal, approximately 12-feet deep.

Finding/Observation: Drilling began with boring B15. Boring B15 was advanced to 20 feet without encountering auger refusal.

Corrective Action for Incident: Craig Stoll, Mark Daubenmire, and John Price were contacted regarding the nonconformance. Based on the WESTON geologist's description that natural soil was encountered in B15 between 12 and 14 feet bgs and based on the discovery that a nearby historic boring encountered bedrock at 41.5 feet bgs, the decision was made to advance borings to 4 feet below natural soil.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *08 October 1999*

Root Cause: Depth to bedrock estimated in the SAP was incorrect.

Corrective Action to Prevent Recurrence:. SAP author was informed of the discrepancy. Additional care will be taken in the writing of SAPs to further investigate information essential to project objectives.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *08 October 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stoll **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	10/08/99
CAR No:	002	**Revision:**	0

Requirement: Drilling Subcontract Agreement for Alliance required the installation of 15 borings and estimated a time frame for completion of two days.

Finding/Observation: Due to various problems detailed in a letter to Alliance dated October 1, 1999 (01011.032.043 file 2.3), drilling activities continued longer than anticipated. Alliance was on site from 9/22 through 9/23 and returned on 9/27 through 9/28. During these four days, four borings were completed and B03 had been advanced to a depth between 6 and 8 feet bgs.

Corrective Action for Incident: It was determined that it would be in the best interest of Mound and WESTON to release Alliance from continuing the work at PRS 76 and ultimately at PRS 66. On 9/29/99, Mound Radiological Control scanned most of Alliance's equipment out and the drillers left the site. Alliance left behind their unused drums and left approximately 2 flights of augers and associated drilling equipment in the ground. Alliance returned for the augers once they had been decontaminated.

Bowser-Morner was contracted to complete the drilling activities at PRS 76.

Initiator of Corrective Action: *Laura Funk* *Date:* *08 October 1999*

Root Cause: N/A

Corrective Action to Prevent Recurrence:

Initiator of Corrective Action: _____ *Date:* _____

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Gray Stoll **Date:** 5-26 00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	Initiator:	Laura Funk
Internal Project Number:	01011-032-035	File Code:	6.2.5
Project Manager:	Gordon Horn	Date Initiated:	10/08/99
CAR No:	003	Revision:	0

Requirement: Boring would be advanced to a depth of 4 feet below natural soil.

Finding/Observation: Samples had been collected from boring B03 to a depth of 6 feet bgs. Augers had advanced to 8 feet bgs when the drill rig broke. Alliance was released from the project and Bowser Morner was contracted to complete the drilling.

Corrective Action for Incident: To avoid complications with equipment, boring B03 was offset and samples were collected continuously from below the asphalt to four-feet below natural soil. The sample collected from the 0-4 foot interval of the original B03 location (000028) had already been submitted This sample was not submitted for radiological analyses.

Initiator of Corrective Action: *Laura Funk* **Date:** *08 October 1999*

Root Cause: N/A

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: _____ **Date:** _____

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Gray Stell **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	10/12/99
CAR No:	004	**Revision:**	0

Requirement: Sample will be collected at every 4 foot interval (i.e. 0-4 ft bgs, 4-8 ft bgs, etc).

Finding/Observation: Driller encountered boulder refusal and no recovery from 4-6 feet bgs. WESTON did not realize this no recovery had occurred until after the interval from 6-8 had been combined with the interval from 8-10 feet bgs.

Corrective Action for Incident: Sample No. 000045 contains the intervals from 6 to 10 feet bgs. The next sample collected contained only a two foot interval.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Root Cause:

Corrective Action to Prevent Recurrence:. Drillers were asked to keep WESTON better informed if they would be skipping a split spoon interval due to no recovery.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stoll **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	10/12/99
CAR No:	005	**Revision:**	0

Requirement: Collect samples at 4 foot intervals until a depth of 4 feet below natural soil is achieved.

