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Ms. Jennifer Tufts Federal Facility Agreement Manager U.S. Environmental Protection Agency, Region 4 61 Forsyth Street Atlanta, Georgia 30303

Dear Mr. Mullins and Ms. Tufts:

TRANSMITTAL OF THE FINAL CHARACTERIZATION REPORT FOR SOLID WASTE MANAGEMENT UNITS 211-A AND 211-B VOLATILE ORGANIC COMPOUND SOURCES FOR THE SOUTHWEST GROUNDWATER PLUME AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, DOE/LX/07-1288&D1

Enclosed for your review is the *Final Characterization Report for Solid Waste Management Units 211-A and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1288&D1. This report presents the results of the August through October 2012 and February and March 2013 investigations of the Northeast C-720 [Solid Waste Management Unit (SWMU) 211-A] and Southeast C-720 (SWMU 211-B) volatile organic compound source zones and provides an assessment of the data collected during these investigations. This Final Characterization Report is intended to support the selection and design of remedial actions for SWMUs 211-A and 211-B. DOE requests comments on the subject document no later than July 26, 2013.

If you have any questions or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,

enrife Woodard

Jennifer Woodard Federal Facility Agreement Manager Portsmouth/Paducah Project Office

Final Characterization Report

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DOE/LX/07-1288&D1 Secondary Document

Final Characterization Report for Solid Waste Management Units 211-A and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky



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Final Characterization Report for Solid Waste Management Units 211-A and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—June 2013

U.S. DEPARTMENT OF ENERGY Office of Environmental Management

Prepared by LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC managing the Environmental Remediation Activities at the Paducah Gaseous Diffusion Plant under contract DE-AC30-10CC40020

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ACRONYMS

CSM	conceptual site model
Dhc	Dehalococcoides mccartyi
DNAPL	dense nonaqueous-phase liquid
DOE	U.S. Department of Energy
DPT	direct push technology
DQO	data quality objective
DSS	Decision Support Software
EPA	U.S. Environmental Protection Agency
EVS-ES	Environmental Visualization Systems Expert System
FCR	final characterization report
FFS	focused feasibility study
GSD	grain size distribution
HU	hydrogeologic unit
ID	inside diameter
KOW	Kentucky Ordnance Works
LATA Kentucky	LATA Environmental Services of Kentucky, LLC
LCD	Lower Continental Deposits
LUC	land use control
MCL	maximum contaminant level
MW	monitoring well
OREIS	Oak Ridge Environmental Information System
OU	operable unit
PGDP	Paducah Gaseous Diffusion Plant
PID	photoionization detector
QAPP	quality assurance program plan
RDWP	remedial design work plan
RDSI	remedial design support investigation
RGA	Regional Gravel Aquifer
RI	remedial investigation
ROD	record of decision
SI	site investigation
SWMU	solid waste management unit
UCD	Upper Continental Deposits
UCRS	Upper Continental Recharge System
VC	vinyl chloride
VOC	volatile organic compound
WAG	waste area group

EXECUTIVE SUMMARY

This Final Characterization Report (FCR) presents the results of the remedial design support investigation (RDSI) for solid waste management units (SWMUs) 211-A and 211-B. Requirements for the RDSI are outlined in the Remedial Design Work Plan for Solid Waste Management Units 1, 211-A, 211-B, Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE 2012a) (RDWP). The RDSI was performed to better determine the lateral and vertical extent and distribution of volatile organic compounds (VOCs) and source material in the Southwest Plume source areas and to determine soil and groundwater parameters, including geochemical parameters, at each of the SWMUs to be used to design *in situ* bioremediation, if this alternative is selected. Soil sampling focused on soils in hydrogeologic units (HUs) HU1, HU2, HU3, and HU4 within the Upper Continental Deposits (UCD) and previously identified potential TCE source areas northeast and southeast of the C-720 Building. The Focused Feasibility Study (DOE 2011) identified a number of alternatives to remediate SWMU 211-A and 211-B, but ultimately concluded that the appropriate alternative would require an RDSI to provide sufficient information as a basis to select a remedial alternative. The selected remedy, as identified in the Record of Decision (ROD) for SWMUs 211-A and 211-B, pending this final characterization of source extent and magnitude, is enhanced in situ bioremediation with interim land use controls (LUCs) (Alternative 8) or long-term monitoring with interim LUCs (Alternative 2).

SWMU 211-A RDSI SUMMARY

Soil samples were collected from 42 boring locations at SWMU 211-A (Figure ES.1). [Note: the RDWP (DOE 2012a) allotted a total of up to 41 planned and contingency soil borings to characterize TCE levels in soil at SWMU 211-A. DOE sampled an additional soil boring to better characterize the extent of the VOC contamination.] Between 12 and 13 soil samples were collected and analyzed at each boring. Grain size distribution (GSD) analysis was performed on select soil samples. Soil sample analytical results which were used to further evaluate the magnitude and extent of VOCs at SWMU 211-A are summarized below.

- The average soil boring TCE concentration (based upon the 12 to 13 collected soil samples per soil boring location) was 122 micrograms per kilogram (μ g/kg), exceeding the TCE soil remediation goal of 75 μ g/kg as identified in the RDWP (DOE 2012a). The maximum individual soil sample TCE concentration detected was 4,800 μ g/kg. The areal extent of TCE is defined to the east, west, north, and south.
- Average TCE levels in soil exceeded the remediation goal (75 µg/kg) in 12 of the 42 soil borings (29%). The average TCE level among all samples in these 12 soil borings was 380 µg/kg.¹
- Using the three-dimensional analysis software Environmental Visualization Systems Expert System (EVS-ES) and a 90% maximum source volume confidence level statistical evaluation, the estimated total TCE volume is approximately 2.2 gal over an areal extent of approximately 34,000 square feet (ft²) area. The area of 90% confidence level that TCE levels exceed 75 µg/kg in part of the soil column

¹ The average TCE level among all samples excludes the lower analysis for depth intervals where duplicate analyses are available and uses one-half of the laboratory reporting limit for "U" qualified analyses.



Figure ES.1. SWMU 211-A and SWMU 211-B Sampling Locations

extends a maximum of 140 ft in the north-to-south direction (plant coordinate system) and 350 ft in the east-to-west direction (plant coordinate system).

- 1,1-dichloroethene (1,1-DCE) was the only other VOC to exceed its groundwater protection remediation goal as identified in the RDWP (DOE 2012a). Average 1,1-DCE levels in soil exceeded the remediation goal (137 μ g/kg) in 6 of the 42 soil borings (14%).
- The average soil boring 1,1-DCE concentration (based upon the 12 to 13 collected soil samples per soil boring location) among all SWMU 211-A RDSI soil borings was 94 µg/kg. The maximum individual soil sample 1,1-DCE concentration detected was 4,400 µg/kg. 1,1-DCE was primarily detected in the western portion of the 211-A area and may be attributable to a separate historic release of 1,1,1-trichloroethane (1,1,1-TCA) since 1,1-DCE is an abiotic degradation product of 1,1,1-TCA.
- The area of 1,1-DCE levels that exceed 137 μ g/kg in part of the soil column is approximately 18,000 ft², a subset of the area of TCE contamination as defined above and wholly contained within the area of TCE contamination.
- The average soil boring *cis*-1,2-DCE, *trans*-1,2-DCE, and vinyl chloride (VC) concentrations did not exceed their respective soil remediation goals.
- The VOC levels in soil define two discrete areas of greater contaminant levels: an east area of TCE contamination, within and south of the previously identified SWMU 211-A boundary, and a west area of both TCE and 1,1-DCE, outside of the previously identified SWMU 211-A boundary.

Groundwater samples were collected from five monitoring wells (MWs) at SWMU 211-A. Groundwater sample results are summarized in Table ES-1 To estimate the total TCE mass in soil and the extent of TCE soil impacts at SWMU 211-A, the RDSI soil TCE data and all historical soil TCE data for the SWMU 211-A investigation area in the Oak Ridge Environmental Information System (OREIS) were interpolated using the software Environmental Visualization Systems Expert System (EVS-ES) and a 90% maximum source volume confidence level statistical evaluation.

LATA Environmental Services of Kentucky (LATA Kentucky) completed an RDSI HU hydrologic analysis to aid in the understanding of injection capacity in the event *in situ* bioremediation is selected as the final remedy for SWMU 211-A. Soil conditions at SWMU 211-A appear to be consistent with the requirements associated with an injection-dependent technology. Flexible wall permeameter tests (ASTM D5084-10) and GSD analyses (ASTM D422) were performed at nine locations. The calculated average hydraulic conductivity values ranged from 5.5E-10 cm/s to 3.8E-7 cm/s. RDSI nested-well injection testing also was performed to assess the hydraulic conductivity of the HU1, HU2, and HU3 formations. The injection testing average hydraulic conductivities were 4.4E-5 cm/s, 1.5E-5 cm/s, and 7.9E-6 cm/s for the HU1, HU2, and HU3 formations, respectively.

SWMU 211-B RDSI SUMMARY

Soil samples were collected at 19 boring locations at SWMU 211-B (Figure ES.1). [For reference, the RDWP (DOE 2012a) allotted a total of up to 23 planned and contingency soil borings to characterize TCE levels in soil at SWMU 211-B.] Thirteen soil samples were collected and analyzed at each boring. GSD analysis was performed on select soil samples. Soil sample analytical results

Analyte	Maximum Detected Groundwater Concentration*		Project Action Limit	MCL Secondary Standard	
Total and Dissolved Metals					
Aluminum (mg/L)	1.77	Ν		0.05 to 0.2	
Aluminum, dissolved (mg/L)	0.2	U	1		
Chromium (mg/L)	0.284		1	0.1	
Chromium, dissolved (mg/L)	0.01	U	1		
Iron (mg/L)	4.99		10	0.3	
Iron, dissolved (mg/L)	0.404		10		
Lead (mg/L)	0.00308		1	Zero	
Lead, dissolved (mg/L)	0.0013	U	1		
Manganese (mg/L)	0.282	Ν	1	0.05	
Manganese, dissolved (mg/L)	0.248	Х	1	0.05	
Volatile Organic Compounds					
Trichloroethene (µg/L)	220	D	5	5	
1,1-Dichloroethene (µg/L)	810	D	7	7	
<i>cis</i> -1,2-Dichloroethene (μ g/L)	29		70	7	
<i>trans</i> -1,2-Dichloroethene (µg/L)	1 to 10	U	100	100	
Vinyl chloride (µg/L)	2 to 20	U	2	2	
Biological (method Quantitative Polymer	ase Chain React	ion)			
Dehalococcoides ethenogenes (cells/mL)	43	U	Not Applicable	Not Applicable	
Dissolved Gases (method Modified R. S. I	Kerr SOP-175)				
Ethane (μ g/L): MDL = 0.10 μ g/L	0.41		Not Applicable	Not Applicable	
Ethene (μ g/L): MDL = 0.025 μ g/L	0.49		Not Applicable	Not Applicable	
Methane (μ g/L): MDL = 0.025 μ g/L	6.8		Not Applicable	Not Applicable	
Inorganic Anions					
Chloride (mg/L)	120		Not Applicable	250	
Nitrate (mg/L)	5.4		Not Applicable	20	
Sulfate (mg/L)	66		Not Applicable	250	

Table ES.1. Groundwater Results Summarized from MWs at SWMU 211-A

*Where all analyses are "U" qualified. Table ES.1 reports the laboratory reporting limits.

Notes:

 Notes:

 1. μg/L—microgram per liter

 2. mg/L—milligram per liter.

 3. D—Compounds identified in an analysis at a secondary dilution filter.

 4. N—Sample spike recovery not within control limits.

 5. U—(inorganics and organics)—Analyte result is less than reporting limit.

 6. X—Other specific flags and footnotes may be required to properly define results.

 7. The higher detection limits reported for *trans*-1,2-Dichloroethene and vinyl chloride are due to a 10× dilution in one sample.

that were used to further evaluate the magnitude and extent of VOCs at SWMU 211-B are summarized below.

- The average soil boring TCE concentration (based upon 13 collected soil samples per soil boring location) was 150 μ g/kg, exceeding the soil remediation goal of 75 μ g/kg. The maximum soil sample TCE concentration detected was 13,000 μ g/kg. The areal extent of TCE contaminated soil, accessible by the selected remedies, is defined to the east, west, and south and encompasses an area of approximately 3,000 ft². Contamination extending under the C-720 footprint (located to the immediate north) is not addressed in this FCR.
- The average TCE concentration exceeded the soil remediation goal of 75 μ g/kg at 4 of the 20 boring locations (20%).
- The average soil boring 1,1-DCE, *cis*-1,2-DCE, *trans*-1,2-DCE, and VC concentrations did not exceed their respective soil remediation goals.

Groundwater samples were scheduled to be collected from five MWs at SWMU 211-B. MW514 was dry during the field event; therefore, groundwater samples were collected and analyzed from the four remaining MWs. Groundwater sample results are summarized in Table ES.2.

EVS-ES was used to interpolate the RDSI soil TCE concentration data along with historical soil TCE data for the SWMU 211-B investigation area from OREIS and estimate the total TCE mass in soil and the extent of TCE soil impacts at SWMU 211-B, with consideration of a 90% maximum source volume confidence level statistical evaluation. The total estimated TCE volume is 0.8 gal [based upon current areal extent and that the FCR is focusing on contaminated soil accessible by the selected remedies (i.e., no mass interpolated beneath building)]. LATA Kentucky performed an RDSI HU hydrologic analysis to aid the design of remedial injection technologies to be applied at SWMU 211-B. Soil conditions at SWMU 211-B are consistent with the requirements associated with an injection dependent technology. Flexible wall permeameter tests (ASTM D5084-10) and GSD analyses (ASTM D422) were performed at nine locations. The calculated average hydraulic conductivity values ranged from 1.6E-9 cm/s to 3.3E-6 cm/s. RDSI nested-well injection testing also was performed to assess the hydraulic conductivity of HU1, HU2, and HU3 formations. The injection testing average hydraulic conductivities were 6.7E-5 cm/s, 2.0E-5 cm/s, and 2.4E-5 cm/s for HU1, HU2, and HU3 formations, respectively.

DATA GAPS

The lone Decision Rule from the data quality objectives for the RDSI is as follows:

If soil boring averaged concentration of TCE and TCE degradation products in soil of the UCRS exceed cleanup levels for a given soil boring, then include the location in the treatment area. If the soil boing-averaged soil concentrations do not exceed cleanup levels, then the area need not be included in the treatment area.

The RDSI fulfilled this requirement to the extent possible.

• The 42 soil borings of SWMU 211-A that were sampled for VOC analyses as part of the RDSI and data from historical soil borings in the area as contained in OREIS delimit the lateral extent of soil contamination of TCE and its degradation products, as defined by the project remediation goals, in all directions.

Analyte	Maximum Detected Groundwater Concentration*		Project Action Limit	MCL	Secondary Standard
Total and Dissolved Metals					
Aluminum (mg/L)	8.49	Ν	1		0.05 / 0.0
Aluminum, dissolved (mg/L)	0.281		1		0.05 to 0.2
Chromium (mg/L)	0.131		1	0.1	
Chromium, dissolved (mg/L)	0.01	U		0.1	
Iron (mg/L)	9.79		10		0.2
Iron, dissolved (mg/L)	0.139		10		0.5
Lead (mg/L)	0.0106		1	7.000	
Lead, dissolved (mg/L)	0.0013	U	1	Zero	
Manganese (mg/L)	1.43		1		0.05
Manganese, dissolved (mg/L)	0.746	Х	1		0.03
Volatile Organic Compounds					
Trichloroethene (µg/L)	120		5	5	
1,1-Dichloroethene (µg/L)	10	U	7	7	
<i>cis</i> -1,2-Dichloroethene (µg/L)	2.2		70	7	
trans-1,2-Dichloroethene (µg/L)	2	U	100	100	
Vinyl chloride (µg/L)	4	U	2	2	
Biological (method Quantitative Polymer	ase Chain React	ion)		-	
Dehalococcoides ethenogenes (cells/mL)	35	U	Not Applicable	Not A	Applicable
Dissolved Gases (method Modified R. S. I	Kerr SOP-175)				
Ethane (μ g/L): MDL = 0.10 μ g/L	25		Not Applicable	Not A	Applicable
Ethene (μ g/L): MDL = 0.025 μ g/L	7.9		Not Applicable	Not A	Applicable
Methane (μ g/L): MDL = 0.025 μ g/L	35		Not Applicable	Not A	Applicable
Inorganic Anions					
Chloride (mg/L)	340		Not Applicable		250
Nitrate (mg/L)	3		Not Applicable	20	
Sulfate (mg/L)	40		Not Applicable		250

Table ES.2. Groundwater Results Summarized from MWs at SWMU 211-B

*Where all analyses are "U" qualified. Table ES.2 reports the laboratory reporting limits.

Notes:

 Notes:

 1. μg/L—microgram per liter

 2. mg/L—milligram per liter.

 3. N—Sample spike recovery not within control limits.

 4. U—(inorganics and organics) -Analyte result is less than reporting limit.

 5. X—Other specific flags and footnotes may be required to properly define results.

• At SWMU 211-B, the 20 soil borings that were sampled for VOC analyses as part of the RDSI and data from historical soil borings in the area as contained in OREIS delimit the east, west, and south extent of soil contamination by TCE and its degradation products, as defined by the project remediation goals. The area of soil contamination abuts the C-720 Building. As recognized in the RDWP (DOE 2012a), plant infrastructure and continuing use of the C-720 Building prevent current sampling of the soils beneath the building such that the north extent of the soil contamination cannot be determined at this time.

The available soil data for SWMUs 211-A and 211-B provide a foundation for selection and design of an appropriate remedial alternative.

DISCUSSION

This FCR (based on data from the current RDSI as well as the soil sample data from 2004 and other historical data for the investigation areas as available in OREIS) used EVS-ES to contour the 90% confidence limit of 75 μ g/kg TCE in soil. The EVS-ES software estimates the TCE source mass within the 90% confidence limit of 75 μ g/kg TCE to be approximately 12 kg (2.2 gal) at 211-A and 5 kg (0.8 gal) at 211-B.

The soil and groundwater data collected at SWMU 211-A and SWMU 211-B indicate that natural biodegradation may be occurring, albeit at a relatively slow rate. The presence of methane, ethene, ethane, and *cis*-1,2-DCE, and the absence of VC or measureable *Dehalococcoides mccartyi* are indicative of an environment that appears to have some natural attenuation capacity.

1. PROJECT DESCRIPTION

The U.S. Department of Energy (DOE) has tasked LATA Environmental Services of Kentucky, LLC, (LATA Kentucky) with performing field activities to (1) better determine the lateral and vertical extent and distribution of volatile organic compounds (VOCs) and source material and (2) determine soil and groundwater parameters, including geochemical parameters to be utilized in the design of *in situ* bioremediation, if this alternative is selected for the Upper Continental Deposits (UCD) at Solid Waste Management Units (SWMUs) 211-A and 211-B at the Paducah Gaseous Diffusion Plant (PGDP), located near Paducah, Kentucky (Figure 1). LATA Kentucky has developed this Final Characterization Report (FCR) to document these field activities that are associated with the Remedial Design Support Investigation (RDSI) (DOE 2012a) for the Southwest Plume (Figure 2).

The Southwest Plume refers to an area of groundwater contamination in the Regional Gravel Aquifer (RGA) south of the Northwest Groundwater Plume and west of the C-400 Building. The primary groundwater contaminant of concern for the Southwest Plume is trichloroethene (TCE). Other potential contaminants found in the plume include additional VOCs, metals, and the radionuclide technetium-99.

DOE conducted a site investigation (SI) in 2004 to address uncertainties regarding potential source areas to the Southwest Plume that remained after previous investigations. The SI further profiled the concentration and distribution of VOCs in the dissolved-phase plume along the west plant boundary as documented in the SI report (DOE 2007). The potential presence of dense nonaqueous-phase liquid (DNAPL) TCE at the Southwest Plume source areas has been noted based on contaminant trends observed in soil and groundwater samples.

The potential source areas investigated in the SI (DOE 2007) included the C-747-C Oil Landfarm (Oil Landfarm–SWMU 1); the C-720 Building Area near the northeast and southeast corners of the building (C-720 Northeast Site–SWMU 211-A and C-720 Southeast Site–SWMU 211-B); and the storm sewer system between the south side of the C-400 Building and Outfall 008 (storm sewer–SWMU 102). As a result of the SI, the storm sewer was excluded as a potential VOC source to the Southwest Plume.

A revised focused feasibility study (FFS) (DOE 2011) was prepared to evaluate remedial alternatives for potential application at the Southwest Plume source areas. The revised FFS defined the following remedial action objectives:

- 1. Treat and/or remove the principal threat waste consistent with the National Contingency Plan.
- 2a. Prevent exposure to VOC contamination in the source areas that will cause an unacceptable risk to excavation workers (< 10 ft).
- 2b. Prevent exposure to non-VOC contamination and residual VOC contamination through interim land use controls (LUCs) within the Southwest Plume source areas (i.e., SWMU 1, SWMU 211-A, and SWMU 211-B) pending remedy selection as part of the Soils Operable Unit (OU) and the Groundwater OU.
- 3. Reduce VOC migration from contaminated subsurface soils in the treatment areas at the Oil Landfarm and C-720 Northeast and Southeast Sites so that contaminants migrating from the treatment areas do not result in the exceedance of maximum contaminant levels (MCLs) in underlying RGA groundwater.





The following remediation goals for the Upper Continental Recharge System (UCRS) soils at SWMUs 211-A and 211-B are presented in the record of decision (ROD) (DOE 2012b):

- TCE: 75 µg/kg,
- 1,1-dichloroethene (DCE): 137 µg/kg,
- *cis*-1,2-DCE: 619 µg/kg,
- *trans*-1,2-DCE: 5,290 µg/kg, and
- vinyl chloride (VC): 570 µg/kg.

The selected remedies for SWMUs 211-A and 211-B are identified in the ROD (DOE 2012b), which are *in-situ* source treatment using enhanced *in situ* bioremediation with interim LUCs (Alternative 8) or long-term monitoring with interim LUCs (Alternative 2).

This FCR for SWMU 211-A and 211-B is intended to resolve data needs in support of the treatment system design. Based on the information presented in this a report a recommendation for final remedy selection for SWMUs 211-A and 211-B will be presented to the Federal Facility Agreement parties by a letter notification.

2. SITE BACKGROUND

2.1 SITE DESCRIPTION

PGDP is located approximately 10 miles west of Paducah, Kentucky, (population approximately 26,000) and 3.5 miles south of the Ohio River in the western part of McCracken County (Figure 1). The plant is located on a DOE-owned site, approximately 650 acres of which are within a fenced security area, approximately 800 acres are located outside the security fence, and the remaining 1,986 acres are licensed to Kentucky as part of the West Kentucky Wildlife Management Area. Bordering the PGDP reservation to the northeast, between the plant and the Ohio River, is a Tennessee Valley Authority reservation on which the Shawnee Fossil Plant is located. All plant and process water at PGDP is drawn from the Ohio River.

Before the PGDP was built, a munitions-production facility, the Kentucky Ordnance Works (KOW), was operated at the current PGDP location and at an adjoining area southwest of the site. Munitions, including trinitrotoluene, were manufactured and stored at the KOW between 1942 and 1945. Construction of PGDP was initiated in 1951 and the plant began operations in 1952. Construction was completed in 1955 and PGDP became fully operational in that year, supplying enriched uranium for commercial reactors and military defense reactors.

2.2 REGIONAL GEOLOGY AND HYDROGEOLOGY

Regional Geology. PGDP is located in the Jackson Purchase Region of Western Kentucky, which represents the northern tip of the Mississippi Embayment portion of the Coastal Plain. The Jackson Purchase Region is an area of land that includes all of Kentucky west of the Tennessee River. The stratigraphic sequence in the region consists of Cretaceous, Tertiary, and Quaternary sediments unconformably overlying Paleozoic bedrock. Within the Jackson Purchase Region, strata deposited above the Precambrian basement rock attain a maximum thickness of 12,000 ft to 15,000 ft. Exposed strata in the region range in age from Devonian to Holocene. The Devonian stratum crops out along the western shore of Kentucky Lake.