Finding/Observation: A boulder was encountered while drilling B13. Neither auger or split spoon techniques could advance past the boulder and instead pushed the boulder down as the drilling advanced.

Corrective Action for Incident: Boring B13 was offset in order to collect the missed sample intervals. The offset boring was not sampled until a depth of 16 feet was achieved. Soil description began at 14 feet bgs.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Root Cause:

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Gray Ball **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	10/12/99
CAR No:	006	**Revision:**	0

Requirement: Sample identification will follow the naming scheme presented in the SAP.

Finding/Observation: Due to advancement problems and poor recovery, offsets of borings were necessary. The naming scheme did not address how offset borings should be identified.

Corrective Action for Incident: Offset borings were identified by adding a "a" to the primary boring identification.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Root Cause: Boring offsets were not anticipated.

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *12 October 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stoll **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	11/17/99
CAR No:	007	**Revision:**	0

Requirement: Collect samples at 4 foot intervals until a depth of 4 feet below natural soil is achieved.

Finding/Observation: Due to practical considerations with sampling composite intervals and confidence with natural designation, the exact depth drilled below natural did not always conclude at exactly 4 feet.

Corrective Action for Incident: Generally, the nearest 2 foot interval was designated as the desired depth to discontinue drilling on that borehole. The borings which did not stop at exactly 4 feet below natural included (B01-5 feet, B04-4.5 feet, B05-6 feet, B06 –3.5 feet, B07 –5.5 feet, B10 –6 feet, and B13a –5.5 feet)

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Root Cause:

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stoll **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	11/17/99
CAR No:	008	**Revision:**	0

Requirement: Collect samples at 4 foot intervals until a depth of 4 feet below natural soil is achieved.

Finding/Observation: A fill/till interface in boring B12 was not identifiable to the field geologist and drilling continued to a depth of 22 feet bgs, where refusal due to shale was observed.

Corrective Action for Incident: All intervals were submitted for analyses.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Root Cause:

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stoll **Date:** 5-26-00

Mound Plant
Nonconformance/Corrective Action Report

Task Name:	PRS 76	**Initiator:**	Laura Funk
Internal Project Number:	01011-032-035	**File Code:**	6.2.5
Project Manager:	Gordon Horn	**Date Initiated:**	11/17/99
CAR No:	009	**Revision:**	0

Requirement: Collect samples at 4 foot intervals until a depth of 4 feet below natural soil is achieved.

Finding/Observation: Four borings (B03a, B08, B11, B14) were overdrilled and samples were collected at natural depths greater than 4 feet from the fill/till interface.

Corrective Action for Incident: The following samples were requested to be withheld from analysis: (000084, 000090, 000097, 000098, 000105).

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Root Cause:

Corrective Action to Prevent Recurrence:.

Initiator of Corrective Action: *Laura Funk* ***Date:*** *17 November 1999*

Rejected By: ___ **Date Rejected:** _

Verifications/Approvals:

Project Manager: Craig Stall **Date:** 5-26-00

APPENDIX F

DATA REVIEW AND VALIDATION

Review of Analytical Data

The sample results from the investigation of PRS 76 were subjected to data review. During data review, key quality control results are assessed to determine whether there are indications the data may be biased and unusable. The assessments of the key quality control results are presented in this section by the type of analysis.

Volatile Organic Analysis

The holding times, equipment rinsates, trip blanks, surrogate recoveries, matrix spike recoveries, and field duplicates were reviewed. The results of each of the quality control sample reviews are presented in the following subsections.

Holding Times

The samples were analyzed within the specified holding times and no qualifications were necessary on the basis of exceeded holding times.

Equipment Rinsate

Five (5) equipment rinsates were submitted during the project for volatiles analysis. During the review of the results, acetone and methylene chloride were consistently detected at concentrations below the reporting limit. The presence of these common laboratory contaminants may indicate that the analyzed samples are positively biased. Consistent with the data review guidelines, sample concentrations less than 10x the average blank contamination levels were attributed to laboratory contamination and were qualified non-detect (U). The non-detect qualification was applied in accordance with the review guidelines. No qualifications were applied on the basis of contaminants which were assessed not to be systematically present in the field blanks. The following Table F1 lists the detected analytes, concentrations, and the average level of contamination.

Table F1 – Field Rinsate Contaminants

Analyte	000021	000036	000049	000078	000106	Average
Acetone	2 JB	3 JB	10 U	5 BJ	3 JB	3
Methylene Chloride	10 B	3 JB	3 JB	8 B	3 JB	5
2-Hexanone	10 U	2 J	10 U	2 J	10 U	NS
Tetrachloroethene	5 U	5 U	5 U	5 U	1 J	NS

Notes:

All values expressed in ug/l

NS – Not a Systematic Contaminant

Trip Blanks

Six (6) trip blanks were submitted during the project for volatiles analysis. During the review of the results, acetone, 2-butanone, and methylene chloride were consistently detected at concentrations near the reporting limit. The presence of these common laboratory contaminants may indicate that the analyzed samples are positively biased. Consistent with the data review guidelines, sample concentrations less than 10x the average blank contamination levels were attributed to laboratory contamination and were qualified non-detect (U). The non-detect qualification was applied in accordance with the review guidelines. No qualifications were applied on the basis of contaminants which were assessed not to be systematically present in the trip blanks. Table F2 lists the detected analytes, concentrations, and the average level of contamination.

Table F2 – Trip Blank Contaminants

Analyte	000006	000027	000029	000062	000107	000108	Average
Chloromethane	2 J	10 U	10 U	10 U	10 U	10 U	NS
Methylene Chloride	2 JB	6 B	3 JB	4 JB	8 B	4 JB	4
Acetone	10 U	3 JB	2 JB	2 JB	10 U	3 JB	2
Carbon Disulfide	5 U	1 J	5 U	5 U	5 U	5 U	NS
Chloroform	5 U	5 U	4 J	5 U	5 U	5 U	NS
2-Butanone	2 JB	2 JB	10 U	2 J	10 U	10 U	2
Trichloroethene	5 U	5 U	5 U	5 U	3 J	5 U	NS
2-Hexanone	10 U	10 U	10 U	1 J	10 U	10 U	NS
Tetrachloroethene	5 U	5 U	5 U	5 U	2 J	5 U	NS
1,1,2-Trichlorotrifluoroethane	1 JB	5 U	5 U	5 U	5 U	5 U	NS

Notes:

All values expressed in ug/l

NS – Not a Systematic Contaminant

Field Duplicates

Table F3 lists the field duplicates and the calculated percent differences. No specific field duplicate precision criteria was cited in the SAP for volatile organic analysis of soils. The field duplicate percent differences were very high, greater than 100 percent, in duplicate pairs for samples 000008 and 000041. These percent differences ranged up to 195%. The positive results in these samples and their field duplicate pairs were qualified estimated (J). Because the soil contains significant amounts of clay, the higher percent differences are not unexpected. Because all of the volatile results were far less than the site guideline values, the variances were judged not to impact the usability of the data.