Mississippian carbonates form the nearest outcrop of bedrock and are exposed approximately 9 miles northwest of PGDP in southern Illinois (MMES 1992). The Coastal Plain deposits unconformably overlie Mississippian carbonate bedrock and consist of the following: the Tuscaloosa Formation; the sand and clays of the Clayton/McNairy Formations; the Porters Creek Clay; and the Eocene sand and clay deposits (undivided Jackson, Claiborne, and Wilcox Formations). Continental Deposits unconformably overlie the Coastal Plain deposits, which are, in turn, covered by loess and/or alluvium.

Relative to the shallow groundwater flow system in the vicinity of PGDP, the Continental Deposits and the overlying loess and alluvium are of key importance. The Continental Deposits resemble a large low-gradient alluvial fan that covered much of the region and eventually buried the erosional topography. A principal geologic feature in the PGDP area is the Porters Creek Clay Terrace, a subsurface terrace that trends approximately east to west across the southern portion of the plant. The Porters Creek Clay Terrace represents the southern limit of erosion or scouring of the ancestral Tennessee River. Thicker sequences of Continental Deposits, as found underlying PGDP, represent valley fill deposits and can be informally divided into a lower unit (gravel facies) and an upper unit (clay facies). The Lower Continental Deposits (LCD) are the gravel facies consisting of chert gravel in a matrix of poorly sorted sand and silt that rests on an erosional surface representing the beginning of the valley fill sequence. In total, the gravel units average approximately 30-ft thick, but some thicker deposits (as much as 50 ft) exist in deeper scour

channels. The UCD is primarily a sequence of fine grained, clastic facies varying in thickness from 15 ft to 60 ft that consist of clayey silts with lenses of sand and occasional gravel. The UCRS is comprised of alluvial deposits, which vary considerably in grain size and porosity. Based on geologic logs, the lithology reflects facies changes that range from silt to sand to clay. Some logs indicate clay is present from land surface to the top of the RGA, which confines the aquifer. Other logs indicate there are areas where only silt and sand are present from land surface to the top of the RGA, so the RGA is unconfined in these areas. The RGA receives recharge most readily in the unconfined areas. These areas may serve as pathways for contaminant migration from the UCRS to the RGA.

The area of the Southwest Plume lies within the buried valley of the ancestral Tennessee River in which Pleistocene Continental Deposits (the fill deposits of the ancestral Tennessee River Basin) rest unconformably on Cretaceous marine sediments. Pliocene through Paleocene formations in the area of the Southwest Plume have been removed by erosion from the ancestral Tennessee River Basin. In the area of the Southwest Plume and its sources, the upper McNairy Formation consists of 60 to 70 ft of interbedded units of silt and fine sand and underlies the Continental Deposits. Total thickness of the McNairy Formation is approximately 225 ft.

The surface deposits found in the vicinity of PGDP consist of loess and alluvium. Both units are composed of clayey silt or silty clay and range in color from yellowish-brown to brownish-gray or tan, making field differentiation difficult.

Regional Hydrogeology. The local groundwater flow system at the PGDP site occurs within the sands of the Cretaceous McNairy Formation, Pliocene terrace gravels, Plio-Pleistocene lower continental gravel deposits and upper continental deposits, and Holocene alluvium (Jacobs EM Team 1997; MMES 1992). Four specific components have been identified for the groundwater flow system and are defined as follows from lowest to uppermost.

- <u>McNairy Flow System.</u> Formerly called the deep groundwater system, this component consists of interbedded sand, silt, and clay of the Cretaceous McNairy Formation. Sand facies account for 40% to 50% of the total formation's thickness of approximately 225 ft. Groundwater flow is predominantly north.
- <u>Terrace Gravel.</u> This component consists of gravel deposits and later reworked sand and gravel deposits found at elevations higher than 320 ft above mean sea level (amsl) in the southern portion of the plant site; they overlie the Paleocene Porters Creek Clay and Eocene sands and are thought to be Pliocene in age. These deposits usually lack sufficient thickness and saturation to constitute an aquifer. Terrace Gravel is not present in the area of the Southwest Plume sources.
- <u>RGA.</u> This component consists of the Quaternary sand and gravel facies of the LCD and Holocene alluvium found adjacent to the Ohio River and is of sufficient thickness and saturation to constitute an aquifer. These deposits are commonly thicker than the Pliocene(?) gravel deposits, having an average thickness of 30 ft, and range up to 50 ft in thickness along an axis that trends east-west through the plant site. Prior to 1994, the RGA was the primary aquifer used as a drinking water source by nearby residents. The RGA has not been formally classified, but likely would be considered a Class II groundwater under U.S. Environmental Protection Agency (EPA) Groundwater Classification guidance (EPA 1986). Groundwater flow is predominantly north toward the Ohio River.
- <u>UCRS</u>. Formerly called the shallow groundwater system, the UCRS consists of the surficial alluvium and UCD. Sand and gravel lithofacies appear relatively discontinuous in cross-section, but portions may be interconnected. The most prevalent sand and gravel deposits occur at an elevation of approximately 345 to 351 ft amsl; less prevalent deposits occur at elevations of 337 to 341 ft amsl.

Groundwater flow is predominantly downward into the RGA from the UCRS, which has a limited horizontal component in the vicinity of PGDP.

The groundwater flow systems associated with the Southwest Plume and its sources are the UCRS and the RGA. In the area of the Southwest Plume, groundwater flow and contaminant migration through the upper 45 ft to 55 ft of subsurface soil (UCD) is predominantly downward with little lateral spreading. This flow system is termed the UCRS. Locally, the UCRS consists of three hydrogeologic units (HUs), an upper silt interval (HU1), an intermediate horizon of sand and gravel lenses (HU2), and a lower silt and clayey silt interval (HU3). Groundwater flow rates in the UCRS tend to be on the order of 0.1 ft per day (ft/day). The silts and clays of the UCRS readily adsorb some contaminants, such as many metals and radionuclides, retarding the migration of these contaminants in groundwater from the source areas. Moreover, laterally extensive silt and clay horizons in the UCRS may halt the downward migration of DNAPLs, but foster the development of DNAPL pools in the subsurface.

Groundwater occurrence in the UCRS is primarily the result of infiltration from natural and anthropogenic recharge. Flow is predominantly downward. Groundwater in the UCRS provides recharge to the underlying RGA. The water table in the UCRS varies both spatially and seasonally due to lithologic heterogeneity and recharge factors (e.g. infiltration of focused run-off from engineered surfaces, seepage due to variations in cooling water line integrity, rainfall and evapotranspiration), and averages approximately 17 ft in depth with a range of 2 to 50 ft.

Downward vertical hydraulic gradients generally range from 0.5 to 1 ft per ft where measured by monitoring wells (MWs) completed at different depths in the UCRS. MWs in the south-central area of PGDP (south of the C-400 Building and east of the C-720 Building) have lower water level elevations than MWs in other areas of the plant (DOE 1997). Horizontal hydraulic conductivity of the UCRS sand units has been determined from numerous slug tests in a previous investigation (CH2M HILL 1992). The measured hydraulic conductivity of the UCRS sands was 3.5E-05 centimeters per second (cm/s) at SWMU 1 and 3.4E-05 cm/s at the C-720 Building (1.4E-05 and 1.3E-05 inches/second). Measurements of the vertical hydraulic conductivity of the UCRS silt and clay units are not available for either SWMU 1 or the C-720 Building; measurements of the vertical hydraulic conductivity of UCRS silt and clay units are not available for either SWMU 1 or the C-720 Building; measurements of the vertical hydraulic conductivity of UCRS silt and clay units on-site range between 1.7E-08 and 2.1E-05 cm/s (6.7E-09 and 8.2E-06 in/s) (DOE 1997; DOE 1999). (The depth-averaged vertical hydraulic conductivity of the total UCRS interval is approximately 1E-06 cm/s [3.9E-07 in/s].)

A thick interval of late Pleistocene sand and gravel from a depth interval of 60 to 90 ft (LCD) represents the shallow, uppermost aquifer underlying most of PGDP, referred to as the RGA. The RGA consists of a discontinuous upper horizon of fine to medium sand (HU4) and a lower horizon of medium to coarse sand, and gravel (HU5). The RGA is the main pathway for lateral flow and dissolved contaminant migration off-site. Variations in hydraulic conductivity and the location of discrete sources of recharge govern the local direction and rate of groundwater flow; however, overall flow within the RGA trends north-northeast toward the Ohio River, which represents the regional hydraulic base level.

The RGA typically has a high hydraulic conductivity with a range from 1.9E-02 to 2.0E+00 cm/s (7.5E-03 to 7.9E-01 in/s) as determined from aquifer testing. RGA horizontal hydraulic gradients range between 1.84E-04 and 2.98E-03 ft/ft and have average and median values of 7.81E-04 and 4.4E-04 ft/ft, respectively. Groundwater flow rates within the RGA average approximately 1 to 3 ft/day. Contaminant migration tends to be less retarded in the coarse sediments of the RGA due to its high groundwater flow rate and also due to the low fraction of organic carbon (0.02%).

2.3 STUDY AREA GEOLOGY AND HYDROGEOLOGY

Study Area Geology. The geologic strata found in the C-720 Building Area range from clays to silts to sands. Silt and clay are the predominant subsurface soil texture to a depth of 15 to 20 ft. Interbedded sand and clay units are commonly found below those depths. Clay and sandy clay/clayey sand are present near the bottom of most of the soil borings northeast of C-720 Building (DOE 2007).

Immediately southeast of the C-720 Building silt and clay are present to a depth of 15 ft with interbedded sand and clay layers found at deeper horizons. Medium-to-coarse-grained sand, suggestive of the contact between the UCD and LCD, was encountered near the bottom of borings in the southeast corner.

Study Area Hydrogeology. The Southwest Plume SI included soil sampling within the upper 60 ft of SWMU 211-A and 211-B. Soil samples verified the presence of the HU1, HU2, and HU3 members of the UCRS. The UCRS is comprised of alluvial deposits, which vary considerably in grain size and porosity. Based on geologic logs, the lithology reflects facies changes that range from silt to sand to clay. Some logs indicate clay is present from land surface to the top of the RGA, which confines the aquifer. Other logs indicate there are areas where only silt and sand are present from land surface to the top of the RGA, so the RGA is unconfined in these areas. The RGA receives recharge most readily in the unconfined areas. These areas may serve as pathways for contaminant migration from the UCRS to the RGA. HU3 sediments tended to be coarser grained than typical. The RGA was not encountered, although the final interval sampled 55 to 60 ft often revealed a noticeable increase in grain size and a significant increase in moisture content, consistent with trends near the top of the RGA.

2.4 CONTAMINANT HISTORY

The Southwest Plume refers to an area of groundwater contamination at PGDP in the RGA that is south of the Northwest Groundwater Plume and west of the C-400 Building. The Southwest Plume was identified during the Waste Area Grouping (WAG) 27 Remedial Investigation (RI) (DOE 1999). Additional work to characterize the plume (SWMU 210) was performed as part of the WAG 3 RI (DOE 2000a) and Data Gaps Investigations (DOE 2000b). The Southwest Plume SI (DOE 2007) evaluated potential source areas of contamination to the Southwest Plume and profiled the level and distribution of VOCs in the plume along the west plant fence line.

The C-720 Building is located in the southwest area of the PGDP, southwest of the C-400 Building (Figure 2). The C-720 Building consists of several repair and machine shops, as well as other support operations. The WAG 27 RI identified areas of TCE contamination at the C-720 Building Area. One area was underneath the parking lot and equipment storage area at the northeast corner of the building. The second area was located underneath the parking lot adjacent to the loading docks at the southeast corner of the building.

C-720 Northeast Site (SWMU 211-A) Source. Contamination found to the northeast of the C-720 Building is believed to have been released during routine equipment cleaning and rinsing performed in the area. Solvents were used to clean parts, and the excess solvent may have been discharged on the ground; additionally, spills and leaks from the cleaning process may have contaminated surface soils in the area. Solvents may have migrated as dissolved contamination, as rainfall percolating through the soils and migrating to deeper soils and the shallow groundwater, or as DNAPL migrating to adjacent and underlying soils.

C-720 Southeast Site (SWMU 211-B) Source. The source of VOC contamination found southeast of the C-720 Building is not certain. The VOCs found in this area may have originated from spills that occurred

within the building, with subsequent discharge to storm drains leading to the southeast corner of the building or from spills or leaks on the loading dock or parking lot located to the southeast of the building. The area of concern discovered during the WAG 27 RI is near the outlet to one of the storm drains for the east end of the building. A storm sewer inlet for the southeast parking lot also is located in the vicinity. The north edge of the parking lot, where the contamination occurs, is the location of one of the loading docks for the C-720 Building, an area where chemicals, including solvents, may have been loaded or unloaded.

2.5 CONCEPTUAL SITE MODELS

The C-720 Building is a maintenance and machine shop facility that has supported PGDP activities since 1952. It is located in the southwest portion of the plant. The area around the east end of the C-720 Building is covered mostly by concrete or asphalt with intermittent small areas of exposed soil. Both the Northeast and Southeast sites contain multiple utilities that influence the types of subsurface intrusive activities that are feasible in those areas.

For the source zones comprised of high concentration TCE soils and other VOCs at the C-720 sites, the primary pathway of contaminant migration is dissolution of contaminant residual, comprised of TCE and other VOCs, into groundwater in the UCRS and downward migration into the RGA. No lateral migration in the UCRS outside the SWMU area has been identified or is expected since vertical flow is the predominant direction of migration for the TCE contaminant. Dissolved contaminants from these sources subsequently migrate toward the west-northwest in the RGA. The much lower hydraulic conductivity of the McNairy Formation underlying the RGA limits vertical migration of dissolved contamination below approximately 100 ft. Groundwater samples from the RGA in the Southwest Plume support the conclusion that the Southwest Plume has not migrated beyond the DOE property line, which is approximately 4,789 ft northwest of the C-720 Building area. From the point where the groundwater flow path that includes the Southwest Plume crosses the DOE property line, the modeled particle flow path distance to potential points of exposure to RGA groundwater near the Ohio River is approximately 4.0 miles. Currently, there is no uncontrolled exposure to groundwater at PGDP. At this time, exposure to contaminated groundwater off DOE property is hypothetical because the DOE Water Policy controls its use. Figure 3 illustrates the conceptual site model (CSM) for the C-720 Building TCE source area.

C-720 Northeast Site (SWMU 211-A) CSM. The suspected source of contamination for the Northeast site is from a spill(s) of TCE that occurred during routine equipment cleaning and rinsing performed in the area. The suspected spill location(s) is to the north of the adjacent concrete and asphalt parking and maintenance area west of Eighth Street. The maximum TCE concentration detected in soil (8,100 μ g/kg) in the WAG 27 RI was in a sample 30 ft below ground surface (bgs), located immediately north of the parking lot. The WAG 27 RI and subsequent Southwest Plume SI results show soil TCE levels are variable throughout the UCRS. The source of 1,1-DCE, found co-mingled with TCE in the soils of the west end of the area of SWMU 211-A contamination, is unknown.

C-720 Southeast Site (SWMU 211-B) CSM. The suspected source of contamination for the Southeast site is located below and adjacent to the outlet for the storm drain on the east end, south side of the C-720 Building, and/or a nearby storm sewer inlet for the parking lot. The southeast corner of the building has a parking lot and a material loading and unloading dock adjacent to it. The highest concentration of TCE in soil samples (68,000 μ g/kg) in the WAG 27 RI and subsequent Southwest Plume SI were found at 20 ft bgs beneath the concrete and asphalt-covered southeast parking lot and adjacent to the intersection of a buried storm water drain issuing from the facility and a main storm-water sewer line on the south side of the C-720 Building that eventually discharge through Outfalls 008 and 009 to Bayou Creek. The interval of contaminated soils extends from the base of the storm sewer (5-ft depth) to



the base of the UCRS (60-ft depth). The WAG 27 RI and subsequent Southwest Plume SI results show soil TCE levels are variable throughout the UCRS.
3. DATA QUALITY OBJECTIVES

This FCR implemented the seven-step data quality objectives (DQO) process as summarized in the remedial design work plan (RDWP) (DOE 2012a) to ensure that sufficient data of the appropriate type and quality are collected to resolve the data needs identified previously. The DQO process is a series of logical steps that guides managers or staff to a plan for the resource-effective acquisition of environmental data. The DQO process is used to establish performance and acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of the study.

The DQO process includes systematic planning for environmental data collection. This step is based on the widely accepted "scientific method" and includes concepts such as objectivity of approach and acceptability of results. The DQO process consists of seven iterative steps. Since it is an iterative process, one or more of these steps may be revisited as more information is obtained. The first five steps are focused on identifying qualitative criteria such as the nature of the problem, conceptual model, decisions that need to be made, type of data needed, and the analytic approach or decision rule that describes how the data will be used to draw conclusions. The sixth step establishes acceptable quantitative criteria (acceptance criteria) on the quality and quantity of the data to be collected. The seventh step involves a data collection design to generate data that will meet the quantitative and qualitative criteria specified in step 6. The data collection design specifies the type, number, location, and physical quantity of samples and data and quality assurance/quality control measures.

The DQO process as applied to data collection in support of decision making is summarized here:

- (1) **State the Problem**, wherein the problem to be resolved by the data collection activity is sufficiently defined that the focus of the study will be unambiguous.
- (2) **Identify the Decision**, wherein the principal study question that the study will try to resolve is defined. An output of this step is a decision statement that links the principal study question to possible actions that will solve the problem.
- (3) **Identify Inputs to the Decision**, which identifies informational inputs required to resolve the decision statement and determine which inputs require environmental measurements.
- (4) **Define the Study Boundaries**, which defines the spatial and temporal boundaries of the problem.
- (5) **Develop a Decision Rule**, wherein the environmental measurement parameter of interest, the action level, and inputs from previous steps are formulated in a single statement that describes a logical basis for choosing among alternative actions. An output of this step is an "If...then..." statement that defines conditions that would cause the decision maker to choose among alternative actions.
- (6) **Specify Limits on Decision Errors**, wherein the decision makers' tolerable limits on decision errors are used to establish performance goals for the data collection design.
- (7) **Optimize the Design for Obtaining Data**, wherein an efficient strategy for obtaining data that satisfy the DQOs is identified.

These steps in the DQO process, as they apply to C-720 Northeast and Southeast Sites, are shown in Table 1. The DQO process was conducted for SWMUs 211-A and 211-B and for SWMU 1. Accordingly,

Table 1. Summary of the DQO Process for the Southwest Plume Source Areas RDSI[Table A.2 of the Remedial Design Work Plan (DOE 2012a)]

1. State the Problem		2. Identify the Decision		3. Identify Inputs to the	4. Define the Study Boundaries	5. Develop a	6. Specify Limits	7. Optimize the Design for Obtaining
	Principal Study Questions	Alternative Actions	Decision Statement	Decision		Decision Rule	on Decision Errors	Data
 Problem Statement: The PGDP's Southwest Plume consists of groundwater in the RGA contaminated primarily with TCE. The C 747-C Oil Landfarm (SWMU 1) and the C 720 Building Northeast and Southeast Sites (SWMUS 211-A and 211-B, respectively) are sources of contamination to the Southwest Plume. A revised FFS (DOE 2011a) was performed for the three Southwest Plume source areas. These are defined in the Southwest Plume FFS: (1) Treat and/or remove principal threat waste consistent with CERCLA and the National Contingency Plan. (2) (a) Prevent exposure to VOC contamination in the source areas that will cause an unacceptable risk to excavation workers (< 10 ft depth bgs). (b) Prevent exposure to non-VOC contamination and residual VOC contamination through interim land use controls (LUCs) within the Southwest Plume source areas (i.e., SWMU 1, SWMU 211 A, and SWMU 211 B), pending remedy selection as part of the Soils OU and the Groundwater OU. (3) Reduce VOC migration from contaminated subsurface soils in the treatment areas at the Oil Landfarm and C-720 Northeast and Southeast sites so that contaminants migrating from the treatment areas do not result in an exceedance of MCLs in underlying RGA groundwater. Soil cleanup levels, soil boring-averaged TCE UCRS soil concentrations that would meet RAO #3, calculated in the Southwest Plume Revised FFS Appendix C, are listed below: Oil Landfarm source area 7.3E-02 mg/kg. C-720 northeast and southeast once areas. 7.5E 02 mg/kg. Previous investigations documented in the WAG 27 RI (DOE 1999) and the SI Report (DOE 2007) did not completely define the areal and vertical extent of soil contaminated above cleanup levels in the source areas. This was identified in the Southwest Plume FFS (DOE 2011a) as a data gap to be resolved in the RDSI. The Southwest Plume Proposed Plan (DOE 2011b) identified <i>In Situ</i> Source Treatment Using Deep Soil Mixing with Interim LUCs (Alternative	PSQ-1: What is the areal extent of TCE and TCE degradation products present at soil boring- averaged concentrations higher than cleanup levels at the Southwest Plume source areas? PSQ-2: What are the SWMU-specific ranges of geotechnical and microbial properties that are important to the design of the remedial actions?	AA-1a: Remediation is required where the soil boring-averaged concentrations of TCE and TCE degradation products in soils of the UCRS exceed cleanup levels. AA-1b: Remediation is not required where the soil boring- averaged concentrations of TCE and TCE degradation products in soils of the UCRS do not exceed cleanup levels.	DS-1: Determine the extent of soil boring-averaged concentrations of TCE and TCE degradation products in soils of the UCRS and upper RGA in the Southwest Plume source areas that exceed cleanup levels and require remediation. DS-2: Determine where additional design-type information is required for the preferred alternatives.	 Process knowledge of releases (DOE 2011a). Previous investigation results (DOE 2011a). Description of C 720 source areas in Appendix C of the GWOU FS (DOE 1999). Site conceptual model (DOE 2011a). Southwest Plume FFS Alternatives 2, 3, and 8 descriptions (DOE 2011a). Southwest Plume FFS Alternatives 2, 3, and 8 descriptions (DOE 2011a). Minimum TCE cleanup levels: 7.3E-02 mg/kg for the C-747-C Oil Landfarm and 7.5E-02 mg/kg for the C-720 Northeast and Southeast Sites (DOE 2011a). TCE DLs by USEC = 5E-03 mg/kg (Watson 2010). Current estimates of source area dimensions shown in Southwest Plume FFS (DOE 2011a). Information requirements for design of the preferred alternatives as follows: Soil properties common to both soil mixing and <i>in situ</i> bioremediation—fraction organic carbon, and grain size. Soil properties specific to soil mixing—<i>in situ</i> water content, pH, unconfined compressive strength, compressibility, and index properties. Soil properties specific to <i>in situ</i> bioremediation—alkalinity, total and dissolved metals, ferrous iron, major anions, dissolved gasses, and microbial 	Spatial boundaries: The vertical boundary of the study is the upper RGA as feasible (to the base of HU4 interval) at all sites. The results of soil TCE analyses will be provided to EPA and KDEP on a timely basis, and the FFA Parties will confer via teleconference regarding the need for further sampling in the RGA. TCE concentrations above cleanup levels are present at the maximum depths sampled in previous investigations. Surface and subsurface infrastructure is present in the C-720 source areas. The C-720 building bounds the north side of the southeast source area. Schedule boundaries: The focused investigation results must be available by the start of development of the 90% remedial design. Fieldwork and lab analysis turnaround is anticipated to require approximately 120 days. Operational boundaries: Field investigations and remedial design are constrained by surface and subsurface infrastructure at the C-720 Building. No significant interferences exist at the Oil Landfarm. None of the areas are posted as radiological contamination areas; however, VOCs, metals, and SVOCs are present in soils. An underground storage tank near northeast corner of C-720 may present problems both as subsurface infrastructure and source of petroleum in soils. Administrative boundaries: The investigation includes subcontracting for a field laboratory to provide near real time analysis of VOCs in soil and groundwater. Establishment of a field laboratory facility will require development of additional work control.	DR-1: If soil boring-averaged concentrations of TCE and TCE degradation products in soil of the UCRS exceed cleanup levels for a given soil boring, then include the location in the treatment area. If the soil boring- averaged soil concentrations do not exceed cleanup levels, then the area need not be included in the treatment area.	Definitive data quality is assumed for fixed-base and field laboratory analysis. Screening level data quality is assumed for field analyses. The soil boring- averaged contaminant concentration will be derived solely from laboratory analyses from each 5-ft depth interval. The derived soil boring-averaged contaminant concentration will be used as a definitive criterion for comparison with the remediation goal, with no consideration for false rejection rate or false acceptance rate. The sampling plan minimizes decision error by intentionally biasing the location of the sample for laboratory analysis to the location of highest field PID measurement in each 5-ft depth interval.	The selected treatment technologies are able to address the range of small discrete areas to broad areas. There effectively is no minimum or maximum decision area. A combination of field screening instruments, field laboratory analysis, and fixed-base laboratory confirmation analysis will be used to define the outer extent of the area contaminated above the remediation goals. The contaminants of interest are TCE and degradation products: 1,1 dichloroethene; <i>cis</i> -1,2-dichloroethene; <i>trans</i> -1,2-dichloroethene; and vinyl chloride. The targeted depth of investigation is 60 ft bgs, which penetrates through the average depth of the base of the HU4 at SWMU 1 and at the C-720 sites. Where one or more soil boring- averaged contaminant concentrations in a soil boring exceed an RG for a site, contingency borings will be sampled, as necessary (up to the contingency allotment for each site), to bound the remediation area. At SWMU 1, successive contingency boring step outs nominally will be 75 ft. (Multiple contingency boring smay extend the investigation beyond 75 ft of the SWMU boundary.) At the C-720 sites, contingency boring step outs must be consistent with the sampling grid except where prevented by the presence of utilities or other obstructions. Parameters as established in quality assurance project plan for precision, accuracy, representativeness, completeness, and comparability. A combination of field measurements and fixed-base laboratory analysis will be used to quantify key design criteria for the preferred alternatives.
				population.				

text in Table 1 contains references to SWMU 1, which are artifacts of the scoping process and not intended to provide information for SWMU 1 as part of this final characterization report. The resulting sampling and analysis plan is described in Section 4. The Quality Assurance Project Plan (QAPP) for the RDSI [Attachment A5 of the RDWP (DOE 2012a)] contains measurement quality objectives and data quality indices derived from the project DQOs that ensured quality data was obtained to adequately assess SWMUs 211-A and 211-B. With the few exceptions noted in Section 4.9 (one soil 1,1-DCE analysis and two groundwater *trans*-1,2-DCE and VC analyses), all VOC analyses associated with soil and groundwater samples of the RDSI meet measurement performance and other assessment criteria of the project QAPP and are included in this FCR. In addition to the RDSI data, this FCR incorporates data from the WAG 27 RI and Southwest Plume SI, as required by the project DQOs and QAPP (DOE 2012a).