Table F3 – Field Duplicate Percent Differences

Analyte	B12 4-8 000008 ug/kg	B12 4-8 000009* ug/kg	RPD		B12 16-20 000012 ug/kg	B12 16-20 000013* ug/kg	RPD
Chloromethane	12 U	12 U	--		11 U	11 U	--
Vinyl Chloride	13	12 U	--		11 U	11 U	--
Methylene Chloride	11 B	15 B	--		21 B	14 B	--
Acetone	9 JB	12 B	--		4 JB	7 JB	--
Carbon Disulfide	6 U	6 U	--		1 J	6 U	--
1,1-Dichloroethene	6 U	6 U	--		6 U	6 U	--
1,2-Dichloroethene (total)	160	8	181.0		6 U	6 U	--
Chloroform	6 U	6 U	--		6 U	6 U	--
2-Butanone	5 JB	6 JB	--		2 JB	4 JB	--
1,2-Dichloropropane	6 U	6 U	--		6 U	6 U	--
Trichloroethene	3,400 D	880 D	117.8		6 U	6 U	--
1,1,2-Trichloroethane	6 U	6 U	--		6 U	6 U	--
Benzene	6 U	6 U	--		6 U	6 U	--
4-Methyl-2-pentanone	12 U	12 U	--		11 U	11 U	--
2-Hexanone	12 U	12 U	--		11 U	11 U	--
Tetrachloroethene	2,900 D	1,600 D	57.8		6 U	6 U	--
1,1,2,2-Tetrachloroethane	6 U	6 U	--		6 U	6 U	--
Toluene	7	4 J	--		6 U	6 U	--
Ethylbenzene	6 U	6 U	--		6 U	6 U	--
Xylene (total)	1 J	6 U	--		6 U	6 U	--
1,1,2-Trichlorotrifluoroethane	6 U	6 U	--		6 U	6 U	--

Table F3 – Field Duplicate Percent Differences (continued)

Analyte	B06 8-12 000024 ug/kg	B06 8-12 000025* ug/kg	RPD		B01 8-12 000032 ug/kg	B01 8-12 000033* ug/kg	RPD
Chloromethane	12 U	11 U	--		13 U	2 J	--
Vinyl Chloride	25	11 U	--		13 U	12 U	--
Methylene Chloride	15 B	18 B	--		17 B	14 B	--
Acetone	12 U	5 J	--		23 B	19 B	--
Carbon Disulfide	6 U	6 U	--		6 U	6 U	--
1,1-Dichloroethene	6 U	6 U	--		6 U	6 U	--
1,2-Dichloroethene (total)	5 J	2 J	--		79	80	0.63
Chloroform	6 U	6 U	--		6 U	6 U	--
2-Butanone	5 JB	4 JB	--		8 JB	9 JB	--
1,2-Dichloropropane	6 U	6 U	--		6 U	6 U	--
Trichloroethene	46	33	32.9		36	65	57.4
1,1,2-Trichloroethane	6 U	6 U	--		6 U	6 U	--
Benzene	6 U	6 U	--		6 U	6 U	--
4-Methyl-2-pentanone	12 U	11 U	--		13 U	12 U	--
2-Hexanone	12 U	11 U	--		13 U	12 U	--
Tetrachloroethene	3 J	4 J	--		18	39	73.7
1,1,2,2-Tetrachloroethane	6 U	6 U	--		6 U	6 U	--
Toluene	6 U	6 U	--		1 J	6 U	--
Ethylbenzene	6 U	6 U	--		6 U	6 U	--
Xylene (total)	6 U	6 U	--		6 U	6 U	--
1,1,2-Trichlorotrifluoroethane	6 U	6 U	--		6 U	6 U	--

Table F3 – Field Duplicate Percent Differences (continued)

Analyte	B04 16-20 000041 ug/kg	B04 16-20 000042* ug/kg	RPD		B10 12-16 000053 ug/kg	B10 12-16 000054* ug/kg	RPD
Chloromethane	10 U	11 U	--		50 U	56 U	--
Vinyl Chloride	10 U	11 U	--		50 U	56 U	--
Methylene Chloride	21 B	23 B	--		70 B	21 JB	--
Acetone	13 B	11 JB	--		26 JB	23 JB	--
Carbon Disulfide	8	5 J	--		25 U	28 U	--
1,1-Dichloroethene	5 U	2 J	--		25 U	28 U	--
1,2-Dichloroethene (total)	1 J	53	--		750	83	84.3
Chloroform	5 U	6 U	--		25 U	28 U	--
2-Butanone	5 J	4 J	--		15 JB	56 U	--
1,2-Dichloropropane	5 U	1 J	--		9 J	28 U	--
Trichloroethene	6	480 D	195.1		3,600 D	1,300 D	93.9
1,1,2-Trichloroethane	5 U	1 J	--		25 U	28 U	--
Benzene	5 U	6 U	--		25 U	28 U	--
4-Methyl-2-pentanone	10 U	11 U	--		50 U	56 U	--
2-Hexanone	10 U	11 U	--		50 U	56 U	--
Tetrachloroethene	12	340 D	187.5		3,600 D	1,800 D	66.7
1,1,2,2-Tetrachloroethane	5 U	6 U	--		25 U	28 U	--
Toluene	1 J	6 U	--		9 J	28 U	--
Ethylbenzene	5 U	6 U	--		25 U	28 U	--
Xylene (total)	5 U	6 U	--		25 U	28 U	--
1,1,2-Trichlorotrifluoroethane	5 U	6 U	--		25 U	28 U	--

Table F3 – Field Duplicate Percent Differences (continued)

Analyte	B13a 20-24 000064 ug/kg	B13a 20-24 000065* ug/kg	RPD		B14 4-8 000092 ug/kg	B14 4-8 000093* ug/kg	RPD
Chloromethane	11 U	11 U	--		12 U	12 U	--
Vinyl Chloride	11 U	11 U	--		2 J	12 U	--
Methylene Chloride	10 B	25 B	--		17 B	13 B	--
Acetone	12 B	11 JB	--		81 B	94 B	--
Carbon Disulfide	2 J	3 J	--		1 J	6 U	--
1,1-Dichloroethene	6 U	6 U	--		6 U	6 U	--
1,2-Dichloroethene (total)	6 U	6 U	--		62	59	4.95
Chloroform	6 U	6 U	--		6 U	6 U	--
2-Butanone	11 U	11 U	--		19	23	14.3
1,2-Dichloropropane	6 U	6 U	--		6 U	6 U	--
Trichloroethene	8	2 J	--		7	6	15.4
1,1,2-Trichloroethane	6 U	6 U	--		6 U	6 U	--
Benzene	6 U	6 U	--		6 U	6 U	--
4-Methyl-2-pentanone	11 U	11 U	--		12 U	12 U	--
2-Hexanone	11 U	11 U	--		12 U	12 U	--
Tetrachloroethene	24	6 U	--		7	7	0
1,1,2,2-Tetrachloroethane	6 U	6 U	--		6 U	6 U	--
Toluene	6 U	6 U	--		57	40	35.1
Ethylbenzene	6 U	6 U	--		17	11	42.9
Xylene (total)	6 U	6 U	--		45	30	40.0
1,1,2-Trichlorotrifluoroethane	6 U	2 J	--		6 U	6 U	--

Table F3 – Field Duplicate Percent Differences (continued)

Analyte	B03 8-12 000101 ug/kg	B03 8-12 000102* ug/kg	RPD
Chloromethane	52 U	51 U	--
Vinyl Chloride	52 U	51 U	--
Methylene Chloride	38 B	30 B	--
Acetone	37 JB	23 JB	--
Carbon Disulfide	26 U	26 U	--
1,1-Dichloroethene	26 U	26 U	--
1,2-Dichloroethene (total)	25 J	38	--
Chloroform	26 U	26 U	--
2-Butanone	13 JB	11 JB	--
1,2-Dichloropropane	26 U	26 U	--
Trichloroethene	4,800 D	6,700 D	33.0
1,1,2-Trichloroethane	26 U	26 U	--
Benzene	26 U	26 U	--
4-Methyl-2-pentanone	52 U	51 U	--
2-Hexanone	52 U	51 U	--
Tetrachloroethene	870	660	27.5
1,1,2,2-Tetrachloroethane	26 U	26 U	--
Toluene	26 U	26 U	--
Ethylbenzene	26 U	26 U	--
Xylene (total)	26 U	26 U	--
1,1,2-Trichlorotrifluoroethane	26 U	26 U	--

Surrogate Recoveries

The surrogate recoveries for the samples were reviewed and found to be acceptable. No qualifications were made on the basis of the surrogate recoveries.