4. FINAL CHARACTERIZATION/RDSI PLANNING

RDSI planning includes evaluating existing data, DQO scoping, and performing a site visit. Additionally, planning is necessary to protect health and safety, develop the environmental sampling protocol, and identify procedures for handling investigation derived waste. Each activity has been completed and is discussed below.

4.1 EVALUATION OF EXISTING DATA

The preliminary C-720 northeast and southeast site boundaries shown in the Southwest Plume FFS were based on the fate and transport model grid for the C-720 area used in the WAG 27 RI (DOE 1999) and the Southwest Plume SI (DOE 2007). The Groundwater OU Feasibility Study (DOE 2001) also provided estimates of source area locations and dimensions. These estimates were used in the Southwest Plume FFS to define the SWMU 211-A and 211-B boundaries shown on Figures 4 and 5, respectively.

4.2 INITIAL SAMPLING LOCATIONS

By combining data from previous reports as well as information obtained through Oak Ridge Environmental Information System (OREIS), a new general sample boundary area was drawn for the C-720 northeast (i.e., SWMU 211-A) and southeast (i.e., SWMU 211-B) sites (Figures 4 and 5, respectively). The boundaries incorporate historical detections of TCE contamination and extend a short distance outward from these locations. Two sampling locations (720-018 and P4-H7/720-027) in the C-720 northeast site identified during the SI as having at least one TCE detection at a concentration greater than 70 μ g/kg are included within the sampling area. Sampling grid spacing and sampling location coordinates presented in Appendix A.1 of the RDWP (DOE 2012a) were used as a guide, but site obstructions and/or sample results were used to determine appropriateness of sample locations.

4.3 DQO SCOPING MEETING

A DQO scoping meeting, attended by subject matter experts, was held February 4, 2010, to gather input to DQO development for the RDSI characterization plan. Subsequently, additional meetings were held, from which data needs specific to the selected remedies were identified. The results from those meetings are presented in the DQOs provided in Section 3.

4.4 SITE WALKDOWNS

The SWMU 211-A and 211-B source areas were visited by the project team prior to commencement of the RDSI characterization plan implementation. The site visits to SWMU 211-A and 211-B were conducted in June and July of 2012. A LATA Kentucky surveyor completed the site walkdown to locate and mark utilities with the aid of plant drawings and coordinates, a handheld Metrotech line locator, and a Geophysical Survey Systems, Inc., ground penetrating radar system, model SIR-3000.

Following the site walkdowns the proposed sample locations at SWMU 211-A required no modifications. The SWMU 211-B proposed locations were shifted toward building C-720 by approximately 5 ft to avoid contact with the sewer drain system.





4.5 HEALTH AND SAFETY

Environmental sampling to protect the health and safety of the workers is an important part of any related project. During drilling and sampling operations, a photoionization detector (PID) was used to determine if VOCs were present at hazardous levels in the workers' breathing zone. Personal samplers were also used to establish baseline values early in the project. Monitoring for radioactive contamination was conducted according to the radiation work permit. Additional details and requirements for health and safety sampling are contained in the *Health and Safety Plan for the Southwest Plume Remedial Design Support Investigation at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PAD-PROJ-0133/R0 (LATA Kentucky 2012).

4.6 SOIL SAMPLING STRATEGY

The SWMU 211-A and 211-B boundaries shown in the Southwest Plume FFS were based on the fate and transport model grid for the C-720 area used in the WAG 27 RI (DOE 1999) and the Southwest Plume SI (DOE 2007). The Groundwater OU Feasibility Study (DOE 2001) also provided estimates of source area locations and dimensions. These estimates were used in the Southwest Plume FFS to define the SWMU boundaries. The data from these three reports and information obtained through OREIS were combined and a sample boundary area was presented in the RDSI as shown in Figures 4 and 5. The boundaries encompassed historical detections of TCE and extended a short distance outward from the detections and provided a general starting point for this RDSI. Figures 4 and 5 show the actual sampling locations for SWMUs 211-A and 211-B, respectively. Table 2 provides PGDP coordinates for the sampling locations depicted in Figure 4 for SWMU 211-A. Table 3 provides PGDP coordinates for the sampling locations depicted in Figure 5 for SWMU 211-B.

Soil borings 211-A-001 through 211-A-036 and 211-B-001 through 211-B-020 were performed from August 16 through October 19, 2012. Follow-on sampling at SWMU 211-A (soil borings 211-A-037 through 211-A-044) was performed from February 25 through March 6, 2013. Soil borings were completed using an AMS 9500 VTR rig with Geoprobe direct push technology (DPT) DT-22 tooling and polyvinyl chloride sample liners, provided by Chase Environmental Group, Inc. (Kevil, Kentucky).

4.7 MONITORING WELL INSTALLATION

MWs were installed at SWMU 211-A (MW511, MW512, and MW513) and SWMU 211-B (MW514, MW515, and MW516) in August 2012 using hollow stem auger drilling methods. Tables 4 and 5 provide well construction details for the MWs installed at SWMU 211-A and SWMU 211-B, respectively. The locations of the newly installed MWs are presented on Figure 4 (SWMU 211-A) and Figure 5 (SWMU 211-B).

At SWMU 211-A, MW511 and MW513 were installed as a cluster within a common borehole using a 6.25-inch inside diameter (ID) auger, and MW512 was installed using a 4.25-inch ID auger. The MWs were constructed of 2-inch diameter stainless screen and riser, with screen intervals of 10 to 15 ft bgs (MW511), 18 to 28 ft bgs (MW512), and 37 to 42 ft bgs (MW513). MW construction logs are included in Appendix A.

At SWMU 211-B, MW514, MW515, and MW516 were installed as a cluster within a common borehole using a 8.25-inch ID auger. The MWs were constructed of 2-inch diameter stainless screen and riser, with screen intervals of 8 to 13 ft bgs (MW514), 19 to 29 ft bgs (MW515), and 35 to 40 ft bgs (MW516). MW construction logs are included in Appendix A.

Station	Plant Coor	Elevation	
Station	Northing [ft]	Easting [ft]	[ft amsl]
211-A-001	-2023.2110	-5059.5510	374.598
211-A-002	-2023.6120	-5029.1430	374.504
211-A-002a	-2023.7790	-5031.2360	374.476
211-A-003	-2022.6390	-4994.8430	374.913
211-A-004	-2048.0820	-5212.8110	373.283
211-A-005	-2047.9830	-5179.8330	373.701
211-A-006	-2043.4640	-5148.4270	374.090
211-A-008	-2043.2190	-5088.8040	374.092
211-A-009	-2043.5870	-5058.3150	374.263
211-A-010	-2046.7240	-5031.9270	374.330
211-A-010a	-2045.4290	-5030.7210	374.359
211-A-011	-2048.2000	-4995.4900	375.221
211-A-012	-2043.9840	-4973.5470	375.458
211-A-013	-2066.2640	-5194.1350	374.351
211-A-014	-2065.9010	-5119.3050	374.469
211-A-015	-2066.2010	-5088.9670	374.601
211-A-016	-2065.9450	-5059.0230	374.653
211-A-017	-2066.3420	-5029.0030	374.894
211-A-018	-2066.3810	-4994.8990	374.865
211-A-019	-2066.1750	-4974.1430	374.771
211-A-020	-2085.9880	-5035.1640	374.833
211-A-021	-2096.0950	-5089.2170	374.593
211-A-022	-2095.8230	-5058.8970	374.620
211-A-023	-2096.1320	-4994.5060	374.620
211-A-024	-2115.8920	-5065.2080	374.350
211-A-025	-2114.2460	-5040.0200	374.210
211-A-026	-2131.2640	-5088.8230	374.296
211-A-027	-2125.7710	-4995.0460	374.622
211-A-028	-2048.7590	-5231.1660	373.633
211-A-029	-2066.7480	-5214.0940	374.274
211-A-030	-2027.3620	-5204.6280	373.823
211-A-031	-2136.2860	-5040.0740	373.999
211-A-032	-1999.9050	-5031.5160	373.362
211-A-033	-2094.9760	-5216.5300	374.359

Table 2. PGDP Plant Coordinates for SWMU 211-A Source AreaSampling Locations

Station	Plant Coo	rdinates	Elevation
Station	Northing [ft]	Easting [ft]	[ft amsl]
211-A-034	-2024.1310	-5089.0630	374.423
211-A-035	-2105.5170	-5240.0280	373.994
211-A-036	-2055.4830	-5261.2480	374.472
211-A-036a	-2051.9460	-5261.3630	374.415
211-A-037	-2044.5470	-5395.8070	373.516
211-A-038	-2045.0350	-5323.1710	374.499
211-A-039	-2020.1390	-5309.1090	374.571
211-A-040	-1994.8890	-5272.9960	374.583
211-A-041	-2077.0010	-5273.3620	373.935
211-A-042	-2137.9710	-5262.2770	373.996
211-A-043	-2138.0230	-5183.7380	374.863
211-A-044	-2089.7250	-5180.1200	374.396

Table 2. PGDP Plant Coordinates for SWMU 211-A Source Area Sampling Locations (Continued)

Table 3. PGDP Plant Coordinates for SWMU 211-B Source AreaSampling Locations

Station.	Plant Coo	rdinates	Elevation
Station	Northing [ft]	Easting [ft]	[ft amsl]
211-B-001	-2607.6980	-5240.8990	371.916
211-B-002	-2608.4570	-5201.4670	371.965
211-B-003	-2607.3650	-5181.1500	372.000
211-B-004	-2607.1870	-5143.3300	371.941
211-B-005	-2606.3070	-5129.5960	371.940
211-B-006	-2611.2800	-5085.4310	371.960
211-B-007	-2611.7170	-5056.8590	372.028
211-B-008	-2642.0290	-5211.0330	371.474
211-B-009	-2642.0580	-5180.9140	371.359
211-B-010	-2642.3830	-5151.4210	371.331
211-B-011	-2642.3070	-5120.9840	371.318
211-B-012	-2642.2870	-5091.2570	371.587
211-B-013	-2642.1370	-5057.0470	371.850
211-B-014	-2642.3210	-5074.0080	371.668
211-B-015	-2607.9310	-5163.5150	371.996
211-B-016	-2624.6240	-5148.0390	371.569
211-B-017	-2607.4590	-5258.7540	371.976
211-B-018	-2630.5500	-5241.1330	371.646
211-B-019	-2603.3600	-5105.9730	371.996
211-B-020	-2627.5870	-5106.1450	371.664

Table 4. PGDP SWMU 211-A Well Construction Details

		Dian	Riser			Top of	f Bottom Screen		Fon of Bottom		Screen			Plant Coo	rdinates
Well Number	Date Installed	Casing Material	Casing Diameter [in]	Screened Zone	HU	Screen [ft bgs]	of Screen [ft bgs]	Screen Material	Diameter [in]	Elevation [ft NAVD88]	Datum Reference	Northing [ft]	Easting [ft]		
MW511	8/27/2012	SLS	2	UCRS	H1	10	15	SLS	2	376.82	TOC	-2043.56	5066.98		
MW512	8/24/2012	SLS	2	UCRS	H2	17.8	27.8	SLS	2	377.59	TOC	-2043.56	5016.04		
MW513	8/27/2012	SLS	2	UCRS	Н3	37	42	SLS	2	376.82	TOC	-2043.56	5066.98		

Notes:

1. SLS—stainless steel

2. NAVD88—North American Vertical Datum of 1988

TOC—top of casing
 Yellow shading indicates data is an estimate.

Table 5. PGDP SWMU 211-B Well Construction Details

		Diana	Riser			Tomof	Bottom	Bottom		Datar		Plant Coo	ordinates
Well Number	Date Installed	Casing Material	Casing Diameter [in]	Screened Zone	HU	Screen [ft bgs]	of Screen [ft bgs]	Screen Material	Diameter [in]	Datum Elevation [ft NAVD88]	Datum Reference	Northing [ft]	Easting [ft]
MW514	8/27/2012	SLS	2	UCRS	H1	7.8	12.8	SLS	2	375.67	TOC	-2672.35	5035.85
MW515	8/27/2012	SLS	2	UCRS	H2	18.8	28.8	SLS	2	375.67	TOC	-2672.35	5035.85
MW516	8/27/2012	SLS	2	UCRS	H3	34.8	39.8	SLS	2	375.67	TOC	-2672.35	5035.85

Notes:

1. SLS-stainless steel

2. NAVD88—North American Vertical Datum of 1988

3. TOC—top of casing

4. Yellow shading indicates data is an estimate.

4.8 INVESTIGATION-DERIVED WASTE

Investigation derived waste generated during the performance of fieldwork associated with this FCR are considered part of the Southwest Plume RDSI. As such, only a portion of the following inventory of the Southwest Plume RDSI-generated waste is directly associated with SWMUs 211-A and 211-B.

- Nine ST-90 boxes and two 55-gal drums of soil/personal protective equipment and debris (approximately 825 ft³).
 - Five of the nine ST-90 boxes have been approved for disposal at the C-746-U Contained Landfill [permitted for operation by the Kentucky Division of Waste Management (Solid Waste Landfill Permit Number 073-00045)]. Currently these five ST-90 boxes are awaiting final disposal.
 - The remaining four ST-90 boxes are awaiting sample results from the laboratory or sampling collection to complete the characterization.
- One 55-gal drum of personal protective equipment from decontamination activities (approximately 7.4 ft³).
- Five 1,200-gal poly tanks of decontamination water (approximately 802 ft³).
 - Three of the five poly tanks are approved for disposal at C-612, but have not been delivered.
 - The remaining two poly tanks have yet to be characterized.

4.9 DATA EVALUATION

Data verification, validation, and assessment were performed for the project data in accordance with PAD-ENM-5003, *Quality Assured Data* (LATA Kentucky 2010). The data evaluation results are stored in Paducah Project Environmental Measurements System and are transferred with the data to Paducah OREIS.

The data evaluation for the RDSI identified the following variances. At SWMU 211-A, a total of 31 planned borings and 10 contingency borings were allotted. The investigation sampled 30 of the planned borings and 12 contingency borings. DOE sampled the 2 additional contingency borings to better characterize the extent of the VOC contamination. (For SWMU 211-B, a total of 17 planned borings and 12 contingency borings were available. Only the original 17 planned borings and 2 contingency borings were required to characterize the extent of contamination.)

The investigation soil analyses include a single exceedance of the laboratory reporting limits required by the RDWP (DOE 2012a). The analysis for 1,1-DCE in the sample from 211-A-036 at 22 ft depth reports a result of 31 "U" μ g/kg; the reporting limit for 1,1-DCE is required to be 10 μ g/kg. This variance is anticipated to have minimal impact to the project. Analyses of 1,1-DCE for deeper samples in this soil boring significantly exceed the 1,1-DCE remediation goal (137 μ g/kg) while analyses for shallower samples report nondetect levels.

Groundwater analyses include exceedances of the required laboratory reporting limit only for *trans*-1,2-DCE and vinyl chloride in 1 of 3 samples from MW204 and the lone sample from MW513 (both SWMU 211-A MWs). In MW204, the highest reporting limits (2 μ g/L *trans*-1,2-DCE and 4 μ g/L

VC) are twice the required reporting limits. Because all three results for these analytes in MW204 are "U" qualified, this variance has little impact to the groundwater assessment.

In the lone MW513 groundwater sample, the reporting limits (10 μ g/L *trans*-1,2-DCE and 20 μ g/L VC) are 10 times the required reporting limits (due to a 10 × dilution of the sample); however, analyses for collocated wells MW511 and MW512 (nondetect levels of 1 μ g/L *trans*-1,2-DCE and 2 μ g/L VC in both wells) provide good characterization of UCRS groundwater quality at SWMU 211-A. The RDWP (DOE 2012a) identified method ASTM D4360-96 or equivalent for constant head injection tests of the RDSI. The correct method reference is ASTM D4630-96.

4.10 THREE-DIMENSIONAL ANALYSIS

Results of the UCD soil samples from the RDSI and historical data from OREIS are inputs to three-dimensional contamination models for SWMU 211-A and SWMU 211-B using the EVS-ES software. The area historical data in OREIS come from the WAG 27 RI (DOE 1999) and the Southwest Plume SI (DOE 2007). These models estimate the extent of TCE soil impacts and the total TCE mass in soil at each SWMU.

EVS is similar to other environmental decision support software (DSS), such as SitePro and Spatial Analysis and Decision Assistance, and was evaluated by EPA and DOE in 1998 alongside five other DSS packages. EVS underwent an environmental technology verification report in March 2000 that concluded that "the main strengths of EVS-PRO are its outstanding 3-D visualization capabilities and its capability to rapidly process, analyze and visualize data" and "the demonstration showed the EVS-PRO software can be used to generate reliable and useful analyses for evaluating environmental contamination problems."

Several interpolation techniques, including inverse distance weighting, nearest neighbor, and kriging, were evaluated, with kriging ultimately being selected as the primary interpolation technique. Kriging is a stochastic technique similar to inverse distance weighted averaging in that it uses a linear combination of weights at known points to estimate the value at the grid nodes. Kriging is named after D. L. Krige, who used kriging's underlying theory to estimate ore content. Kriging uses a variogram (a.k.a. semivariogram), which is a representation of the spatial and data differences between some or all possible "pairs" of points in the measured data set. The variogram then describes the weighting factors that will be applied for the interpolation.

It is acknowledged that there are significant uncertainties associated with providing a mass estimate of DNAPL using kriging. Using kriging, however, is still a useful and valid approach to estimate the extent of the source area at various isoconcentration levels below the threshold of residual saturation. Kriging also provides insight about the mass distribution at differing isoconcentration levels. Uncertainty has been considered by estimating mass at different levels of statistical confidence. By kriging data at every node of the model, an average value along with a standard deviation is calculated, thus providing a range of estimated TCE concentrations and ultimately mass. A level of significance of 0.1 (i.e., 90% confidence interval) was used in modeling the geometry and mass of TCE above 75 μ g/kg in order to address uncertainty in the estimates.

Each SWMU contaminant model was based on a five-layer geologic model. Analytical results were log processed in the model. The Horizontal/Vertical Anisotropy Ratio parameter, which allows the model to take into consideration expected differences in fluid flow through the soil matrix, was set to a value of 1.5. The Octant Search method was used to determine which sample points are selected for inclusion in

the kriging matrix. This method sets a maximum number of points for each octant, which helps offset bias effects of sampling distribution irregularities. The model used a soil density of 1.4 gram per cubic centimeter (g/cc) and a chemical density of 1.46 g/cc.

Model results of TCE soil impacts for SWMU 211-A and SWMU 211-B are illustrated later in this report as the 50% and 90% confidence limits of 75 μ g/kg soil TCE and the 90% confidence limit of 1,000 μ g/kg soil TCE. Soil TCE mass estimates for SWMUs 211-A and 211-B are reported as the 90% maximum confidence level for the source volume statistical evaluation.

Appendix B provides a CD containing viewable three-dimensional model EVS-ES files. The sensitivity analysis of the source volume estimate.

5. SWMU 211-A RDSI SAMPLE RESULTS

5.1 LITHOLOGY

Soil lithology logs that provide a detailed description of soil type and HU transitions are included in Appendix D. Within the SWMU 211-A investigation area, lithology logs reveal the presence of fill material (gravelly fine sand) to a typical depth of approximately 2 ft, underlain primarily by silt with very fine sand representing the HU1 to a typical depth of approximately 20 ft bgs. HU2 was identified from approximately 20 ft bgs to approximately 35 ft bgs and consisted primarily of fine sand and silt with some gravel. HU3, primarily consisting of silt with fine sand and clay, was identified from approximately 35 ft bgs to 60 ft bgs.

5.2 SOIL SAMPLE RESULTS

Forty-two DPT soil boring locations (25 original, 18 contingency), shown in Figure 4, were performed on and extending north of the parking lot off the northeastern portion of the C 720 Building. Collected soil cores were screened approximately every 0.5 ft using a PID to identify intervals of maximum organic vapor response, if present. Soil samples were collected from the 0.5 ft interval of maximum PID reading for each 5-ft soil core and sent by courier to the fixed-base laboratory for overnight VOC analysis. The laboratory preliminary analytical results were available by 8:30 a.m. on Monday for samples collected on the previous Friday and by 8:30 a.m. Tuesday through Friday for samples collected the previous day. The next day laboratory results were used to assess actively whether additional borings were needed by comparison of the average contaminant concentration² for the samples from each boring to the remediation goal. If the average exceeded the remediation goal, then one or more contingency borings were required.