Matrix Spike Pairs

The matrix spike recoveries for the samples are listed in Table F4. The matrix spike recoveries were assessed to be systematically acceptable. It should be noted that the laboratory did not perform matrix spike analysis on samples 000069 and 000100 as requested on the chain-of-custody. The laboratory did perform an unrequested matrix spike analysis on sample 000012. The net result is that one less matrix spike analysis than required by the SAP was performed. No qualification was assigned on the basis of the omitted spike analysis.

Table F4 – Matrix Spike Recoveries

Analyte	000012 MS	000012 MSD	000018 MS	000018 MSD	000035 MS
1,1-Dichloroethene	97	98	91	97	87
Trichloroethene	94	106	93	103	85
Benzene	106	110	108	111	126
Toluene	116	116	119	124	128
Chlorobenzene	103	108	101	107	106
Acrylonitrile	103	119	146	141	128
Acetonitrile	120	127	146	144	151

Table F4 – Matrix Spike Recoveries (continued)

Analyte	000035 MSD	000060 MS	000060 MSD	Ave % Rec.
1,1-Dichloroethene	92	87	90	92.3
Trichloroethene	87	91	79	92.3
Benzene	125	105	102	111.6
Toluene	125	104	107	117.4
Chlorobenzene	106	96	98	103.1
Acrylonitrile	125	90	87	117.4
Acetonitrile	146	99	100	129.1

Alpha Spectrometry

Equipment Rinsate

No target analytes were detected in the associated equipment rinsates. Therefore, no qualifications were assigned to the data. Table F5 lists the equipment rinsates and the non-detect levels.

Table F5 – Equipment Rinsate Results – Radiological Results

Analyte	000021 pCi/l	000036 pCi/l	000049 pCi/l	000078 pCi/l	000106 pCi/l
Plutonium-238	0.289 U	0.290 U	0.267 U	0.215 U	0.0972 U
Plutonium-239/240	0.206 U	0.206 U	0.158 U	0.362 U	0.0971 U
Thorium-228	0.364 U	0.540 U	0.509 U	0.507 U	0.512 U
Thorium-230	0.151 U	0.248 U	0.290 U	0.238 U	0.293 U
Thorium-232	0.151 U	0.167 U	0.234 U	0.238 U	0.236 U

Field Duplicate

The field duplicate percent differences are listed in Table F6. The percent differences were judged to be good for soils and no qualifications were applied on the basis of the percent differences.

Table F6 – Field Duplicate Percent Differences

Analyte	B12 4-8 000009* pCi/g	B12 8-12 000010 pCi/g	RPD		B12 16-20 000012 pCi/g	B12 16-20 000013* pCi/g	RPD
Plutonium-238	0.0278	0.0268 U	200%		0.0216 U	0.0179 U	--
Plutonium-239/240	0.0392 U	0.0316 U	--		0.0215 U	0.0101 U	--
Thorium-228	0.602	0.436 J	32%		0.610	0.671	9.52
Thorium-230	0.512 J	0.394 J	26%		0.411 J	0.350 J	16%
Thorium-232	0.557 J	0.370 J	40%		0.522 J	0.639	20%

Analyte	B06 8-12 000024 pCi/g	B06 8-12 000025* pCi/g	RPD		B01 8-12 000032 pCi/g	B01 8-12 000033* pCi/g	RPD
Plutonium-238	0.00826 U	0.0152 U	--		0.00847 U	0.0155 U	--
Plutonium-239/240	0.0146 U	0.0200 U	--		0.0150 U	0.0222 U	--
Thorium-228	0.522 J	0.448 J	15%		0.704	0.674	4%
Thorium-230	0.529 J	0.488 J	8%		0.504 J	0.599 J	17%
Thorium-232	0.482 J	0.471 J	2%		0.529 J	0.582 J	10%