A total of 541 soil samples was collected from 42 soil boring locations. Soil sample VOC results are summarized in Table 6 and presented in Appendix E. Soil sample depths ranged from 0.1 ft bgs to 66.5 ft bgs. The maximum measured TCE result was 4,800 μ g/kg from location 211-A-036 at a depth of 47.5 ft bgs. The observed maximum *cis*-1,2-DCE and VC results of 110 μ g/kg and 28 μ g/kg (both results "J" qualified indicating estimated values), respectively, also were collected at soil boring location 211-A-036, at a depth of 44.5 ft bgs. The maximum measured 1,1-DCE result was 4,400 μ g/kg from location 211-A-036 are located in the western portion of the investigation area. *Trans*-1,2-DCE was not detected in the collected soil samples above laboratory detection limits. At 12 borings (29%), the borehole average concentration exceeded the remediation goal. A total of 97 soil samples (18%) exceeded the remediation goal. In general, the highest concentrations were noted in the 30 to 50 ft bgs depth range.

Figure 6 illustrates all of the soil TCE analyses for the SWMU 211-A investigation area, overlaid on a map. For reference, soil TCE analyses greater than 75 μ g/kg (the borehole average project remediation goal) are noted by yellow highlight.

Subsequent to development of the RDWP (DOE 2012a), the approach for determining the distribution of TCE mass within the UCRS that exceeds soil TCE concentrations of 75 μ g/kg was refined based on discussion among the FFA parties. The revised approached included the use of historical TCE soil data for the UCRS contained in OREIS, analytical results from the RDSI, and the use of the spatial

² The average contaminant concentration for a borehole was calculated using one half of the laboratory reporting limit for nondetect analyses and using the greater concentration where analyses of duplicate samples were available.

Station	Date Collected	TCE [µg/kg]	1,1-DCE [µg/kg]	<i>cis</i> -1,2- DCE [µg/kg]	trans-1,2- DCE [μg/kg]	VC [µg/kg]
Groundwate Remediation	er Protection n Goal	75	137	619	5290	570
211-A-001	8/29/2012	3.4	***	***	***	***
211-A-002	8/30/2012 & 8/31/2012	161	2.5	2.0	***	***
211-A-003	9/12/2012	18	4.1	0.5	***	***
211-A-004	8/31/2012 & 9/4/2012	552	763	9.1	***	***
211-A-005	9/4/2012	175	163	5.2	***	5.9
211-A-006	9/26/2012	8.3	7.4	0.6	***	***
211-A-008	9/20/2012	12	6.8	0.6	***	***
211-A-009	9/20/2012	40	4.8	0.8	***	***
211-A-010	8/16/2012, 9/13/2012 & 9/17/2012	135	3.4	2.3	***	***
211-A-011	8/17/2012	12	6.7	0.3	***	***
211-A-012	9/17/2012	4.9	11	0.6	***	***
211-A-013	9/4/2012 & 9/5/2012	34	45	4.4	***	2.4
211-A-014	9/5/2012	12	24	0.8	***	***
211-A-015	9/6/2012	36	19	0.8	***	***
211-A-016	9/27/2012	58	14	1.7	***	***
211-A-017	9/21/2012	276	***	5.6	***	4.3
211-A-018	9/11/2012 & 9/12/2012	46	5.8	***	***	***
211-A-019	9/12/2012	1.3	10	0.5	***	***
211-A-020	9/24/2012	297	6.7	3.7	***	***
211-A-021	9/6/2012	19	32	1.8	***	0.2
211-A-022	9/27/2012	12	4.1	0.6	***	***
211-A-023	9/11/2012	19	4.4	0.5	***	***
211-A-024	9/10/2012	9	***	0.4	***	***
211-A-025	9/10/2012	213	***	13	***	***
211-A-026	9/7/2012	4.8	4.8	1.2	***	0.3
211-A-027	9/11/2012 & 9/18/2012	55	1.6	0.7	***	***
211-A-028	9/24/2012	804	<mark>904</mark>	12	***	***
211-A-029	9/25/2012	351	348	7.0	***	***
211-A-030	9/25/2012	12	14	1.5	***	***
211-A-031	9/26/2012	32	***	1.1	***	***
211-A-032	9/28/2012	6.6	***	0.6	***	***

Table 6. Soils VOC Data (Average Borehole Concentration) for SWMU 211-A

Station	Date Collected	TCE [µg/kg]	1,1-DCE [μg/kg]	<i>cis</i> -1,2- DCE [µg/kg]	trans-1,2- DCE [μg/kg]	VC [µg/kg]
Groundwater Protection Remediation Goal		75	137	619	5290	570
211-A-033	10/1/2012	166	140	7.1	***	***
211-A-035	10/2/2012	170	131	4	***	***
211-A-036	10/3/2012	1,171	1,043	20	***	9
211-A-037	2/25/2013	0.5	***	***	***	***
211-A-038	2/25/2013	14	3.3	3.9	***	2.9
211-A-039	2/26/2013	0.6	7.3	0.57	***	***
211-A-040	2/26/2013	***	2.5	***	***	***
211-A-041	2/27/2013	21	36	4.3	***	1.2
211-A-042	2/27/2013	28	20	4.2	***	0.6
211-A-043	3/4/2013	11	2.5	15	***	***
211-A-044	3/6/2013	14	3.4	131	***	14

 Table 6. Soils VOC Data (Average Borehole Concentration) for SWMU 211-A (Continued)

Notes:

- 1. Groundwater Protection Remediation Goals from *Remedial Design Work Plan for Solid Waste* Management Units 1, 211-A, and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, (DOE 2012a).
- 2. ***—indicates average concentration not calculated as all boring analyses were "U" qualified (compound analyzed for but not detected at or below the lowest concentration reported) for specific VOC.
- 3. For "U" qualified analyses, a value of one half the concentration reported was used in calculating the average borehole concentration.
- 4. Yellow shading and bold text indicates an exceedance of Groundwater Protection Remediation Goals.
- 5. Soil boring 211-A-007 was not collected.
- 6. Soil boring 211-A-034 was collected and archived. Boring was not logged or screened for VOC impacts.

SER ENTRE	211-A-005
	Sample Date 4 4 0.39 U 1.6 U 6 14 9 0.38 U 1.6 U 14
	3 0.38 U 1.6 U 14 14 0.36 U 1.6 J 15.1 16.5 0.33 U 16 (15.1)DUP 24.9 1.700 1.600 23.5
	27. 960 970 26 30.1 620 900 9/4/2012 34.9
	35.1 1,200 1,400 35.3 40.1 2,400 4,400 43.5 48.5 17 U 480 45.5
	9/4/2012 9/4/2012 59.9 97 12 55.5 61 160 23 60.5 60.5 9/4/2012 55.5 61 160 23 55.5 60.5
	A verage 552 763 A verage 211-A-004
	Sample Date Sample Depth TCE 9 0.39 U
	211-A-028 14 0.56 U Sample Date Sample Depth TCE 1,1 DCE 23,5 21 U
Sample Date Sample Date	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
9 0.41 U 1.7 U 9 14 0.44 U 1.8 U 14 (14)Dup 0.46 U 1.9 U 16.5	0.4 U 1.7 U 19 0.76 J 55 40.1 0.88 U 0.38 U 1.6 U 22.5 0.44 U 1.8 J 49 0.39 U 0.42 U 1.7 U 26 210 290 54.5 4.8 J
19 0.36 U 1.5 U 22 23 0.39 U 1.6 U 26 27.5 0.44 U 1.8 U 34.5	0.53 U 2.2 U 9/24/2012 34 220 J 55 J 58 20 0.34 U 1.4 U 38.5 3,700 4,200 61 12 0.34 U 1.4 U 42.5 2,800 3,800 Average 12
2/26/2013 33 0.34 U 1.4 U 2/26/2013 36 37 0.41 U 3.4 J 34 J 36 36 42 0.38 U 15 41.5 41.5	0.41 U 1.7 U 48 1,600 1,800 240 0.35 U 1.5 U 50.5 1,700 1,400 240 240 240 0.4 U 1.7 U 55.1 42 79 240
49.5 0.34 U 12 48.5 51.5 0.39 U 57 51.5 56 1 J 1.5 U 56	0.37 U 2.4 J 61 180 66 0.37 U 1.5 U Average 804 904 0.36 U 21 211-A-028 211-A-028
64 4.5 J 2.3 U 61 Average 0.6 7.3 Average 211-A-039	0.38 U 3.2 J *** 2.5 211-A-040
211-A-036 & 211-A-036a Sample Date Sample Depth TCE 1,1 DCE	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
19 0.67 J 2.1 J 22 280 J 31 U 26.5 810 340	
10/3/2012 31.5 1,400 1,600 35.5 2,800 3,700 44.5 3,800 3,900	
47.5 4,800 3,300 50.1 1,300 690 55.5 3.1 1.511	
61 33 12 Average 1,171 1,043	
211-A-036a 211-A-036	
211FA-037 211-A-037 Sample Date Sample Depth TCE 1,1 DCE Sample Date Sample Depth TCE 1,1 DCE	
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
211-A-041	
Sample Date Sample Depth TCE 1,1 DCE 4 0.39 U 1.6 U 9 0.41 U 1.7 U	
14.5 0.41 U 1.7 U 18.5 0.37 U 8.8 J (18.5)Dup 0.35 U 8.7 J	
24 0.53 U 2.2 U 27 0.34 U 1.4 U 2/27/2013 34.5 1.7 J 1.6 J	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
50.5 18 26 55.1 27 2.2 J 63 68 21	
Average 21 36 211-A-042	
Sample DateSample DepthTCE $1,1DCE$ 9 0.41 U 1.7 U14.5 0.39 U 1.6 U	
17 0.37 U 1.5 U 22.5 0.33 U 1.4 U 27.5 0.34 U 1.4 U	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
48 82 40 54.9 40 21 57 0.38 U 1.6 U	
62.5 27 6.4 J Average 28 20	211-A-035 Sample Date Sample Depth TCE 1,1 DCE
Legend	1.9 0.4 U 1.7 U 8.6 0.39 U 1.6 U 13.4 0.38 U 2.5 J
Soil Boring Location with Average Soil Concentration Exceeding One or Both Remediation Goals	18.5 1.6 J 33 24 7.6 J 30 27 2.1 J 1.7 J
Soil Boring Location with Average Soil Concentration Less than Both Remediation Goals	30.5 35 27 10/2/2012 37 580 590 (41.5)DUP 420 350
Archive Core Soil Boring Location - Not Sampled	41.5 400 400 49 210 J 26 J 51.5 680 360
Historic Soil Boring Location with Average Soil Concentration Exceeding TCE Remediation Goal	55.5 17 1.7 U 66.5 25 9.3 J Average 170 131
Historic Son Boring Location with Average Son Concentration Less than TCE Remediation Goal Historic Archive Core Soil Boring Location - Not Sampled	211-A-033 211-A-029 211-A-033 211-A-029 Sample Date Sample Depth TCE
Monitoring Well Location (screen interval ft BLS)	Sample Date Sample Depth TCE 1,1 DCE 4 0.4 U 1.7 U 4 0.42 U 1.7 U 9 0.51 U 2.1 U 9 0.38 U 1.6 U 14 0.4 U 1.7 U
Area defined by 90% Confidence Level TCE Concentrations greater than 1,000 μg/kg	14 0.37 U 1.5 U 18 0.31 U 1.3 U 19 0.35 U 1.5 U 24.9 23 18 21.5 0.33 U 1.4 U 28.5 440 240
Area defined by 80% Confidence Level TCE Concentrations greater than 75 μg/kg	29.9 3.6 J 2.4 J (32)DUP 110 77 (34)DUP 12 1.9 J 9/25/2012 32 480 360 10/1/2012 34 60 16 38 2,600 2,900
General RDSI Sample Area	36 1,100 1,100 40.5 870 880 44.5 700 540 48.5 270 350 49.5 300 240 50.5 22 27
SWMU 211-A	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Groundwater Protection Remediation Goals Contour (µg/kg) Total Area (ft ²) Area (ft ²) Exclusive Parameter Abbreviation UCRS Soil Cleanup Level (µg/kg) 90% CL 75 34,000 24,500	Average 100 140 C-720 Building
Trichloroethene TCE 75 Nominal 75 13,200 9,500 1,1-Dichloroethene 1,1 DCE 137 90% CL 1000 3,700 3,700	le le
Notes: 1. Results are presented in microgram per kilogram (μg/kg).	
 2. Sample depth is presented in feet below land surface (ft BLS). 3. Only those individual volatile organic compounds (VOC) with a result exceeding remediation goals are presented. 4. DUP indicates duplicate sample. 	
 5. J indicates an estimated value. 6. U indicates compound analyzed for but not detected at or below the lowest concentration reported. 7. Yellow shaded, bold text indicates an exceedance of the Groundwater Protection Remediation Goal UCRS Soil Cleanup Target Level for VOCs 	
8. *** - indicates average concentration not calculated as all boring samples were "U" qualified for specific VOC. 9. TCE isopleths are based upon individual soil sample results over all depths of sampling.	
confidence levels. 11. Source of 2009 Aerial: Williams Aerial & Mapping, Inc.	



$\begin{array}{c c c c c c c c c c c c c c c c c c c $	12 TCE 1,1 DCE 0.46 U 1.9 U	211-A-019 Sample Depth TCE 1,1 DCE 0.5 0.36 U 1.5 U 9 0.37 U 1.5 U 14 0.39 U 1.6 U 19 0.32 U 1.3 U 23 0.34 U 1.4 U	Line North
6 U 40.1 2 U 49 5 U 59 5 U 59 6 4.5 Average 9 U 3U *** 211-A-012 *** 0.5 6.5 (11)D 11 0.5 9/11/2012 28.5 9/11/2012 28.5 9/11/2012 28.5 9/11/2012 28.5 9/12/2012 62 9/12/2012 62	20 23 16 11 5.1 J 1.6 J 12 50 14 55 5 11 I-A-018 211-A-018 Depth TCE 1,1 DCE 0.4 U 1.7 U 0.42 U 1.7 U 0.42 U 1.7 U 0.36 U 1.5 U 0.34 U 1.4 U 0.36 U 1.5 U 0.35 U 1.5 U 0.35 U 1.5 U 1.1 J 1.6 U 0 7.7 J 4.6 J 49 15 15 81 23 6 6 20 440 24 U 15.5	23.5 0.36 U 1.5 U 39 0.36 U 4.4 J 44 0.35 U 2.4 J 47 0.35 U 4.5 J 54 2 J 26 59 2.4 J 35 64 11 59 Average 1 10	
Aver 211-A-013 211-A-022 2 2 1.1 DCE 0.5 0.43 U 1.8 U 14 3.2 J 1.6 U 1.5 U 24.9 0.37 U 1.5 U 24.9 27.5 0.36 U 1.5 U 27.5 0.36 U 1.5 U 9/24/2 12 33.5 0.7 J 5 J 12 35.1 8.5 J 6.7 J 5 J 5 4.5 J 13 17 5 6 88 1.8 J 1 1 <t< td=""><td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td><td>180 590 440 20 310 5</td><td></td></t<>	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	180 590 440 20 310 5	
O.2 27 3.5 J Average 12 4 23 211-A-023 3 ate Sample Depth TCE 1,1 DCE 1 0.4 U 1.7 U 1 7 0.37 U 1.5 U 1.5 U 10 0.4 U 1.7 U 1.5 U 1 0.4 U 1.7 U 1.5 U 12 0.30 U 1.5 U 1.5 U 120.1 0.33 U 1.6 J 1.6 J (20.1) DDUP 0.36 U 7.2 J 25.5 0.33 U 3.9 J 2 34.9 0.37 U 1.5 U 36.5 0.43 U 1.8 U 43 0.39 U 7.9 J 49 1.4 J 9.9 53 66 8.6 J 55.1 130 6.9 J 62 73 11 Average 19 4 4 4 4	Average 297 7		
1.8 U 2.2 U 1.7 U 1.5 U 1.6 U 1.4 U 20 U 1.7 U 1.9 J 2			
	● 720000 30 15 SWMU 211 Paducah Ga	0 A Soil VOC Results seous Diffusion Plant vil, Kentucky	30 Feet
R.	Geosyn consul Titusville, FL	tants May 2013	Figure 6

analysis EVS-ES software to contour the 90% confidence limit of 75 μ g/kg soil TCE for SWMUs 211-A and 211-B. Figure 6 shows the lateral extent of 75 μ g/kg soil TCE (90% confidence limit).

In addition, Figure 6 shows the smaller areas of 75 μ g/kg soil TCE (50% confidence limit) and 1,000 μ g/kg soil TCE (90% confidence limit) for comparison. These depictions define the extent of TCE contamination.

Total organic carbon (TOC) results for SWMU 211-A ranged from 150 milligram/kilogram (mg/kg) to 650 mg/kg with an average concentration of 396 mg/kg. TOC sample results are presented in Table 7.

5.3 GROUNDWATER SAMPLE RESULTS

Groundwater samples were collected during September and October 2012 from the following MWs: MW203 (RGA), MW204 (UCRS), MW511 (UCRS), MW512 (UCRS), and MW513 (UCRS). Collected groundwater samples were analyzed for VOCs, alkalinity, total and dissolved metals, ferrous iron, major anions, and dissolved gasses. Additionally, MW511 and MW513 samples were analyzed for *Dehalococcoides mccartyi* (*Dhc*). Groundwater sample results are presented and are summarized in Table 8.

VOCs. TCE was measured at groundwater concentrations in the UCRS ranging from 10 μ g/L at MW511 to 220 μ g/L ("D" qualified) at MW513 and in the RGA ranging from 72 μ g/L ("JY" qualified) to 110 μ g/L at MW203. In MW203, previous TCE analyses typically range from 11 to 130 μ g/L. In general, TCE concentrations in the RGA wells typically were higher than TCE concentrations in the UCRS wells (excluding MW513). *cis*-1,2-DCE was measured at concentrations ranging from 1.2 μ g/L (MW512) to 18 μ g/L (MW204) in UCRS wells and 27 to 29 μ g/L in RGA MW203. 1,1-DCE ranged from lower than the reporting limit of 5 μ g/L to 810 μ g/L ("D" qualified) at MW513. *Trans*-1,2-DCE and VC were not detected above individual laboratory detection limits. The presence of *cis*-1,2-DCE suggests that biologically mediated reductive dechlorination is occurring in the groundwater at SWMU 211-A. Groundwater VOC sample results are displayed in Figure 7.

Dissolved Gases. Methane concentrations ranged from 0.16 μ g/L to 6.8 μ g/L. Ethene concentrations ranged from 0.01 μ g/L ("J" qualified) to 0.49 μ g/L. Ethane concentrations ranged from 0.0076 μ g/L ("J" qualified) to 0.41 μ g/L. Methane is produced by methanogenic bacteria conversion of acetate or reduction of carbon dioxide under anaerobic conditions. Methanogens and dechlorinating organisms thrive under similar conditions; therefore, the production of methane in groundwater is an indicator that conditions exist that are suitable for reductive dechlorination. Ethene is the final dechlorination product of TCE, while ethane is the product of ethene reduction. The presence of ethene/ethane provides a direct line of evidence that reductive dechlorination is proceeding to completion.

Inorganic Anions. Chloride was measured at concentrations ranging from 3.9 mg/L (MW511) to 120 mg/L (MW203). Nitrate was measured at concentrations ranging from less than the reporting limit of 3 mg/L to 5.4 mg/L at MW204. Sulfate was measured at concentrations ranging from 15 mg/L (MW203) to 66 mg/L (MW511). The nitrate and sulfate (electron acceptors) concentrations present are not at levels that would be anticipated to hinder the reductive dechlorination pathway. Additionally, sulfate is not present at an elevated concentration that has the potential to result in sulfide concentrations that are toxic to dechlorinating microorganisms.

Station	Date Collected	Sample Top Depth [ft bls]	Sample Bottom Depth [ft bls]	Hydrologic Unit	TOC [mg/kg]
		15.5	16	HU1	420
211-A-006	9/26/2012	20.5	20.5	HU2	650
		40.5	40.5	HU3	340
211-A-	8/16/2012	9	9	HU1	500
	8/10/2012	19.5	19.5	HU2	370
010	9/13/2012	40	40	HU3	220
		15	16	HU1	400
211-A- 012	9/17/2012	25	26	HU2	490
012		37	38	Hydrologic Unit HUC [mg/kg HU1 420 HU2 650 HU3 340 HU1 500 HU2 370 HU2 370 HU3 220 HU1 400 HU2 490 HU3 410 HU1 530 HU2 270 HU3 150	410
		14	15	HU1	530
211-A- 027	9/18/2012	25	25.5	HU2	270
021		36.5	37	HU3	150

Table 7. Summary of Soils TOC Data for SWMU 211-A

Analyte	Date Collected	MW2	203	MW204		MW51 1	L	MW51	2	MW5	13
Total and Dissolved	Metals										
	9/5/2012	0.2	U	0.64							
Aluminum (mg/L)	9/12/2012	0.2	U	0.659							
_	10/22/2012	0.2	UN	0.736	N	1.77	Ν			0.2	UN
	9/5/2012	0.2	U	0.2	U						
Aluminum, Dissolved (mg/L)	9/12/2012	0.2	U	0.2	U						
Dissolved (Ing/L)	10/22/2012	0.2	U	0.2	U	0.2	U			0.2	U
	9/5/2012	0.117		0.261							
Chromium (mg/L)	9/12/2012	0.114		0.284							
	10/22/2012	0.202		0.229		0.01	U			0.0409	
	9/5/2012	0.01	U	0.01	U						
Dissolved (mg/L)	9/12/2012	0.01	U	0.01	U						
Dissolved (ilig/L)	10/22/2012	0.01	U	0.01	U	0.01	U			0.01	U
	9/5/2012	4.99		1.38							
Iron (mg/L)	9/12/2012	4.67		1.62							
	10/22/2012	4.73		1.96		2.35				0.77	
Iron Dissolved	9/5/2012	0.275		0.326							
(mg/L)	9/12/2012	0.186		0.177							
(IIIg/L)	10/22/2012	0.404		0.325		0.115				0.1	U
Lead (mg/L)	9/5/2012	0.0013	U	0.0013	U						
	9/12/2012	0.0013	U	0.00162							
	10/22/2012	0.0013	U	0.00308		0.00275				0.0013	U
Land Dissolved	9/5/2012	0.0013	UB	0.0013	UB						
(mg/I)	9/12/2012	0.0013	UB	0.0013	UB						
(1115/12)	10/22/2012	0.0013	U	0.0013	U	0.0013	U			0.0013	U
	9/5/2012	0.168		0.0221							
Manganese (mg/L)	9/12/2012	0.151		0.0357							
	10/22/2012	0.209	Ν	0.0341	N	0.204	Ν			0.282	Ν
Manganasa	9/5/2012	0.162		0.0228							
Dissolved (mg/L)	9/12/2012	0.11		0.0175							
	10/22/2012	0.181	Х	0.0249	Х	0.203	Х			0.248	Х
Volatile Organic Co	ompounds										
	9/5/2012	72	JY	56	DJY						
Trichloroethene	9/12/2012	83		61							
(µg/L)	10/22/2012	110		76		10				220	D
	10/23/2012							34			
	9/5/2012	6.1		15	D						
1,1-Dichloroethene	9/12/2012	6.5		17							
(µg/L)	10/22/2012	6.7		16		5	U			810	D
	10/23/2012							5	U		
ais 1.0	9/5/2012	28		17	D						
CiS-1,2- Dichloroethene	9/12/2012	29		17							
	10/22/2012	27		18		2.6				12	D
(mg/2)	10/23/2012							1.2			

Table 8. Summary of Groundwater Metals, VOCs, and Dissolved Gases Data for SWMU 211-A

Analyte	Date Collected	MW203	MW204	MW511	MW512	MW513	
1.0	9/5/2012	1 U	2 U				
trans-1,2-	9/12/2012	1 U	1 U				
(ug/L)	10/22/2012	1 U	1 U	1 U		10 U	
(µg/L)	10/23/2012				1 U		
	9/5/2012	2 U	4 U				
Vinyl chloride	9/12/2012	2 U	2 U				
$(\mu g/L)$	10/22/2012	2 U	2 U	2 U		20 U	
	10/23/2012				2 U		
Biological							
Dehaloccoides ethenogenes (cells/mL)	10/22/2012			43 U		17 U	
Dissolved Gases							
	9/5/2012	0.097	0.039				
Ethops (us/L)	9/18/2012	0.02 J	0.022 J				
Ethane (µg/L)	10/22/2012	0.0076 J	0.012 J	0.41		0.33	
	10/23/2012				0.03		
	9/5/2012	0.49	0.1				
Ethopo (ug/L)	9/18/2012	0.034	0.031				
Ethene (µg/L)	10/22/2012	0.026	0.02 J	0.32		0.12	
	10/23/2012				0.01 J		
	9/5/2012	6.8	2.6				
Mathana (ug/L)	9/18/2012	0.31	0.47				
Methane (µg/L)	10/22/2012	0.23	0.16	0.86		1.3	
	10/23/2012				0.48		
Inorganic Anions							
	9/5/2012	120	88				
Chloride (mg/L)	9/12/2012	120	87				
	10/22/2012	110	90	3.9		92	
	9/5/2012	3.6	5.4				
Nitrate (mg/L)	9/12/2012	3.4	5.1				
	10/22/2012	3.1	5.4	3 U		3 U	
	9/5/2012	15	49				
Sulfate (mg/L)	9/12/2012	15	47				
	10/22/2012	17	48	66		22	

Table 8. Summary of Groundwater Metals, VOCs, and Dissolved Gases Data for SWMU 211-A (Continued)

Notes:

1. B—Applies when the analyte is found in the associated blank.

2. D-Compounds identified in an analysis at a secondary dilution filter.

3. J—Indicates an estimated value.

4. N—Sample spike recovery not within control limits.

5. U (inorganics and organics)—Analyte result is less than the reporting limit.

6.

 X—Other specific flags and footnotes may be required to properly define results.
 Y—Matrix spike, matrix spike duplicate and/or relative percent difference failed acceptance criteria. 7.

"---"—signifies sample was not collected. 8.

9. The high reporting limits for MW513 for *trans*-1,2- DCE and VC are due to a $10 \times$ dilution of the sample.



	211-A-010a		1			20°
MW51	211-A-010					North
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l to 76)	10/22/2012	Date	9/5/20	12 9/12/201	2 10/22/2012	
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Metals. Total aluminum was measured at concentrations ranging from lower than the reporting limit of 0.2 mg/L to 0.736 mg/L ("N" qualified) at MW204. Dissolved aluminum concentrations were lower than the reporting limit of 0.2 mg/L.

Total chromium was measured at concentrations ranging from lower than the reporting limit of 0.01 mg/L to 0.284 mg/L at MW204. Dissolved chromium concentrations were lower than the reporting limit of 0.01 mg/L.

Total iron was measured at concentrations ranging from 0.77 mg/L (MW513) to 4.99 mg/L at MW203. Dissolved iron was measured at concentrations ranging from lower than the reporting limit of 0.1 mg/L to 0.326 mg/L at MW204.

Total lead was measured at concentrations ranging from lower than the reporting limit of 0.0013 mg/L to 0.00308 mg/L at MW204. Dissolved lead concentrations were lower than the reporting limit of 0.0013 mg/L.

Total manganese was measured at concentrations ranging from 0.0221 mg/L (MW204) to 0.282 mg/L ("N" qualified) at MW513. Dissolved manganese was measured at concentrations ranging from 0.0175 mg/L (MW204) to 0.248 mg/L ("X" qualified) at MW513.

Biological. *Dhc* was not measured at a concentration greater than the reporting limits of 43 cells/milliliter (cells/mL) in MW511 and 17 cells/mL in MW513. The absence of detectable *Dhc* suggests that reductive dechlorination is not occurring at a high rate under current conditions.

5.4 SWMU 211-A HU HYDROLOGIC ANALYSIS

Both field and laboratory evaluations were performed to assess the ability of the HU1, HU2, and HU3 formations to accept injectate (Appendix F) and to predict the likely injection pressures and flow rates that may be encountered during field implementation of an injection remedy. Table 9 presents the results of the flexible wall permeameter tests and injection tests. One of the geotechnical laboratory tests estimated hydraulic conductivity by use of a flexible wall permeameter test (ASTM D5084-10) performed at nine locations:

- 211-A-012 (10-12 ft bgs), 211-A-012 (23-25 ft bgs), 211-A-012 (38-40 ft bgs)
- 211-A-027 (10-12 ft bgs), 211-A-027 (22.5-24.5 ft bgs), 211-A-027 (38-40 ft bgs)
- MW513 (10-12 ft bgs), MW513 (20-21 ft bgs), MW513 (40-42 ft bgs).

The calculated average hydraulic conductivity values ranged from 5.5E-10 cm/s to 3.8E-7 cm/s.

Injection test results provided estimates of the likely injection pressures and flow rates during performance of an injection-based remedy. MW511, MW512, and MW513 were tested at pressures of 25, 50, 75, and 100 pounds per square inch (psi) while the flow rate was recorded. The injection flow rates and pressures were used as inputs to calculate hydraulic conductivity by the Jacob-Lohman Method, as provided by the U.S. Geological Survey (USGS 2002). The Jacob-Lohman method calculated hydraulic conductivity values ranged from 4.2E-6 cm/s to 8.8E-5 cm/s. Based upon field observations injection pressures in excess of 50 psi and a flow rate greater than 2 gallons per minute (gpm) are not advisable. Pressures greater than 50 psi tended to raise the immediate groundwater level to the ground surface, signifying that the aquifer is over pressurized and will not provide optimum horizontal distribution within the target HU.

Permeameter Test Result Summary							
Boring Location	Hydrologic Unit	Sample Depth Interval (ft bgs)	Average Vertical Hydraulic Conductivity (cm/s)				
211-A-012	HU1	10-12	1.2E-08				
211-A-012	HU2	23-25	3.5E-09				
211-A-012	HU3	38-40	3.8E-09				
211-A-027	HU1	10-12	2.0E-08				
211-A-027	HU2	22-24.5	3.9E-09				
211-A-027	HU3	38-40	4.8E-09				
MW513	HU1	10-12	3.8E-07				
MW513	HU2	20-21	5.5E-10				
MW513	HU3	40-42	1.8E-07				

Table 9. Summary of Hydrologic Unit Hydraulic Conductivities for SWMU 211-A

Monitoring Well	Hydrologic Unit	Injection Pressure (psi)	Average Flow Rate (gpm)	Calculated Horizontal Hydraulic Conductivity (cm/s)
MW511	HU1	25	2.3	8.8E-05
MW511	HU1	50	3.1	4.2E-05
MW511	HU1	75	3.9	2.6E-05
MW511	HU1	100	4.8	1.9E-05
MW512	HU2	25	2.0	2.9E-05
MW512	HU2	50	3.3	1.5E-05
MW512	HU2	75	4.1	9.9E-06
MW512	HU2	100	4.7	7.4E-06
MW513	HU3	25	0.9	1.3E-05
MW513	HU3	50	2.0	6.4E-06
MW513	HU3	75	3.0	4.2E-06

A laboratory evaluation of soil samples was performed to obtain soil grain size distribution (GSD) information (see Appendix F). GSD analyses (ASTM D422) were performed at the following locations:

- 211-A-006 (12-15.5 ft bgs), 211-A-006 (21.3-25 ft bgs), 211-A-006 (40-42.5 ft bgs)
- 211-A-002 (9-13 ft bgs), 211-A-002 (23-26 ft bgs), 211-A-002 (37.4-39 ft bgs)
- 211-A-012 (12-15 ft bgs), 211-A-012 (20-23 ft bgs), 211-A-012 (40-42 ft bgs)
- 211-A-027 (12-15 ft bgs), 211-A-027 (22-25 ft bgs), 211-A-027 (35.5-37 ft bgs)

Overall, the GSD results indicate that injection technologies would be expected to be successful (though limited in rate/pressure due to grain size) at SWMU 211-A.

6. SWMU 211-B RDSI SAMPLE RESULTS

6.1 LITHOLOGY

Soil lithology logs that provide a detailed description of soil type and HU transitions are included in Appendix D. Within the SWMU 211-B investigation area, lithology logs reveal the presence of fill material (gravelly fine sand) to a typical depth of approximately 2 ft, underlain primarily by silt with very fine sand representing HU1 to a typical depth of approximately 20 ft bgs. HU2 was identified from approximately 35 ft bgs and consisted primarily of fine sand and silt with some gravel. HU3 was identified from approximately 35 ft bgs to 60 ft bgs and consisted primarily of silt with fine sand and clay.

6.2 SOIL SAMPLING RESULTS

Nineteen DPT soil boring locations (17 original and 2 contingency) (Figure 5) were performed on the parking lot south of the southeastern portion of the C-720 Building. Collected soil samples were screened approximately every 0.5 ft using a PID to identify intervals of maximum organic vapor response, if present. Soil samples were collected from the 0.5 ft interval of maximum PID reading for each 5-ft soil core and sent by courier to the fixed-base laboratory for overnight VOC analysis. The laboratory preliminary analytical results were available by 8:30 a.m. on Monday for samples collected on the previous Friday and by 8:30 a.m. Tuesday through Friday for samples collected the previous day. The next day laboratory results were used to actively assess whether additional borings were needed based upon a comparison to the RDWP (DOE 2012a) remediation goals. As a result, two contingency borings were completed.

A total of 256 soil samples were collected from 19 soil boring locations. The soil sample VOC results are summarized in Table 10 and presented in Appendix G. Soil sample depths ranged from 0.5 ft bgs to 64.9 ft bgs. The maximum measured TCE result was 13,000 μ g/kg from location 211-B-019 at a depth of 25.1 ft bgs. The observed maximum *cis*-1,2-DCE result was 66 μ g/kg ("J" qualified) collected at soil boring location 211-B-004, at a depth of 14.5 ft bgs. Soil boring location 211-B-019 and 211-B-004 are located centrally in the investigation area and within 35 ft of historical location 720-002 (location with greatest TCE concentrations from the Southwest Plume SI). 1,1-DCE, *trans*-1,2-DCE, and VC were not detected in the collected soil samples above laboratory detection limits. At four borings (21%), the borehole average concentration³ exceeded the remediation goal. A total of 40 soil samples (16%) exceeded the remediation goal exceedances is immediately adjacent to the southern limit of the eastern portion of the C-720 Building.

Figure 8 illustrates all of the soil TCE analyses for the SWMU 211-B investigation area, overlaid on a map. For reference, soil TCE analyses greater than 75 μ g/kg (the borehole average project remediation goal) are noted by yellow highlight. As discussed in Section 5.2, Figure 8 shows the lateral extent of 75 μ g/kg soil TCE (90% confidence limit) and the smaller areas of 75 μ g/kg soil TCE (50% confidence limit) and 1,000 μ g/kg soil TCE (90% confidence limit) for comparison.

³ The average contaminant concentration for a borehole was calculated using one half of the laboratory reporting limit for nondetect analyses and using the greater concentration where analyses of duplicate samples were available.

Station	Date Collected	TCE [µg/kg]	1,1-DCE [µg/kg]	<i>cis</i> -1,2- DCE [µg/kg]	trans-1,2- DCE [μg/kg]	VC [µg/kg]
Groundwater Protection Remediation Goal		75	137	619	5290	570
211-B-001	10/9/2012	197	***	1	***	***
211-B-002	10/10/2012	43	***	***	***	***
211-B-003	10/10/2012	10	***	***	***	***
211-B-004	10/11/2012	418	***	10	***	***
211-B-005	10/15/2012	863	***	6	***	***
211-B-006	10/15/2012	15	***	***	***	***
211-B-007	10/16/2012	4	***	***	***	***
211-B-008	10/9/2012	0.6	***	***	***	***
211-B-009	10/8/2012	2	***	0.3	***	***
211-B-010	10/5/2012	3	***	0.3	***	***
211-B-011	10/8/2012	5	***	***	***	***
211-B-012	10/4/2012	1.0	***	***	***	***
211-B-013	10/4/2012	0.3	***	***	***	***
211-B-015	10/16/2012	39	***	2	***	***
211-B-016	10/17/2012	15	***	0.4	***	***
211-B-017	10/17/2012	25	***	0.6	***	***
211-B-018	10/18/2012	4	***	***	***	***
211-B-019	10/18/2012	1,178	***	4	***	***
211-B-020	10/19/2012	11	***	***	***	***

Table 10. Soils VOC Data (Average Borehole Concentration) for SWMU 211-B

Notes:

- 1. Groundwater Protection Remediation Goals from *Remedial Design Work Plan for Solid Waste* Management Units 1, 211-A, and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE 2012a).
- 2. ***—Indicates average concentration not calculated as all boring analyses were "U" qualified (compound analyzed for but not detected at or below the lowest concentration reported) for specific VOC.
- 3. For "U" qualified analyses, a value of one half the concentration reported was used in calculating the average borehole concentration.
- 4. Yellow shading and bold text indicates an exceedance of Groundwater Protection Remediation Goals.
- 5. Soil boring 211-B-014 was collected and archived. Boring was not logged or screened for VOC impacts.

Sample Date Sample Depth TCE 3 0.41 U	*	C-720 Building
211-B-001 Sample Date Sample Depth 4.9 27 8.5 78 10.5 150 (10.5)DUP 100 19.5 91 23 1,700 23.1,700 35.5 23.1,700 35.5 23.1,700 35.5 23.1,700 35.5 23.1,700 35.5 23.1,700 35.5 23.1,700 25.1 10/10/2012 34 44 310 49.5 61 53 84 55.5 24 60.5 1.2.1 Average 197 211:B:001 20.5 ND 26.0/27.0 20.5 ND 26.0/27.0 200 45.5 20.5 20.5 ND 26.0/27.0 200 45.5 20.5 56.5/58.5 ND Average 110	211-B-003 211-B-015 Sample Date Sample Depth TCE 4 0.41 U 3 1.6 J 9 0.41 U 3 1.6 J 14.5 1 J 1.5.1 2.2 J 19.5 0.46 J 1.3.5 4.9 J 19.5 0.46 J 1.5.1 2.2 J 19.5 0.46 J 1.5.1 2.2 J 19.5 0.46 J 1.5.1 1.7 23 0.35 U 29.5 1.20 28.5 0.33 U 30.5 5.4 J 39 17 41.5 37 40.5 19 48.5 17 52 61 56 42 58.5 9.1 56 42 60.5 67 Average 39 211-B-003	211-B-016 Sample Date Sample Depth TCE 1 0.43 U 5.1 0.43 U 14 7.7 J (16) DUP 0.33 U 16 3 J 21.5 19 29.5 23 10/17/2012 33.5 16 36.5 18 43.5 23 48.5 31 50.1 42 55.1 20 60.1 4.3 J Average 15 215B2016 215
201-B-017 Sample Date Sample Depth 4 6.1 J 8 26 14 28 16 13 23.5 13 29.9 16 30.5 39 35.1 8.9 J 44.5 120 48 37 56 3.4 J 62.5 0.38 U Average 25		
211-B-018 211-B-018 Sample Date Sample Depth TCE 3.5 2.5 J 4.9 3.3 J 14 0.59 J 19.5 0.36 U 21 28 10/18/2012 30.1 30.1 2.2 J 37.5 1.9 J 40.5 2 J 47.5 0.37 U 53.5 0.46 U 58 0.38 U 60.1 0.82 U Average 4.2	211-B-009 Sample Date Sample Depth TCE 4 5 14.5 16 8.4.1 22 0.38 U 28.5 1.9 J (34.5)DUP 0.46 U	720-022 ⊕ 211-B-020 Sample Date 2
 Soil Boring Location with Average Soil Concentration Exceeding TCE Remediation Goal Soil boring location with Average Soil Concentration Less than TCE Remediation Goal Archive Core Soil Boring Location - Not Sampled Historic Soil Boring Location with Average Soil Concentration Exceeding TCE Remediation Goal Historic Soil Boring Location with Average Soil Concentration Less than TCE Remediation Goal Historic Soil Boring Location with Average Soil Concentration Exceeding TCE Remediation Goal Historic Soil Boring Location with Average Soil Concentration Less than TCE Remediation Goal Historic Archive Core Soil Boring Location - Not Sampled Monitoring Well Location (screen interval ft BLS) 	10/8/2012 34.5 0.4 U 36 0.35 U 44 0.41 U 49.5 0.41 U 51.5 0.39 U 59.5 0.41 U 62 0.4 U Average 2.0 211-B-010 Sample Date Sample Date	10/19/2012 720-012 ⊕ 211-B-011 Samela Data Samela Data
Area defined by 90% Confidence Level TCE Concentrations greater than 1,000 μg/kg Area defined by Nominal (50%) Confidence Level TCE Concentrations greater than 75 μg/kg Area defined by 90% Confidence Level TCE Concentrations greater than 75 μg/kg General RDSI Sample Area SWMU 211-B Groundwater Protection Remediation Goals Parameter Abbreviation UCRS Soil Cleanup Level (µg/kg) Trichloroethene TCE 75 00% CL 1000 90% CL 1000 600	$10/5/2012 \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
 Results are presented in microgram per kilogram (µg/kg). Sample depth is presented in feet below land surface (ft BLS). DUP indicates duplicate sample. J indicates an estimated value. U indicates compound analyzed for but not detected at or below the lowest concentration reported. ND indicates non-detect. Yellow shaded, bold text indicates an exceedance of the Groundwater Protection Remediation Goal Soil Cleanup Level for Trichloroethene (TCE) of 75 µg/kg. TCE isopleths are based upon individual soil sample results over all depths of sampling. Section 7 of the Final Characterization Report includes explanation of the modeling conducted to establish the TCE contours based upon confidence levels. 	Average 3.0	04.9 2J Average 4.5

10. Source of 2009 Aerial: Williams Aerial & Mapping, Inc.



TOC results for SWMU 211-B ranged from lower than the reporting limit of 33 mg/kg to 670 mg/kg with an average concentration of 500 mg/kg. TOC sample results are presented in Table 11.

Station	Date Collected	Sample Top Depth [ft bls]	Sample Bottom Depth [ft bls]	Hydrogeologic Unit	TOC [mg/kg]
	10/9/2012	9.5	9.5	HU1	430
211-B-001		18.5	18.5	HU2	460
		39	39	HU3	380
211-B-004	10/11/2012	5.5	5.5	HU1	620
		22.3	22.3	HU2	33 U
		38	38	HU3	450
211-B-007	10/16/2012	9	9	HU1	670
		27.5	27.5	HU2	240
		43	43	HU3	750

Table 11. Summary of Soils TOC Data for SWMU 211-B

6.3 GROUNDWATER SAMPLE RESULTS

Groundwater samples were collected from MW217, MW218, MW515, and MW516 (all UCRS wells) in September and October 2012. Collected groundwater samples were analyzed for VOCs, alkalinity, total and dissolved metals, ferrous iron, major anions, and dissolved gasses. Additionally, MW515 and MW516 samples were analyzed for *Dhc*. Groundwater sample results are presented in Table 12 and summarized below.

VOCs. TCE was measured at concentrations ranging from lower than the reporting limit of 1 μ g/L to 120 μ g/L at MW218 (UCRS). Previous TCE analyses in MW218 range from 59 μ g/L to 280 μ g/L. No RGA wells are present for comparison at SWMU 211-B. *cis*-1,2-DCE was measured at concentrations ranging from lower than the reporting limit of 1 μ g/L to 2.2 μ g/L at MW218. 1,1-DCE, *trans*-1,2-DCE, and VC were not detected above individual laboratory detection limits. The presence of *cis*-1,2-DCE suggests that some biologically mediated reductive dechlorination is occurring in the groundwater at SWMU 211-B. Groundwater VOC sample results are displayed in Figure 7.

Dissolved Gases. Methane concentrations ranged from 0.056 μ g/L ("J" qualified) at MW218 to 35 μ g/L (MW515). Ethane concentrations ranged from 0.0093 μ g/L ("J" qualified) at MW217 to 7.9 μ g/L (MW515). Ethane concentrations ranged from 0.013 μ g/L ("J" qualified) at MWs MW218 and MW516 to 25 μ g/L (MW515). The production of methane in groundwater is an indicator that conditions exist that are suitable for reductive dechlorination. Ethene is the final dechlorination product of TCE, while ethane is the product of ethene reduction. The presence of ethene/ethane is a possible indication that reductive dechlorination is proceeding to completion in the groundwater at SWMU 211-B.

Inorganic Anions. Chloride was measured at concentrations ranging from 150 mg/L (MW217) to 340 mg/L (MW218). Nitrate was measured at concentrations ranging from lower than the reporting limit of 3 mg/L to 3 mg/L at MW516. Sulfate was measured at concentrations ranging from 4.8 mg/L (MW217) to 40 mg/L (MW218). The nitrate and sulfate (electron acceptors) concentrations present are not at levels that would be anticipated to hinder the reductive dechlorination pathway. Additionally,

Analyte	Date Collected	MW2	17	MW2	218	MW515	;	MW516	j
Total and Dissolv	ed Metals			•		•			
Aluminum (mg/L)	9/5/2012	0.647		4.48					
	9/12/2012	0.2	U	2.46					
	10/22/2012							0.202	Ν
	10/23/2012	0.237	Ν	4.61	Ν	8.49	Ν		
	9/5/2012	0.2	U	0.2	U				
Aluminum,	9/12/2012	0.2	U	0.2	U				
Dissolved (mg/L)	10/22/2012							0.2	U
	10/23/2012	0.2	U	0.2	U	0.281			
	9/5/2012	0.01	U	0.01	U				
Chromium	9/12/2012	0.01	U	0.01	U				
(mg/L)	10/22/2012							0.131	
	10/23/2012	0.01	U	0.01	U	0.0137			
	9/5/2012	0.01	U	0.01	U				
Chromium,	9/12/2012	0.01	U	0.01	U				
Dissolved (mg/L)	10/22/2012							0.01	U
	10/23/2012	0.01	U	0.01	U	0.01	U		
	9/5/2012	0.354		0.437					
	9/12/2012	0.1	U	0.462					
Iron (mg/L)	10/22/2012							0.605	
	10/23/2012	0.153		0.515		9.79			
	9/5/2012	0.1	U	0.1	U				
Iron, Dissolved	9/12/2012	0.1	U	0.1	U				
(mg/L)	10/22/2012							0.1	U
	10/23/2012	0.1	U	0.1	U	0.139			
	9/5/2012	0.00262		0.00241					
Lood (mg/L)	9/12/2012	0.0013	U	0.00213					
Leau (Ing/L)	10/22/2012							0.0013	U
	10/23/2012	0.0013	U	0.00233		0.0106		-	
	9/5/2012	0.0013	UB	0.0013	UB				
Lead, Dissolved	9/12/2012	0.0013	UB	0.0013	UB				
(mg/L)	10/22/2012							0.0013	U
	10/23/2012	0.0013	U	0.0013	U	0.0013	U		
	9/5/2012	1.43		0.0204					
Manganese	9/12/2012	0.806		0.0167					
(mg/L)	10/22/2012							0.108	Ν
	10/23/2012	0.826	N	0.0356	Ν	0.32	Ν		
	9/5/2012	0.404		0.005	U				
Manganese,	9/12/2012	0.605		0.005	U				
Dissolved (mg/L)	10/22/2012							0.127	Х
	10/23/2012	0.746	Χ	0.00664	Х	0.17	Х		

Table 12. Summary of Groundwater Metals, VOCs, and Dissolved Gases Data for SWMU 211-B
Analyte	Date Collected	MW2	17	MW2	218	MW515	;	MW516		
Volatile Organic	Compounds									
	9/5/2012	1	UJY	72	DJY					
Trichloroethene	9/12/2012	1	U	87						
(µg/L)	10/22/2012							8.9		
	10/23/2012	1	U	120		2	U			
	9/5/2012	5	U	10	UJ					
1,1- Dishlaraathana	9/12/2012	5	U	5	U					
(ug/I)	10/22/2012							5	U	
(µg/L)	10/23/2012	5	U	5	U	10	U			
	9/5/2012	1	U	2.1	DJ					
CIS-1,2-	9/12/2012	1	U	2.2						
$(\mu g/I)$	10/22/2012							1	U	
(µg/L)	10/23/2012	1	U	2.1		2	U			
	9/5/2012	1	U	2	UJ					
trans-1,2-	9/12/2012	1	U	1	U					
Dichloroethene	10/22/2012							1	U	
(µg/L)	10/23/2012	1	U	1	U	2	U			
	9/5/2012	2	U	4	UJ					
Vinyl chloride	9/12/2012	2	U	2	U					
(µg/L)	10/22/2012							2	U	
	10/23/2012	2	U	2	U	4	U			
Biological										
Dehaloccoides enthenogenes	10/22/2012							25	U	
(cells/mL)	10/23/2012					35	U			
Dissolved Gases										
	9/5/2012	0.11		0.18						
Ethere (up/L)	9/18/2012	0.024	J	0.013	J					
Ethane (µg/L)	10/22/2012							0.013	J	
	10/23/2012	0.015	J	0.025	U	25				
	9/5/2012	0.14		0.24						
Etherne (, , , /I)	9/18/2012	0.039		0.021	J					
Ethene ($\mu g/L$)	10/22/2012							0.023	J	
	10/23/2012	0.0093	J	0.027		7.9				
	9/5/2012	6.5		2.4						
Mathema (9/18/2012	0.75		0.18						
Methane ($\mu g/L$)	10/22/2012							0.52		
	10/23/2012	0.52		0.056	J	35				

Table 12. Summary of Groundwater Metals, VOCs, and Dissolved Gases Data for SWMU 211-B (Continued)

Analyte	Date Collected	MW217	MW218	MW515	MW516
Inorganic Anions					
	9/5/2012	160	340		
Chlorida (mg/L)	9/12/2012	160	330		
Chionae (hig/L)	10/22/2012				300
	10/23/2012	150	340	160	
	9/5/2012	3 U	3 U		
Nitroto (ma/L)	9/12/2012	3 U	3 U		
Nitrate (ing/L)	10/22/2012				3
	10/23/2012	3 U	3 U	3 U	
	9/5/2012	5.6	39		
Sulfate (mg/L)	9/12/2012	4.8	39		
	10/22/2012				6.4
	10/23/2012	39	40	22	

Table 12. Summary of Groundwater Metals, VOCs, and Dissolved Gases Data for SWMU 211-B (Continued)

Notes:

- 1. B—Applies when the analyte is found in the associated blank.
- 2. D—Compounds identified in an analysis at a secondary dilution filter.
- 3. J—Indicates an estimated value.
- 4. N—Sample spike recovery not within control limits.
- 5. U (inorganics and organics)—Analyte result is less than the reporting limit.
- 6. X—Other specific flags and footnotes may be required to properly define results.
 - Y-Matrix spike, matrix spike duplicate and/or relative percent difference failed
- 7. acceptance criteria.
- 8. "---"—signifies sample was not collected.

sulfate is not present at an elevated concentration that has the potential to result in sulfide concentrations that are toxic to dechlorinating microorganisms.