Table F6 – Field Duplicate Percent Differences (continued)

Analyte	B04 16-20 000041 pCi/g	B04 16-20 000042* pCi/g	RPD		B10 12-16 000053 pCi/g	B10 12-16 000054* pCi/g	RPD
Plutonium-238	0.0189 U	0.00819 U	--		0.0564 U	0.0434 U	--
Plutonium-239/240	0.0107 U	0.0191 U	--		0.0270 U	0.0434 U	--
Thorium-228	0.454 J	0.457 J	0.66%		0.537 J	0.544 J	1%
Thorium-230	0.542 J	0.547 J	0.92%		0.631	0.524 J	18%
Thorium-232	0.393 J	0.335 J	16%-		0.501 J	0.553 J	10%

Analyte	B13a 20-24 000064 pCi/g	B13a 20-24 000065* pCi/g	RPD		B14 4-8 000092 pCi/g	B14 4-8 000093* pCi/g	RPD
Plutonium-238	0.0274 U	0.0530 U	--		0.241	0.0454	136.59
Plutonium-239/240	0.0131 U	0.0295 U	--		0.0183 U	0.0264 U	--
Thorium-228	0.357 J	0.402 J	12%		0.549 J	0.806	38%
Thorium-230	0.493 J	0.521 J	6%		0.524 J	0.350 J	40%
Thorium-232	0.247 J	0.336 J	30%		0.573 J	0.596 J	4%

Table F6 – Field Duplicate Percent Differences (continued)

Analyte	B03 8-12 000101 pCi/g	B03 8-12 000102* pCi/g	RPD
Plutonium-238	0.0278 U	0.0300	--
Plutonium-239/240	0.0278 U	0.0359 U	--
Thorium-228	0.466 J	0.534 J	9%
Thorium-230	0.458 J	0.445 J	3%
Thorium-232	0.371 J	0.293 J	23%

Matrix Spike Pairs

The matrix spike recoveries for plutonium and thorium in soil were acceptable. No qualifications were assigned on the basis of matrix spike recoveries.

Table F7 – Matrix Spike Recoveries

Analyte	000018 MS	000018 MSD	000035 MS	000035 MSD	000060 MS	000060 MSD
Plutonium-239/240	114.3	119.9	114.6	101.1	101.5	102.4
Thorium-230	89	83.1	98.5	86.5	100.4	95.6

Analyte	000069 MS	000069 MSD	000100 MS	000100 MSD	Ave. % Rec.
Plutonium-239/240	103.4	96.9	98.7	96.9	104.97
Thorium-230	94.8	96.9	87.7	95.6	92.81

Data Validation

Ten (10) percent of the samples were chosen at random for the data validation. Data validation was performed in accordance with the Methods Compendium. The volatile organic analyses were not validated. Volatile analyses were added at the request of the OEPA, but data validation was not specified for this analysis. Because the volatile organic compounds detected in the soils were below the guideline values, data review of the results should be adequate for assessing volatiles contamination of the site.

Radiological Data Validation

Nine (9) samples were submitted for radiological data validation. TechLaw, Inc. (formerly QuantaLex, Inc.) performed the data validation. No qualifications were assigned to the data on the basis of the data validation.

Table F8 – Samples submitted for Radiological Data Validation

Sample ID	Boring #	Interval	Date Collected
000018	B09	12-16	9/28/99
000024	B06	8-12	9/28/99
000030	B01	0-4	10/11/99
000034	B01	12-16	10/11/99
000039	B04	8-12	10/11/99
000079	B08	0-4	10/14/99
000091	B14	8-12	10/15/99
000093	B14	4-8	10/15/99
000099	B03	0-4	10/15/99