Metals. Aluminum was measured at concentrations ranging from lower than the reporting limit of 0.2 mg/L to 8.49 mg/L ("N" qualified) at MW515. Dissolved aluminum concentrations were lower than the reporting limit of 0.2 mg/L to 0.281 mg/L at MW515.

Chromium was measured at concentrations ranging from lower than the reporting limit of 0.01 mg/L to 0.131 mg/L at MW516. Dissolved chromium concentrations were lower than the reporting limit of 0.01 mg/L.

Iron was measured at concentrations ranging from lower than the reporting limit of 0.1 mg/L to 9.79 mg/L at MW515. Dissolved iron was measured at concentrations ranging from lower than the reporting limit of 0.1 mg/L to 0.139 mg/L at MW515.

Lead was measured at concentrations ranging from lower than the reporting limit of 0.0013 mg/L to 0.0106 mg/L at MW515. Dissolved lead concentrations were lower than the reporting limit of 0.0013 mg/L.

Manganese was measured at concentrations ranging from 0.0167 mg/L (MW218) to 1.43 mg/L at MW217. Dissolved manganese was measured at concentrations ranging from lower than the reporting limit of 0.005 mg/L (MW204) to 0.746 mg/L ("X" qualified) at MW217.

Biological. *Dhc* was not measured at concentrations greater than the reporting limit of 35 cells/mL for MW515 and 25 cells/mL for MW516. The absence of detectable *Dhc* suggests that reductive dechlorination is not occurring at a high rate under current conditions.

6.4 SWMU 211-B HU HYDROLOGIC ANALYSIS

Both field and laboratory evaluations were performed to assess the ability of the HU1, HU2, and HU3 formations to accept injectate (Appendix F) and to predict the likely injection pressures and flow rates that may be encountered during field implementation of an injection remedy. Table 13 presents the results of the flexible wall permeameter tests and injection tests. One of the geotechnical laboratory tests estimated hydraulic conductivity by use of a flexible wall permeameter test (ASTM D5084) performed at nine locations:

- 211-B-001 (5-7 ft bgs), 211-B-001 (15-17 ft bgs), 211-B-001 (32-37 ft bgs)
- 211-B-004 (8-10 ft bgs), 211-B-004 (18-20 ft bgs), 211-B-004 (38-40 ft bgs)
- MW516 (10-12 ft bgs), MW516 (25-26 ft bgs), MW516 (40-42 ft bgs)

The calculated average hydraulic conductivity values ranged from 1.6E-9 cm/s to 3.3E-6 cm/s.

Injection test results provided estimates of the likely injection pressures and flow rates during performance of an injection-based remedy. MWs MW514, MW515, and MW516 were tested at pressures of 25, 50, 75, and 100 psi and the flow rate was recorded. The injection flow rates and pressures were used as inputs for hydraulic conductivity calculation by the Jacob-Lohman Method, provided by the U.S. Geological Survey (USGS 2002). The Jacob-Lohman method calculated hydraulic conductivity values ranged from 8.8E-6 cm/s to 1.3E-4 cm/s. A viable injection pressure was not determined conclusively based on the tests conducted at these locations. The groundwater elevation increased on multiple instances during injection testing; however, the water level elevation decreased significantly after completion of the test and prior to the start of the next test. Based on this observation, it is suspected that the bentonite seal between the nested well screens did not provide an effective seal resulting in a preferential path for pressure stress, artificially increasing groundwater levels during testing. If required, future injection efforts should consider the use of direct push injection, as opposed to nested well injection. Injection by DPT tends to create a better seal with the borehole, decreasing the chance of injection fluid making its way to the ground surface. Using the direct push injection method and the injection test data, a flow rate of approximately 2.4 gpm at a pressure of 50 psi should provide effective distribution of injectate among the HU1, HU2, and HU3 formations at SWMU 211-B.

A laboratory evaluation of soil samples was performed to obtain soil GSD information (see Appendix F). GSD analyses (ASTM D422) were performed at the following locations:

- 211-B-007 (8-12 ft bgs), 211-B-007 (27.5-31.5 ft bgs), 211-B-007 (42.5-44 ft bgs)
- 211-B-004 (5-7.5 ft bgs), 211-B-004 (21.1-23.5 ft bgs), 211-B-004 (36-38 ft bgs)
- 211-B-001 (8-10 ft bgs), 211-B-001 (18-20 ft bgs), 211-B-001 (38-40 ft bgs)

Overall, the GSD results indicate that injection technologies would be expected to be successful (though rate/pressure limited due to grain size) at SWMU 211-B.

	Permeameter Test Result Summary												
Boring Location	Hydrologic Unit	Sample Depth Interval (ft bgs)	Average Vertical Hydraulic Conductivity (cm/s)										
211-B-001	HU1	5-7	3.8E-08										
211-B-001	HU2	15-17	3.3E-06										
211-B-001	HU3	32-37	1.9E-09										
211-B-004	HU1	8-10	4.8E-07										
211-B-004	HU2	18-20	1.6E-09										
211-B-004	HU3	38-40	2.5E-09										
MW516	HU1	10-12	9.2E-07										
MW516	HU2	25-26	4.6E-08										
MW516	HU3	40-42	1.1E-07										

E.

Table 13. Summary of Hydrologic Unit Hydraulic Conductivities for SWMU 211-B

	Injection Test Result Summary												
Monitoring Well	Hydrologic Unit	Injection Pressure (psi)	Average Flow Rate (gpm)	Calculated Horizontal Hydraulic Conductivity (cm/s)									
MW514	HU1	25	2.3	1.3E-04									
MW514	HU1	50	2.4	6.7E-05									
MW514	HU1	75	3.1	4.2E-05									
MW514	HU1	100	3.4	3.3E-05									
MW515	HU2	25	1.9	3.9E-05									
MW515	HU2	50	2.8	1.8E-05									
MW515	HU2	75	3.7	1.2E-05									
MW515	HU2	100	4.5	8.8E-06									
MW516	HU3	25	1.9	4.6E-05									
MW516	HU3	50	3.1	2.4E-05									
MW516	HU3	75	3.3	1.6E-05									
MW516	HU3	100	4.2	1.2E-05									

7. SWMU 211-A DATA EVALUATION AND ASSESSMENT

Data collected during the RDSI further delineated the magnitude and areal and vertical extents of TCE and other VOC contamination in SWMU 211-A within the Southwest Plume source areas. The results of the RDSI and previous investigations of the SWMU 211-A area indicate that soils containing VOC contamination are located within the subsurface north of the northeast corner of the C-720 Building Area. The highest level of TCE (4,800 µg/kg) detected during the RDSI was at a depth of 47.5 ft bgs (211-A-036), with low-levels of cis-1,2-DCE (77 µg/kg) and 1,1-DCE (3,300 µg/kg) also detected. Sample location 211-A-036 is located approximately 240 ft north by northwest of the previous investigation maximum concentration (8,100 µg/kg TCE at 30 ft depth in location 720-027 from the WAG 27 RI). RDSI soil locations from this investigation in close proximity to historical soil sample location 720-027 are 211-A-010 and 211-A-017, with 211-A-017 having the greatest TCE concentration of 1,600 µg/kg at 30.1 ft bgs. Among the Southwest Plume SI borings in the SWMU 211-A area, TCE levels were highest in location 720-005 (980 µg/kg at 46 ft depth) (DOE 2007). Overall results from the soil samples indicate that dehalogenation (i.e., degradation of parent VOCs to daughter products such as TCE degrading to cis-1,2-DCE and VC) is occurring. Of the 542 soil samples collected for VOC analysis during the RDSI, 316 samples have a TCE detection, 196 samples have a 1,1-DCE detection, 189 samples have a cis-1,2-DCE detection, no samples have a trans-1,2-DCE detection, and 23 samples have a VC detection. Groundwater analysis results also support that TCE degradation is occurring.

Results of the UCD soil samples from the RDSI and historical data were used to create a three-dimensional contamination model using the software Environmental Visualization Systems Expert System (EVS-ES). A five-layer geologic model was used for modeling soil contamination. Analytical results from this investigation and all historical soil TCE data for the SWMU 211-A investigation area in the OREIS, shown in Figure 6, were log processed in the model. The Horizontal/Vertical Anisotropy Ratio parameter, which allows the model to take into consideration expected differences in fluid flow through the soil matrix, was set to a value of 1.5. The Octant Search method was used to determine which sample points are selected for inclusion in the kriging matrix. This method sets a maximum number of points for each octant, which helps offset bias effects of sampling distribution irregularities. The model used a soil density of 1.4 g/cc and a chemical density of 1.46 g/cc. The SWMU 211-A soil impacted greater than 75 μ g/kg of TCE based upon a 90% confidence level that is estimated to have an areal extent of 34,000 ft². The mass of TCE in the SWMU 211-A soil impacted greater than 75 μ g/kg soil TCE (90% confidence limit) for comparison. These extents define distinct east and west areas of TCE contamination.

Figure 9 shows a cross-section through the locations of the greatest magnitude concentrations. The TCE isopleths depicted in Figure 9 show a predominance of TCE impacts in the western portion of the cross-section in the 25 to 50 ft bgs depth interval. A sensitivity analysis was performed. The sensitivity analysis utilized a range of values to evaluate the area of VOC impacts and volume present. The volume/mass estimates range from 0.2 gal/1 kg to 2.2 gal/12 kg for a range of 10% to 90% confidence level with a volume/mass of 0.7 gal/4 kg for the 50% confidence level. A CD containing viewable three-dimensional model EVS-ES files and supporting calculations and technical details are included in Appendices B and C.

There are two areas with soil remediation goal exceedances that are defined by the areal distribution of soil boring locations with depth-average TCE concentration greater than 75 μ g/kg. Although there are 1,1-DCE exceedances, their location is less extensive and coincides with TCE exceedances. The western area (defined by borings 211-A-004, 211-A-005, 211-A-028, 211-A-029, 211-A-033, 211-A-035, and



211-A-036) covers approximately 15,900 ft² (based upon 50% nominal 75 μ g/kg isocontour) laterally with a depth interval of 6 ft bgs to 64 ft bgs. The eastern area (defined by borings 211-A-002, 211-A-010, 211-A-017, 211-A-020, and 211-A-025) covers approximately 15,000 ft² (based upon 50% nominal 75 μ g/kg isocontour) laterally with a depth interval from 6.5 ft bgs to 65.1 ft bgs.

Overall, FCR findings tend to be consistent with the current CSM regarding the depth and magnitude of VOC soil contamination; however, the horizontal location of the greatest TCE soil impact (potential source area) does not align with previous SI findings. The current CSM assumes the TCE source area is located near soil sample location 720-027 (DOE 1999) (see Figure 4). During performance of the RDSI, the greatest magnitude TCE concentration was located at soil sample location 211-A-036, which indicates that an additional TCE source also is located west of soil sample location 720-027. A number of depth-averaged TCE concentration soil boring locations lower than 75 μ g/kg were installed between historical location 720-027 and 211-A-036 indicating separate source areas. The information presented in this FCR indicates that the area of TCE source-based mass for the 211-A site is larger than previously assumed.

8. SWMU 211-B DATA EVALUATION AND ASSESSMENT

RDSI results and those of previous investigations of the SWMU 211-B area indicate that soils containing low-levels of VOC contamination are present in the subsurface at the southeast corner of the C-720 Building Area (Figure 8). The greatest TCE soil concentration (13,000 μ g/kg) detected during this investigation was at 25.1 ft bgs (211-B-019), which is approximately 10 ft west of the previous investigation maximum concentration (68,000 μ g/kg) location (720-002 at 20 ft depth). Another soil location from this investigation in close proximity to 720-002 is 211-B-005, with a maximum TCE concentration of 3,100 μ g/kg at a depth of 23 ft bgs. Overall results from the soil samples indicate that dehalogenation likely is occurring at SWMU 211-B. Of the 245 soil samples collected for VOC analysis during the RDSI, 171 samples have a TCE detection and 27 samples have a *cis*-1,2-DCE detection. Groundwater analysis results also support this finding. The TCE soil isopleths depicted in Figure 10 show that the mass present is predominantly located in HU2, with limited low-level detections below HU3 (near the RGA).

Overall, RDSI VOC results at SWMU 211-B trend to be consistent with the previous CSM. The lateral location, vertical location, and magnitude of the greatest magnitude TCE impacts align with previous SI findings. Data available at SWMU 211-B are sufficient to provide a foundation for selection of an appropriate remedial technology to address VOC-impacted groundwater.

As at SWMU 211-A, results of the UCD soil samples from this investigation and historical data were used to create a three dimensional model (using EVS-ES) to represent SWMU 211-B soil impacts. A fivelayer geologic model was used for modeling soil contamination. Soil analytical results from this investigation, shown in Figure 8, were log-processed in the model. As at SWMU 211-A, the Horizontal/Vertical Anisotropy Ratio parameter was set to 1.5. The Octant Search method was used to determine which sample points are selected for inclusion in the kriging matrix. The model used a soil density of 1.4 g/cc and a chemical density of 1.46 g/cc. The SWMU 211-B soil impacted greater than 75 µg/kg of TCE is estimated to be 3,213 bcy. The mass of TCE in the SWMU 211-B soil impacted greater than 75 µg/kg is estimated to be 5 kg (0.8 gal) at a 90% confidence level. The mass and volume estimates do not extrapolate the area beneath the C-720 Building. Additional TCE impacts mass may be present beneath the C-720 building, but the purpose of this FCR is to select a remedy for accessible soil contamination. Figure 8 also shows the smaller areas of 75 µg/kg soil TCE (50% confidence limit) and 1,000 µg/kg soil TCE (90% confidence limit) for comparison. A sensitivity analysis was performed. The volume/mass estimates range from 0.1 gal/0.6 kg to 0.8 gal/4 kg for a range of 10% to 90% confidence level with a volume/mass of 0.3 gal/2 kg for the 50% confidence level. A CD containing viewable threedimensional model EVS-ES files and details regarding the sensitivity analysis are included in Appendices B and C.

The area potentially requiring treatment is defined by the areal distribution of soil boring locations with depth-average TCE concentration greater than 75 μ g/kg. The area (defined by borings 211-B-001, 211-B-004, 211-B-005, and 211-B-019) covers approximately 3,000 ft² (at a 90% source volume confidence level) laterally with a depth interval of 8.5 ft bgs to 64.5 ft bgs (approximate volume of 6,200 bcy).

As similarly stated in the SWMU 211-A section, RDSI data indicate that soil VOC concentrations are decreasing over time, based on natural processes.



Figure 10. SWMU 211-B Cross-Section with TCE Isopleths and Hydrologic Unit

9. CONCLUSION

This FCR presents the results of the RDSI for SWMUs 211-A and 211-B, which were outlined in the *Remedial Design Work Plan for Solid Waste Management Units 1, 211-A, 211-B, Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2012a). The RDSI was performed to better determine the lateral and vertical extent and distribution of VOCs and source material in the Southwest Plume source areas and to determine soil and groundwater parameters, including geochemical parameters, at each of the SWMUs to be used to design *in situ* bioremediation, if this alternative is selected. The results of this RDSI provide the data necessary for identifying the areas to be treated and selecting the remedies at SWMUs 211-A and 211-B.

The selected remedy, as identified in the ROD for SWMUs 211-A and 211-B pending this final characterization of source extent and magnitude, is *in situ* source treatment using enhanced *in situ* bioremediation with LUCs (Alternative 8) or long-term monitoring with interim LUCs (Alternative 2).

SWMU 211-A. Data collected during the RDSI further delineated the magnitude and areal and vertical extents of TCE and other VOC contamination at SWMU 211-A. As during previous investigations, RDSI results indicate that soils containing VOC contaminations are located at the northeast corner of the C-720 Building Area. However, the highest level of TCE (4,800 μ g/kg) detected during the RDSI was at sample location 211-A-036, which is located approximately 240 ft west of the previous investigation maximum concentration (8,100 μ g/kg TCE) location (720-027 at 30-ft depth). The SWMU 211-A soil volume impacted greater than the remediation goal of 75 μ g/kg of TCE is estimated to be 29,000 bcy with an areal extent of 34,000 ft² (using both the RDSI data and all historical soil TCE data for the SWMU 211-A investigation area in OREIS). Approximately 2.2 gal (12 kg) of TCE at a 90% confidence level is estimated to be present.

As part of the hydrologic analysis to assess the ability of the HU1, HU2, and HU3 formations to accept injectate at suitable pressures and flow rates, soil conditions at SWMU 211-A appear to be consistent with the requirements associated with an injection-dependent technology.

Overall results from the RDSI indicate that limited dehalogenation (i.e., degradation of parent VOCs to daughter products such as TCE degrading to *cis*-1,2-DCE and VC and 1,1,1-TCA to 1,1-DCE) is occurring at SWMU 211-A.

SWMU 211-B. The lateral location, vertical location, and magnitude of the greatest magnitude TCE impacts align with the current CSM. RDSI results at SWMU 211-B indicate that soils containing VOC contamination are present in the subsurface at the southeast corner of the C-720 Building Area. VOC concentrations are decreasing over time. RDSI soil data indicate that dehalogenation likely is occurring, but is inhibited at SWMU 211-B. The SWMU 211-B soil impacted greater than the remediation goal of 75 μ g/kg of TCE is estimated to be 3,213 bcy (using both RDSI data and all historical soil TCE data for the SWMU 211-B investigation area in OREIS). The mass of TCE in the SWMU 211-B soil impacted at TCE concentrations greater than 75 μ g/kg and accessible for possible treatment is estimated to be 5 kg (0.8 gal) at a 90% confidence level.

The hydrologic analysis to assess the ability of the HU1, HU2, and HU3 formations to accept injectate at suitable pressures and flow rates indicate that soil conditions at SWMU 211-B are consistent with the requirements associated with an injection dependent technology; however, the anticipated maximum injection flow rates likely would be low making resulting in challenges for effective substrate delivery. Overall results from the RDSI indicate that limited dehalogenation (i.e., degradation of parent VOCs to daughter products such as TCE degrading to *cis*-1,2-DCE) is occurring at SWMU 211-B.

10. REFERENCES

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APPENDIX A

MONITORING WELL CONSTRUCTION LOGS



	Ceg	C	H		5		Soil Boring Log	1							
Ducia		thurset T				UD INC	Doring Logation, MW 511/MW 512								
Date	Drilled	$\frac{11West F}{8/24/1}$	7	JSI – I	C-720	Normeast	Sampling Method: Dual Tube								
Date	Comple	ted: 8/2	27/12				Surface Elevation:								
Drilli	ng Metl	10d: 6.2	5" ID H	ISAs			Total Depth: 44.5								
Drilli	ng Com	pany: (Chase Er	ivironi	nental	l Group	Logged By: Ken Davis, LATA of Kentucky								
DEPTH feet	SAMPLE NUMBER	BLOW COUNT 6"	PID mqq	REC	FORMATION		GEOLOGIC DESCRIPTION								
0.0						Dark Gray to	> Light Brown Silty GRAVEL w/organics								
2.5						Dark Gray to Light Brown Silty GRAVEL w/organics Light Brown to Dark Gray SILT, Soft, Moist									
15.2						Reddish Yellow to Light Gray Gravely Fine SAND grading to SILT, Soft to Dense, Moist									
21.5						Light Gray to Pale Brown Fine SAND w/GRAVEL, Hard, Moist									
35.2						White to Red	ldish Yellow Silty Fine SAND, Soft, Moist								
44.5						No Refusal -	- Boring Terminated @ 44.5 in SAND As Above.								

	UNIFORM KENTUCKY WELL CONSTRUCTION RECORD															
				Use this f	form to rep	ort installation of	of monitoring	g or water w	ells.							
			Form must be	completed as	nd submitte	ed to the Divisio	n of Water w	vithin 60 da	ys of well	l completio	n.					
						See instructions	below.									
				One	copy to ov	wner and one co	py to drillerá	's files.								
OwnerN	Jama(*)	United	Statas Dapartma	nt of Enorg												
Owner F	Valle()	Jonned	States Departme		ly											
(*)	list Ivanie	NA		Ow	mer Last	Name(*) NA										
Owner A	Address(*)	5600 H	obbs Road													
Owner C	City(*)	West P	aducah St	ate(*) Ke	ntucky	• Or	wner Zip(*)	42086								
Owner P	Phone(*)	270-441	-6800	Owner	eMail											
Site Nam	ne(*)	Paduca	h Gaseous Diffu	sion Plant										Kentucky Well ID		
Site Add	lress(*)	5600 H	obbs Road				-							(AKGWA) Number	8006-5911	
Site City	(*)	West P	aducah St	ate(*) Ke	ntucky	- Sit	e Zip(*) 4	2086						Owner Well ID	MW-511	_
Site Phor	ne	270-441	-6800	Site eM	ail									Work Start Date(*)	08/24/2012	
Well Lat	itude(*)						_							Work End Date(*)	08/27/2012	
DMS to	DD Convert	37.1 ter	14	Well Long	itude(*)	-88.815	Meth	od(*) Ma	ap Grade	e GPS - Di	tterentially C	orrected	4	Total depth (ft)(*)	17.0	
Agency In	nterest (AI) 1	Number	3059	Facility	Гуре & П	CERCLA	-			_				Depth to bedrock (ft)		
USGS To	opo Map(*)	HE	ATH	-n *	T	County(*)		McCra	cken	T				Static water level (ft)		-
Surface el	levation (ft)	370				Elevation de	termined b	y Topog	raphic ma	ap interpo	olation - digiti	zed 💌		SWL method(*)	Undetermined	
Physiogra	phic Region	(*) Jac	kson Purchase	•		Well Use(*)		Monito	ring well	- complia	nce	•		surface (in)		
Drilling N	fethod(*)	Auç	ger - hollow stem		-	Well Status	(*)	active			-		-	WATER WELLS ON	LY	
Wellhead	(*)	Loc	king Cap 💌			Well Condit	ion(*)	Functio	oning pro	operly 💌				Estimated well yield		
Casing / C	From dept	ole h (ft)(*)	To depth (ft)(*)	Borehole	diameter	(in)(*) Casing	diameter (i	n)(*) Casi	ng type(*)				Well service (# of		<u> </u>
Delete	0		10.0	10.5		2		Ste	el - stainl	less	•			people served)		
Delete	15.0		17.0	10.5		2		Ste	el - stainl	less				Disinfectant amount		
Add New	v													Pitless adapter		
Screen					Borehole	e diameter (in)	Screen d	liameter (i	n)(*)			Screen sl	ot	installed		
Fr	om depth (ft	t)(*)(*)	To depth (ft)	*)(*)	(*)(*)		(*)		Solution Sector	creen Tyj	pe(*)(*)	size(*)(*)		Pump installed	 	
Delete 10	0.0		15.0		10.5		2		S	Steel - stai	nless	▼ 0.010		Apparent quality and	odor:	
New														Appearance		
Annulus f	ill and seal													Odor Type	-	
Delete	Section(*)	Fro	m depth (ft)(*)	To de	epth (ft)(*	*) Ma	terial(*)							Odor-Level	_	
Delete	Seal	6.0		8.0		Be	ntonite							Coliform test type		-
Delete	Filter Pack	< ▼ 8.0		33.0		Sa	nd		•							
Add New	v														or	
Lithologic	From dept	h (ft)(*)	To depth (ft)(*)	Descriptio	m(*)									Comorni test results	# colonies per	100 ml
Add New	v			Sesenpilo	()											
Site Map	/Sketch Map	p(*)									Browse			Date Sampled		
Well Diag	gram (monito	ring wel	1)									Browse		Date Analyzed	ļ	
Coliform	analysis (if a	pplicabl	e)									Browse		Save For Future F	Retrieval	Submit to DEP
Signed va	riance (if app	plicable))									Browse				
Other lab	oratory analy	ysis repo	ort (11 applicable)									Browse				
Casing/Sc	neen supple			<u></u>								Browse				
Affirmation	n: I certify ur	der pen	alty of law that t	his docum	ent and al	1 attachments	were prepa	red under	my direa	ction or s	pervision in	accordance wi	th a			
system des	signed to ass	ure that	qualified person	nel properl	ly gather a	and evaluate the	ne informat	ion submi	tted. Bas	sed on my	inquiry of the	he person or per of my knowled	rsons ge and			
belief, true	e, accurate, ar	nd comp	lete. I am aware	that there a	are signifi	cant penalties	for submitti	ing false in	nformatic	on, includ	ing the possi	bility of fine an	d d			
either by n	ne or by the	people	l represent.	nung data,	uns trans	mission consti	utes my sig	gnature an	u i am re	esponsible	or any and	an coment subr	nued			
Signature driller & l	of certified PIN(*)	Todd V	V Mills				Date Si	igned(*)	03/27/2	2013						
Driller Fit	rst Name(*)	Todd					Driller	Last	Mills							
Certificati	ion Number	0344-0	454-00				Name(Certific	(*) cation	, Chase	Environm	ental Group	Inc	_			
(*)		0344-0	+				Compa	any(*)	Chase	CINITONIM	епан ατουρ,	IIIG.				

	UN	IFORM KENTUC	KY WELL CO	NSTRUCTION R	ECORD				
		Use this form to repo	ort installation of r	nonitoring or water w	ells.				
	Form must be co	ompleted and submitte	d to the Division of	of Water within 60 da	ys of well completion.				
			Faa instructions h	alow					
			see mstructions be	clow.					
		One copy to ow	/ner and one copy	to driller䀙s files.		٦			
Owner Name(*)	United States Departmer	nt of Energy							
Owner First Name (*)	NA	Owner Last 1	Name(*) NA						
Owner Address(*)	5600 Hobbs Road								
Owner City(*)	West Paducah Sta	ate(*) Kentucky	• Own	ner Zip(*) 42086					
Owner Phone(*)	270-441-6800	Owner eMail							
Site Name(*)	Paducah Gaseous Diffus	ion Plant							
Site Address(*)	5600 Hobbs Road						Kentucky Well ID	2006 E012	_
Site City(*)	West Paducah Sta	ate(*) Kentucky	Site 2	Zip(*) 42086			(*)	0000-3313	
Site Phone	270-441-6800	Site eMail					Owner Well ID	MW-513	
Well Latitude(*)	37 114	Vell Longitude(*)	88 815	Method(*)	an Grade GPS - Differentially Co	prrected	Work Start Date(*)	08/24/2012	
DMS to DD Conve	erter						Work End Date(*)	08/27/2012	1
Agency Interest (AI) Number 3059	Facility Type & ID	CERCLA	_			Total depth (ft)(*)	44.0	
USGS Topo Map(*) HEATH	-	County(*)	McCra	cken 🔻		Depth to bedrock (ft)		1
Surface elevation (ff)		Elevation deter	rmined by Topog	aphic map interpolation - digitiz	zed V	Static water level (ft)		
Physiographic Regio	(*) Jackson Purchase	-	Well Use(*)	Monito	ring well - compliance		SWL method(*)	Undetermined	<u> </u>
Drilling Mathod(*)	Augor hollow stom		Well Statuc(*)				Casing height above		1
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			wenconditio				Estimated well yield		
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Prom dep	$\sin(\pi)(*)$ 10 deptn $(\pi)(*)$	Borenole diameter (in)(*) Casing di	ameter (in)(*) Casi	ng type(*)		Well service (# of		
Delete 0	37.0	10.5	2	Ste			people served)	I	
Add New	44.0	10.5	2	318	ei - stainiess		Disinfectant amount		
<u>Add New</u>							Disinfectant type		
Screen		Develop	diamaten (in)	Commention (Como da la t	Pitless adapter		
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Delete 37.0	42.0	10.5		2	Steel - stainless	• 0.010	Pump installed		
Add							Depth to intake (ft)		
INEW							Apparent quality and	odor:	1
Annulus fill and seal							Appearance		í.
Section(*	From depth (ft)(*)	To depth (ft)(*) Mater	rial(*)			Odor Type	<u> </u>	_
Delete Grout		6.0	Bento	onite			Odor-Level		
Delete Seal	■ 6.0	8.0	Bento	onite			Coliform Test		-
Delete Filter Pa	ск • 8.0	33.0	Sand]			Coliform test type		
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Add New	uk • 30.0	44.0	Sand	1			Coliform test resulte	or	
Lithologia la							Contorni test results	# colonies per	100 ml
	th (A)(*) To down (A)(*)	Decorintion(*)							
Add New		Description(*)					Date Sampled		
Site Map/Sketch Ma	ap(*)				Browse		Date Analyzed		
Well Diagram (moni	toring well)					Browse	Save For Future F	Retrieval	Submit to DEP
Coliform analysis (if	applicable)					Browse			
Signed variance (if a	pplicable)					Browse			
Other laboratory and	lysis report (if applicable)					Browse			
Casing/Screen Suppl	lemental Info					Browse			
Comments This is the	ne deep well in a 2 well nes	ted set.							
Affirmation: I certify	under penalty of law that th	his document and al	attachments we	ere prepared under	my direction or supervision in	accordance with a			
system designed to as	ssure that qualified personr	nel properly gather a	nd evaluate the	information submi	tted. Based on my inquiry of th	e person or persons			
belief, true, accurate,	and complete. I am aware t	that there are signific	ant penalties for	r submitting false i	formation, including the possib	bility of fine and			
imprisonment for kno	wing violations. By submi	tting data, this transr	nission constitut	tes my signature an	d I am responsible for any and a	all content submitted			
Signature of certified	e people i represent.			-					
driller & PIN(*)	Todd W Mills			Date Signed(*)	03/27/2013				
Driller First Name(*) Todd			Name(*)	Mills				
Certification Numbe (*)	r 0344-0454-00			Certification Company(*)	Chase Environmental Group, I	Inc.			



	Ceg	C			5 Grou		Soil Boring Log	Page 1 of 1						
Proje	ct: Sou	thwest F	lume R	DSI –	C-720	Northeast	Boring Location: MW-512							
Date	Drilled:	8/22/1	2				Sampling Method: Dual Tube							
Date	Comple	ted: 8/2	24/12				Surface Elevation:							
Drilli	ng Metl	nod: 4.2	5" ID H	ISAs			Total Depth: 30.5							
Drilli	ng Com	ipany: (Chase Er	nvironi	mental	Group	Logged By: Ken Davis, LATA of Kentucky							
DEPTH feet	SAMPLE NUMBER	BLOW COUNT 6"	PID mqq	REC	FORMATION		GEOLOGIC DESCRIPTION							
0.0						Topsoil w/ Or	rganics Mixed with Pea GRAVEL, Loose, I	Moist						
1.2						White to Light Brown SILT, Soft, Moist Reddish Yellow to Light Gray Gravely Fine SAND grading to SILT, Soft to Dense, Moist								
20.0														
22.2						Soft to Dense, Moist Reddish Yellow to Pinkish Gray Sandy to Clayey GRAVEL, Loose, Moist								
23.7						Light Gray to	Pale Brown Silty to Gravely Fine SAND,	Firm, Moist						
30.5						No Refusal –	Boring Terminated @ 30.5 in SAND As A	bove.						

Drilling & Remedial Action Contractors 9470 Hwy. 60 West – Kevil, Kentucky 42053 270-488-2584 Fax: 270-488.2586

		UNIFO	RM KENTUC	KY WELL CO	NSTRUCTIO	ON RECO	RD						
		Us	e this form to repo	ort installation of r	nonitoring or w	ater wells.							
		Form must be compl	eted and submitte	d to the Division of	of Water within	60 days of v	vell completion.						
			:	See instructions be	elow.								
			One copy to ow	ner and one copy	to driller's	files.							
Owner Name(*)	United Sta	tes Department of	Eporav										
Owner First Name	onited Sta	tes Department of]						
(*)	NA		Owner Last 1	Name(*) NA									
Owner Address(*)	5600 Hobb	bs Road											
Owner City(*)	West Padu	ucah State(*) Kentucky	• Own	er Zip(*) 420	086							
Owner Phone(*)	270-441-68	800 O	wner eMail										
Site Name(*)	Paducah G	Gaseous Diffusion F	Plant								Kentucky Well ID		
Site Address(*)	5600 Hobb	bs Road					_				(AKGWA) Number (*)	8006-5912	
Site City(*)	West Padı	ucah State(*) Kentucky	▼ Site 2	Zip(*) 42086						Owner Well ID	MW-512	
Site Phone	270-441-68	800 Si	te eMail								Work Start Date(*)	08/22/2012	
Well Latitude(*)	27 114	Wall	Longituda(*)	00 014		Man Cra	do CBS Diffor	ntially Corr	otod	7	Work End Date(*)	08/24/2012	
DMS to DD Convert	ter	well			ivietnod(*			Corre		1	Total depth (ft)(*)	30.5	
Agency Interest (AI)	Number 3	059 Fac	ility Type & ID	CERCLA	•						Depth to bedrock (ft)		
USGS Topo Map(*)	HEAT	Ή	•	County(*)	M	lcCracken	_				Static water level (ft)		_
Surface elevation (ft)	370			Elevation deter	rmined by To	opographic	map interpolation	on - digitized	i 💌		SwL method(*)		-
Physiographic Region((*) Jackso	on Purchase 💌		Well Use(*)	М	lonitoring w	ell - compliance		•		surface (in)		
Drilling Method(*)	Auger	- hollow stem	•	Well Status(*)	a	ctive					WATER WELLS ON	LY	
Wellhead(*)	Lockin	ng Cap 💌		Well Condition	n(*) Fi	unctioning	properly 💌]	Estimated well yield		
Erom denth	(ff)(*) To	depth (ft)(*) Bore	hole diameter (in)(*) Casing di	ameter (in)(*)	Casing tyr	pe(*)				Well service (# of		
Delete 0	17	7.8 8.5		2		Steel - sta	inless	•			people served)		
Delete 27.8	29	.8 8.5		2		Steel - sta	inless	-			Disinfectant amount		
Add New											Pitless adapter		
Screen			Borehole	diameter (in)	Screen diame	eter (in)(*)			Screen slo	t I	installed		
From depth (ft	(*)(*) 	To depth (ft)(*)(*)	(*)(*)		(*)		Screen Type(*)(*)	size(*)(*)		Pump installed	 	
Delete 17.8		27.8	8.5		2		Steel - stainles	s	0.010		Depth to intake (ft)	odor:	
New											Appearance		
Annulus fill and seal											Odor Type	-	
Section(*)	From	depth (ft)(*)	To depth (ft)(*) Mater	ial(*)		-				Odor-Level	-	
Delete Seal	13.8		15.8	Bento	onite		•] •]				Coliform Test	_	
Delete Filter Pack	15.8		30.5	Sand	1		-						
Add New												or	
Lithologic log											Coliform test results	# colonies per 10	0 ml
From depth Add New	n (ft)(*) To	depth (ft)(*) Desc	cription(*)										
Site Map/Sketch Man	D(*)						Bro	wse		1	Date Sampled		
Well Diagram (monitor	ring well)								Browse	i	Date Analyzed		
Coliform analysis (if ap	pplicable)								Browse	Î	Save For Future F	Retrieval S	ubmit to DEP
Signed variance (if app	plicable)								Browse	l			
Other laboratory analy	/sis report ((if applicable)							Browse]			
Casing/Screen Suppler	mental Info								Browse				
Comments													
Affirmation: I certify un system designed to assi	der penalty	y of law that this d alified personnel p	ocument and all	attachments we	ere prepared u	under my di ubmitted F	irection or super Based on my inc	vision in accurry of the r	cordance wit	h a sons			
who manage the system	n, or those	persons directly re	sponsible for ga	thering the info	rmation, the in	nformation	submitted is, to	the best of i	ny knowledg	e and			
imprisonment for know	ing violatio	ons. By submitting	data, this transr	nission constitut	es my signatu	arse morm	auon, including a responsible for	any and all	content subn	itted			
either by me or by the	people I re	present.			-]			
driller & PIN(*)	Todd W N	Aills			Date Signed	d(*) 03/2	7/2013						
Driller First Name(*)	Todd				Driller Last Name(*)	Mills	3						
Certification Number (*)	0344-0454	I-00			Certification Company(*	n ⁽)	se Environmenta	I Group, Inc					



	Ceg Env	iron	ment	a (5 Gro		Soil Boring Log	Page 1 of 1								
Proje	ct: Sou	thwest I	Plume R	DSI			Boring Location: MW-514/MW-515/MW-516									
Date	Drilled:	8/23/1	2				Sampling Method: Dual Tube									
Date	Comple	ted: 8/2	27/12				Surface Elevation:									
Drilli	ng Metl	10d: 8.2	25" ID H	ISAs			Total Depth: 44.5									
Drilli	ng Com	ipany: (Chase Ei	nvironi	menta	l Group	Logged By: Ken Davis, LATA of Kentucky									
DEPTH feet	SAMPLE NUMBER	BLOW COUNT 6"	UIA	REC	FORMATION		GEOLOGIC DESCRIPTION									
0.0						Unclassified S	Select Fill									
2.5						Light Gray Sl	Unclassified Select Fill Light Gray SILT, Firm, Moist									
16.5						Light Gray to	Light Gray to Reddish Yellow Gravely to Silty SAND, Dense, Moist									
21.3						Reddish Yellow to White Silty Fine SAND, Firm, Moist										
25.9						Reddish Yello Moist	ow to Pale Brown Silty Fine SAND and Gra	avel, Dense,								
37.4						Pale Brown to	o Pink SILT, Soft, Moist									
44.5						No Refusal –	Boring Terminated @ 44.5 in SILT As Abo	ove.								

Drilling & Remedial Action Contractors 9470 Hwy. 60 West – Kevil, Kentucky 42053 270-488-2584 Fax: 270-488.2586

	UNIFORM KENTUCKY WELL CONSTRUCTION RECORD															
				Use this f	form to rep	ort installation o	of monitoring	, or water w	ells.							
			Form must be	completed a	nd submitte	ed to the Divisio	n of Water w	vithin 60 da	ys of well	completion	1.					
						See instructions	below.									
				One	copy to ov	vner and one co	py to drillerâ	i€™s files.								
OwnerN	Iama(*)	United	Statas Dapartma	nt of Enorg								1				
Owner F	irst Name		States Departme		ly											
(*)		NA		Ow	mer Last	Name(*) NA										
Owner A	Address(*)	5600 H	obbs Road													
Owner C	City(*)	West Pa	aducah St	ate(*) Ke	ntucky	• Ov	wner Zip(*)	42086		1						
Owner P	hone(*)	270-441	-6800	Owner	eMail											
Site Nam	ne(*)	Paduca	h Gaseous Diffu	sion Plant										Kentucky Well ID		_
Site Add	ress(*)	5600 H	obbs Road				-							(AKGWA) Number	8006-5914	
Site City	(*)	West Pa	aducah St	ate(*) Ke	ntucky	▼ Sit	e Zip(*) 4	2086						Owner Well ID	MW-514	_
Site Phor	ne	270-441	-6800	Site eM	ail									Work Start Date(*)	08/23/2012	
Well Lat	itude(*)													Work End Date(*)	08/27/2012	_
DMS to	DD Convert	37.1	12	Well Long	itude(*)	88.815	Meth	od(*) Ma	ap Grade	GPS - Dit	ferentially Co	orrected		Total depth (ft)(*)	14.8	
Agency I	MS to DD Converter												Depth to bedrock (ft)			
USGS To	opo Map(*)	HE	ATH		•	County(*)		McCra	cken	_				Static water level (ft)		_
Surface el	evation (ft)	370				Elevation de	termined by	y Topog	raphic ma	ap interpo	lation - digiti	zed 💌		SWL method(*)	Undetermined	
Physiogra	phic Region	(*) Jac	kson Purchase	•		Well Use(*))	Monito	ring well -	- compliar	ice	T		surface (in)		
Drilling N	fethod(*)	Auç	ger - hollow stem		-	Well Status	(*)	active			•			WATER WELLS ON	LY	
Wellhead	(*)	Loc	king Cap 💌			Well Condit	ion(*)	Functio	oning pro	perly 💌				Estimated well yield	<u> </u>	
Casing / C	Dpen Boreho	ble	To depth (ft)(*)	Borehole	diameter	(in)(*) Casing	diameter (ii	n)(*) Casi	ng type(*	*)				Well service (# of		<u> </u>
Delete	0	<u>((()</u> ())	7.8	12.5		2		Ste	el - stainle	ess	•			people served)	ļ	
Delete	12.8		14.8	12.5		2		Ste	el - stainle	ess	•			Disinfectant amount		
Add New	v													Pitless adapter		
Screen					Borehole	e diameter (in)	Screen d	iameter (i	n)(*)			Screen sl	ot	installed		
Fr	om depth (ft	t)(*)(*)	To depth (ft)	*)(*)	(*)(*)		(*)		Sc	creen Typ	e(*)(*)	size(*)(*)		Pump installed	 	
Delete 7.	8		12.8		12.5		2		s	steel - stai	nless	• 0.010		Apparent quality and	odor:	
New														Appearance		
Annulus f	ill and seal													Odor Type	_	
Delete	Section(*)	Fro	m depth (ft)(*)	To de	epth (ft)(*	^c) Ma	terial(*)							Odor-Level	-	
Delete	Seal	3.8		5.8		Be	ntonite		-					Coliform test type		-
Delete	Filter Pack	5.8		14.8		Sa	nd		•							
Add New	<u>v</u>													Coliform tost rogulta	or	
Lithologic	From dept	h (ft)(*)	To depth (ft)(*)	Descriptio	m(*)									Contorni test results	# colonies per	100 ml
Add New	v	()()	·													
Site Map	/Sketch Map	v (*)									Browse			Date Sampled		
Well Diag	gram (monito	ring wel	1)									Browse		Date Analyzed	JJ	
Coliform	analysis (if aj	pplicable	e)									Browse		Save For Future F	Retrieval	Submit to DEP
Signed va	riance (if app	plicable))									Browse				
Casing/So	vratory analy	vsis repo	n (11 applicable)									Browse				
Commont	This is the	endi I	well in a 2 well	l .								510WSE	1			
Affirmation	n: I certify un	der pen	alty of law that t	his docum	ent and al	1 attachments	were prepa	red under	my direc	ction or su	pervision in	accordance wi	th a			
system des	signed to assi ge the system	ure that	qualified person se persons direc	nel properi tly respons	ly gather a	and evaluate the in	ne informati	ion submi the inform	tted. Bas	ed on my bmitted is	inquiry of the test	te person or per of my knowled	rsons ge and			
belief, true	, accurate, ar	nd comp	lete. I am aware	that there a	are signifi	cant penalties	for submitti	ing false in	nformatic	on, includi	ng the possil	bility of fine an	d			
either by n	ne or by the	people l	l represent.	nung data,	uns uans	consti	unes my sig	snature an	a i airi re	sponsible	ior any and	an content subf	inued			
Signature driller & I	of certified PIN(*)	Todd V	V Mills				Date Si	igned(*)	03/27/2	013						
Driller Fit	rst Name(*)	Todd					Driller	Last *)	Mills							
Certificati	on Number	0344-04	454-00				Certific	ation	Chase I	Environm	ental Group,	Inc.				
<u> </u>		I					Compa		1							

	UNI	FORM KENTUCK								
		Use this form to repor	rt installation of m	nonitoring or water w	ells.					
	Form must be co	ompleted and submitted	l to the Division o	of Water within 60 da	ys of well complet	ion.				
		1	an instructions ha	low						
		30	ee instructions be	iow.						
		One copy to own	ner and one copy	to driller䀙s files.			-1			
Owner Name(*)	United States Departmen	t of Energy								
Owner First Name (*)	NA	Owner Last N	(ame(*) NA							
Owner Address(*)	5600 Hobbs Road									
Owner City(*)	West Paducah Sta	te(*) Kentucky	- Owne	er Zip(*) 42086						
Owner Phone(*)	270-441-6800	Owner eMail	-	- · · ·] -						
Site Name(*)	Paducah Gaseous Diffusi	ion Plant								
Site Address(*)	5600 Hobbs Road							Kentucky Well ID		
Site City(*)	West Paducah Sta	te(*) Kentucky	▼ Site Z	Zip(*) 42086				(AKGWA) Number (*)	8006-5915	_
Site Phone	270-441-6800	Site eMail						Owner Well ID	MW-515	
Well Latitude(*)				_				Work Start Date(*)	08/23/2012	
DMS to DD Conve	rter 37.112 W	Vell Longitude(*) -8	8.815	Method(*)	p Grade GPS - I	Differentially C	orrected 💌	Work End Date(*)	08/27/2012	
Agency Interest (AD	Number 3059	Facility Type & ID	CEBC! A					Total depth (ft)(*)	30.8	
LIGGE Tene Mer(*)			Countra(#)					Depth to bedrock (ft)		
Surface elevation (ft)	270	<u> </u>	Elevation datas	McCra	sen van inter	polotion digiti	Tod I	Static water level (ft)		
Division Pasia	370		Wall Ling(*)	mined by Topogr	aphic map inter	polation - digiti	Zed	SWL method(*)	Undetermined -	
Drilling Mathed(*)	Auger, hellow stem		Well Use(*)	Monito	ing well - compli		<u> </u>	Casing height above		
Wallbard(*)	Auger - Honow stell		Well Condition	(*) Eunotic	ning properly	1		WATER WELLS ON	LY	
Gerine (Onen Densi			wen condition			J		Estimated well yield		_
Erom den	101e th (ft)(*) To denth (ft)(*) I	Borehole diameter (ir	n)(*) Casing dia	ameter (in)(*) Casi	ng type(*)			Well Yield Method		1
Delete 0	18.8	12.5	2	Ste	el - stainless			Well service (# of		<u> </u>
Delete 28.8	30.8	12.5	2	Stee	el - stainless			people served)		
Add New	P P		,					Disinfectant amount		•
Screen								Disinfectant type	•	
From depth (ft)(*)(*) To depth (ft)(*	Borehole a	diameter (in)	Screen diameter (i	n)(*)	vne(*)(*)	Screen slot	Pitless adapter		
Delete 19.9		(*)(*)	((*)			size(*)(*)	Pump installed		
Add	28.8	12.5		2	Steel - st	ainiess	<u> </u>	Depth to intake (ft)		
New								Apparent quality and	l odor:	
Annulus fill and seal								Appearance	-	
Section(*) From depth (ft)(*)	To depth (ft)(*)	Materi	ial(*)				Odor Type		
Delete Grout	• 1	3.8	Bento	onite				Odor-Level	-	
Delete Seal	3.8	5.8	Bento	onite				Coliform Test	1	
Delete Filter Pac	sk <u>▼</u> 5.8	14.8	Sand					Coliform test type	· · · · · · · · · · · · · · · · · · ·	
Delete Seal	▼ 14.8	16.8	Bento	onite					-	
Add New		0.00	Sand					Coliform test results	or	
Lithologic log	1								# colonies per 10	0 ml
From den	th (ft)(*) To depth (ft)(*) [Description(*)								
Add New								Date Sampled		
Site Map/Sketch Ma	up(*)					Browse		Date Analyzed		
Well Diagram (monit	oring well)						Browse	Save For Future	Retrieval S	ubmit to DEP
Coliform analysis (if	applicable)						Browse			
Signed variance (if a	oplicable)						Browse			
Other laboratory ana	lysis report (if applicable)						Browse			
Casing/Screen Suppl	emental Info						Browse			
Comments This is th	e intermediate well in a 3 w	vell nested set.								
Affirmation: I certify u	inder penalty of law that th	is document and all	attachments we	re prepared under	my direction or	supervision in	accordance with a			
system designed to as who manage the system	sure that qualified personn m, or those persons directl	el properly gather an ly responsible for gat	nd evaluate the i thering the infor	ntormation submi mation, the inform	ted. Based on n ation submitted	is, to the best	te person or persons of my knowledge and	d		
belief, true, accurate, a	and complete. I am aware th	hat there are significa	ant penalties for	submitting false in	formation, inclu	iding the possi	bility of fine and			
imprisonment for know	wing violations. By submit e people I represent.	tting data, this transm	ussion constitute	es my signature an	d I am responsib	le for any and	all content submitted			
Signature of certified driller & PIN(*)	Todd W Mills			Date Signed(*)	03/27/2013					
Driller First Name(*)	Todd			Driller Last	Mills			-		
Certification Number	0344-0454-00			Certification	Chase Environ	mental Group,	Inc.			
<u> C /</u>	1			Sourbard ()	L					

		UNIFORM KENTUCKY WELL CONSTRUCTION RECORD															
					Use this i	form to repo	rt installation of	of monitoring	or water we	ells.							
				Form must be	completed a	nd submitted	l to the Divisio	n of Water wi	thin 60 day	s of well o	completion.						
						s	ee instructions	below.									
Porce law Porce law <t< td=""><td></td><td></td><td></td><td></td><td>One</td><td>copy to ow</td><td>ner and one co</td><td>py to drillerâ€</td><td>™s files.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>					One	copy to ow	ner and one co	py to drillerâ€	™s files.								
Orange Tell Orange Construction Orang Construction Orange Construction Orang Construction Orange Construction Sine Name? Orange Constructio	Owner N	lame(*)	United S	States Departme	nt of Energ	ју											
Norma Akalong(1) Sino Hanse Norm Overa Rhan(2) Sino Hanse Norm Norm Rhan(2) Sino Hanse Norm Norm Rhan(2) Sino Hanse Norm Sino Akana (2) Sino Hanse Norm <t< td=""><td>Owner F</td><td colspan="9">r First Name Owner Last Name(*) NA</td><td></td><td></td><td></td><td></td><td></td></t<>	Owner F	r First Name Owner Last Name(*) NA															
None Cig(*) Wite Patacab None ** None Cig(*) Wite Datacab None ** None Cig(*) None ** None ** None Cig(*) None ** None ** None Cig(*) None ** None ** None ** None ** None ** N	Owner A	ddress(*)	5600 Ho	obbs Road				-									
Description Description Site Pland? Description Site Pland? Pland Descree Differes Peril Site Charge? Pland Descree Differes Peril Site Pland? Pland Descree Differes Pland Descree Differes Pland D	Owner City(*) West Paducah State(*) Kentucky Vowner Zip(*) 42086																
Non Nun (1) Palaoni Genora Diffuor Part Son Anix (*) Food rocke from Son Anix (*) Food rocke from <tr< td=""><td>Owner P</td><td>hone(*)</td><td>270-441</td><td>-6800</td><td>Owner</td><td>eMail</td><td></td><td></td><td>,</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>	Owner P	hone(*)	270-441	-6800	Owner	eMail			,								
Not Addense(*) 2600 Hadra Hadr Not Op(*) 710 Log Undor(*) Not Fromo 2011 Log Undor(*) Not Dir article 2011 Log U	Site Nam	ne(*)	Paduca	h Gaseous Diffu	sion Plant												
Sinc Prov. Prest Padreal Sinc Adal Sinc Prov. Piter Padreal Sinc Adal Since Adal Piter Padreal Since Adal Since Adal Piter Padreal S	Site Add	ress(*)	5600 Ho	obbs Road				-									
Site PLor Pin-44 600 Size oblig Mol Langkert Wil Langkert Wil Langkert Agency interest (Ab) Number Size oblig Agency interest (Ab) Number Size oblig Agency interest (Ab) Number Size oblig Miller declaritie Display Molecularity Agency interest (Ab) Number Size oblig Miller declaritie Display Molecularity Miller declaritie Display Molecularity Miller declaritie Molecularity Molecularitie Molecularitie	Site City((*)	West Pa	aducah St	ate(*) Ke	entucky	▼ Si	e Zip(*) 42	086						Kentucky Well ID	0000 5010	
Weil Landack? 21/2 Weil Legiskb? Ber Grebe Gies - Deregiskb? Bee Gies - Deregiskb? Bee Grebe Gies - Deregiskb? Bee Greb	Site Phor	ne	270-441	-6800	Site eM	fail]			(AKGWA) Nulliber (*)	8000-5910	
Data DD Converter The Langual of point of the UN of the	Well Lati	itude(*)	37.1	12	Wall Long	ituda(*)	9 915		d(*)	n Grada I			tod =		Owner Well ID	MW-516	
Agency Interest (A) Number 1960 Pacified Provide (N) 1000 1000 USCN T epok (Mpr) 1000 1000 1000 1000 Physiographic Regit (W) 20000 10000 10000 10000 Physiographic Regit (W) 20000 10000 10000 10000 Physiographic Regit (W) 20000 10000 10000 10000 Physiographic Regit (W) 20000 10000 10000 100000 Physiographic Regit (W) 20000 100000 100000 100000 Physiographic Regit (W) 200000 1000000 1000000 1000000 Physiographic Regit (W) 100000000 100000000 100000000 Physiographic Regit (W) 10000000000000 1000000000000 1000000000000000000000000000000000000	DMS to	DD Conver	ter	12	well Long		0.015	Wieulo		p Grade (ar 5 - Dinerential	ly conec	.ieu 🔤		Work Start Date(*)	08/23/2012	
USUSS Topon Map(*) EC E	Agency Ir	nterest (AI)	Number	3059	Facility	Type & ID	CERCLA	•							Total depth (ft)(*)	44.5	
	USGS To	po Map(*)	HE	ATH		County(*)			McCrac	ken 💌				Depth to bedrock (ft)			
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APPENDIX B

THREE-DIMENSIONAL CONTAMINATION MODELS (CD)

APPENDIX B

THREE-DIMENSIONAL CONTAMINATION MODELS (CD)
APPENDIX C

MODEL SENSITIVITY ANALYSES

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C.1. SWMU 211-A TCE VOLUME ESTIMATE AND SENSITIVITY ANALYSIS OF ANISOTROPY, MEASURES OF STATISTICAL CONFIDENCE USING HISTORIC (1998 AND 2004) UPPER CONTINENTAL RECHARGE SYSTEM SOIL INVESTIGATION, AND 2012 REMEDIAL DESIGN SUPPORT INVESTIGATION DATA SETS

C.1.1 PURPOSE

Utilizing the results of soil sampling data provided by LATA Environmental Services of Kentucky, LLC, (LATA Kentucky) Geosyntec has developed estimates of the mass of trichloroethene (TCE) in soils above the Regional Gravel Aquifer (RGA) at Solid Waste Management Unit (SWMU 211-A) 211-A, using C Tech's Environmental Visualization Software (EVS). Provided soil sampling data was collected during evaluation of the Upper Continental Recharge System (UCRS) (1998 and 2004) and Remedial Design Support Investigation (RDSI) (2012) sampling from October 2012 to March 2013. The purpose of this calculation package is to evaluate the sensitivity of TCE mass estimates when interpolating the data using a kriging algorithm by varying the anisotropy of the model and evaluating the statistical confidence of the interpolation.

C.1.2 METHODS

Soil sampling results were interpolated in EVS in order to estimate the volume of TCE in soils. A sensitivity analysis was performed to evaluate the volume of TCE under several different anisotropy ratios: 1, 1.5, 5, and 10. EVS allows for further evaluation of the statistical confidence of the interpolation by providing results at differing user-defined confidence levels. Data was evaluated at 60, 70, 80, and 90% confidence levels. A site-specific soil density of 1.4 gm/cc was used to calculate TCE mass.

Anisotropy allows the model to consider the effects of anisotropy in the conductivity of soil matrices to fluid flow. In most cases, geologic materials are deposited with platy clay minerals oriented horizontally; thus, flow of water in both the saturated and unsaturated zone can be slower in the vertical direction than in the horizontal direction. Ore deposition also can occur along horizontal or vertical fault or fracture systems. Chemical constituents being transported with flowing fluids, therefore, may show a larger degree of spreading in one or the other direction. The Horiz./Vert. Anisotropy Ratio allows the kriging algorithm to specify a factor to be used to apply biased weighting on data points in horizontal and vertical directions away from a given model node. The default value for fluid flow is 10, which allows data points in a horizontal direction away from a model node to influence the kriged value at that node by a factor of 10 than data points an equal distance away in a vertical direction. A value of 10 typically would be appropriate for dissolved-phase concentrations in an aquifer that is either high-velocity or anisotropic. When the property being modeled is not related to fluid flow or other processes that might be affected by matrix anisotropy, then the recommended value is 1 (i.e., isotropic). Based on observations of data from soil sampling to date in SWMU 211-A, despite the fluid based nature of the release, it is expected that transport is vertically controlled more than horizontally controlled. Therefore the use of a lower anisotropy value is appropriate. Based upon the shape and connectedness of the plume to various sample points, an anisotropy of 1.5 was selected.

EVS can be used to determine the Minimum (Min) and Maximum (Max) Plume, or in this specific case, source area, using a Min-Max algorithm. The Min Plume calculates the minimum estimated size of the source area at a user-specified confidence level. Conversely, the Max Plume calculates the maximum

estimated size of the source area at a user-specified confidence level. To determine the confidence level of the interpolation, EVS first calculates the nominal value and associated standard deviation at every node in the model. For the case of Max Plume and 80% confidence, at each node, a maximum value is determined such that 80% of the time, the actual values will fall below the maximum value (for that nominal concentration and standard deviation). This process is shown below as an example directly from the C Tech Help Manual for the case of an assumed nominal value of 10 ppm with a standard deviation of 1.1 (log units). For this case, the maximum value at that node would be approximately 84 ppm. This process is repeated for every node in the model.

For the plot shown below (from the C Tech Help Manual), the entire left portion of the bell curve is shaded. If assessing the minimum value, it would be the right side.



EVS allows the model to be gridded using several different techniques including convex hull (the default method) and rectilinear gridding. The convex hull of a set of points in two-dimensional space is the smallest convex area containing the set. In the x-y plane, the convex hull can be visualized as the shape assumed by a rubber band that has been stretched around the set and released to conform as closely as possible to it. EVS grids convex hull regions with quadrilaterals. Smoothing techniques are used to create a grid that has reasonably equal area cells. In rectilinear (a.k.a. uniform) gridding, the grid axes are parallel to the coordinate axes and the cells are always rectangular in cross-section. The positions of all the nodes can be computed knowing only the coordinate extents of the grid (minimum and maximum x, y, and z). In both convex hull and rectilinear gridding, adaptive gridding was used. Adaptive gridding is the

localized refinement of a grid to provide higher resolution in the areas or volumes surrounding measured sample data.

C.1.3 RESULTS

The table below provides the results of the volume estimates in gallons (gal) using the different datasets. The blue shading highlights the 50% nominal source volume estimate and the green shading highlights the results using an anisotropy value of one, which has previously been reported.

	Anisotropy					
Confidence Level	1	1.5	5	10		
90% - Max Plume	1.5	2.2	3	2.8		
80% - Max Plume	1	1.5	2.1	1.9		
70% - Max Plume	0.8	1.1	1.6	1.5		
60% - Max Plume	0.6	0.9	1.2	1.2		
50% - Nominal	0.5	0.7	1	0.9		
60% - Min Plume	0.4	0.6	0.8	0.8		
70% - Min Plume	0.3	0.4	0.6	0.6		
80% - Min Plume	0.2	0.3	0.5	0.5		
90% - Min Plume	0.2	0.2	0.3	0.3		
Average	0.65	0.94	1.61	2.05		

Estimated Volume of TCE (gal) above 75 ug/kg in SWMU 211-A Soils

The effects of anisotropy on the model can be visualized with the following cross-sections. As shown below, the higher the anisotropy is set, the more connection is seen between horizontal points and the less connection between vertical points.





C.1.4 CONCLUSIONS

The volume of TCE in soil is sensitive to the anisotropy used to interpolate the data as well as the statistical confidence bounds placed on the interpolation. A range of TCE volumes, from 0.2 to 2.2 gal, has been estimated by using kriging using various anisotropies and confidence levels. These volumes estimates do not vary by more than one order of magnitude from the nominal estimate under isotropic conditions of 0.7 gal. Given these sensitivity analyses, the 0.7 gal value represents a reasonable nominal value based upon the review of the data, interpolation results, and professional judgment.

C.2. SWMU 211-B TCE VOLUME ESTIMATE AND SENSITIVITY ANALYSIS OF ANISOTROPY, MEASURES OF STATISTICAL CONFIDENCE USING HISTORIC (1998 AND 2004) UPPER CONTINENTAL RECHARGE SYSTEM (UCRS) SOIL INVESTIGATION AND 2012 REMEDIAL DESIGN SUPPORT INVESTIGATION (RDSI) DATASETS

C.2.1 PURPOSE

Utilizing the soil sampling data results provided by LATA Kentucky, Geosyntec has developed estimates of the mass of TCE in soils above the RGA at SWMU 211-B, using C Tech's EVS. Provided soil sampling data was collected during evaluation of the UCRS (1998 and 2004) and RDSI (2012) sampling from October 2012. The purpose of this calculation package is to evaluate the sensitivity of TCE mass estimates when interpolating the data using a kriging algorithm by varying the anisotropy of the model and evaluating the statistical confidence of the interpolation.

C.2.2 METHODS

Soil sampling results were interpolated in EVS in order to estimate the volume of TCE in soils. A sensitivity analysis was performed to evaluate the volume of TCE under several different anisotropy levels: 1, 1.5, 5, and 10. EVS allows for further evaluation of the statistical confidence of the interpolation by providing results at differing user-defined confidence levels. Data was evaluated at 60, 70, 80, and 90% confidence levels. A site-specific soil density of 1.4 gm/cc was used to calculate TCE mass and volume.

Anisotropy allows the model to consider the effects of anisotropy in the conductivity of soil matrices to fluid flow. In most cases, geologic materials are deposited with platy clay minerals oriented horizontally; thus, flow of water in both the saturated and unsaturated zone can be slower in the vertical direction than in the horizontal direction. Ore deposition also can occur along horizontal or vertical fault or fracture systems. Chemical constituents being transported with flowing fluids, therefore, may show a larger degree of spreading in one or the other direction. The Horiz./Vert. Anisotropy Ratio allows the kriging algorithm to specify a factor to be used to apply biased weighting on data points in horizontal and vertical directions away from a given model node. The default value for fluid flow is 10, which allows data points in a horizontal direction away from a model node to influence the kriged value at that node by a factor of 10 than data points an equal distance away in a vertical direction. A value of 10 typically would be appropriate for dissolved-phase concentrations in an aquifer that is either high-velocity or anisotropic. When the property being modeled is not related to fluid flow or other processes that might be affected by

matrix anisotropy, then the recommended value is 1 (i.e., isotropic). Based on observations of data from soil sampling to date in SWMU 211-B, despite the fluid based nature of the release, it is expected that transport is vertically controlled more than horizontally controlled. Therefore the use of a lower anisotropy value is appropriate. Based upon the shape and connectedness of the plume to various sample points, an anisotropy constant of 1.5 was selected.

EVS can be used to determine the Min and Max Plume, or in this specific case, source area, using a Min-Max algorithm. The Min Plume calculates the minimum estimated size of the source area at a userspecified confidence level. Conversely, the Max Plume calculates the maximum estimated size of the source area at a user-specified confidence level. To determine the confidence level of the interpolation, EVS first calculates the nominal value and associated standard deviation at every node in the model. For the case of Max Plume and 80% confidence, at each node, a maximum value is determined such that 80% of the time, the actual values will fall below the maximum value (for that nominal concentration and standard deviation). This process is shown below as an example directly from the C Tech Help Manual for the case of an assumed nominal value of 10 ppm with a standard deviation of 1.1 (log units). For this case, the maximum value at that node would be approximately 84 ppm. This process is repeated for every node in the model.

For the plot shown below (from the C Tech Help Manual), the entire left portion of the bell curve is shaded. If assessing the minimum value, it would be the right side.



EVS allows the model to be gridded using several different techniques including convex hull (the default method) and rectilinear gridding. The convex hull of a set of points in two-dimensional space is the

smallest convex area containing the set. In the x-y plane, the convex hull can be visualized as the shape assumed by a rubber band that has been stretched around the set and released to conform as closely as possible to it. EVS grids convex hull regions with quadrilaterals. Smoothing techniques are used to create a grid that has reasonably equal area cells. In rectilinear (a.k.a. uniform) gridding, the grid axes are parallel to the coordinate axes and the cells are always rectangular in cross-section. The positions of all the nodes can be computed knowing only the coordinate extents of the grid (minimum and maximum x, y, and z). In both convex hull and rectilinear gridding, adaptive gridding was used. Adaptive gridding is the localized refinement of a grid to provide higher resolution in the areas or volumes surrounding measured sample data.

C.2.3 RESULTS

The table below provides the results of the volume estimates in gallons (gal) using the different datasets. The blue shading highlights the 50% nominal source volume estimate and the green shading highlights the results using an anisotropy value of one, which has previously been reported.

	Anisotropy				
Confidence Level	1	1.5	5	10	
90% - Max Plume	0.8	0.8	1.1	1	
80% - Max Plume	0.5	0.6	0.8	0.7	
70% - Max Plume	0.4	0.4	0.6	0.6	
60% - Max Plume	0.3	0.3	0.5	0.5	
50% - Nominal	0.3	0.3	0.4	0.4	
60% - Min Plume	0.2	0.2	0.3	0.3	
70% - Min Plume	0.2	0.2	0.3	0.3	
80% - Min Plume	0.1	0.1	0.2	0.2	
90% - Min Plume	0.1	0.1	0.1	0.2	
Average	0.39	0.45	0.93	1.42	

Estimated Volume of TCE (gal) above 75 ug/kg in SWMU 211-B Soils

The effects of anisotropy on the model can be visualized with the following cross-sections. As shown below, the higher the anisotropy is set, the more connection is seen between horizontal points and the less connection between vertical points.





C.2.4 CONCLUSIONS

The volume of TCE in soil is sensitive to the anisotropy used to interpolate the data as well as the statistical confidence bounds placed on the interpolation. A range of TCE volumes, from 0.1 to 1.1 gal, has been estimated by using kriging using various anisotropies and confidence levels. These volumes estimates do not vary by more than an order of magnitude from the nominal estimate under isotropic conditions of 0.3 gal. Given these sensitivity analyses, the 0.3 gal value represents a reasonable nominal value based upon the review of the data, interpolation results, and professional judgment.

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APPENDIX D

SOIL LITHOLOGY LOGS

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Plant North -2023.211, Plant East -5059.551

8/29/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.7	Gravel with Silt, 10YR6/4 (light yellowish brown), loose, and dry. Gravel is subangular limestone, 0.2- to 0.8-inch diameter (dense gravel aggregate/DGA)	Fill
2.7	3.5	Silt, 10YR8/2 (very pale brown) with some 10YR7/8 (yellow) mottling, moderately hard, nonplastic, and dry	
3.5	14.4	Silt, 10YR7/3 (very pale brown), with some 10YR7/6 (yellow) mottling, soft, moderately plastic, and moist	11111
14.4	16.1	Silt, 10YR7/4 (very pale brown), moderately soft, nonplastic, and moist	HUI
16.1	19.5	Silt, 10YR7/4 (very pale brown), with 10YR8/1 (white) mottling, soft, slightly plastic, and moist. Little gravel (rounded chert with iron patina, 0.3-inch diameter) beginning at 17.8 ft	
19.5	20.0	Silty Gravel with little Clay, 10YR6/6 (brownish yellow), dense, and moist. Gravel is subangular to subrounded chert with iron patina, 0.2- to 0.5-inch diameter	
20.0	22.5	No Recovery	
22.5	23.2	Gravelly Silt, 10YR8/1 (white), moderately hard, nonplastic, and moist. Gravel is subrounded chert with and without iron patina, 0.2- to 0.4-inch diameter	
23.2	24.9	Sand, 10YR6/6 (brownish yellow), loose, and moist. Sand is fine to medium, rounded, quartz grains	
24.9	26.0	Silty Gravel, 10YR7/3 (very pale brown), dense, and moist. Gravel is subrounded chert with and without iron patina, 0.2- to 1.0-inch diameter	
26.0	29.5	Silt with little Gravel, 10YR7/1 (light gray) with frequent 10YR7/4 (very pale brown) staining, moderately soft, moderately plastic, and moist. Gravel is rounded chert without iron patina, 0.3-iinch diameter	HU2
29.5	30.1	Silt, 10YR7/4 (very pale brown), moderately hard, moderately plastic, and moist	
30.1	31.0	Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow) mottling, moderately hard, slightly plastic, and moist	
31.0	32.2	Silty Sand, 10YR7/4 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	
32.2	33.5	Silt with Gravel, 10YR7/6 (yellow), moderately hard, slightly plastic, and moist	
33.5	34.7	Silt, 10YR6/4 (light yellowish brown), soft, slightly plastic, and moist	

Plant North -2023.211, Plant East -5059.551

8/29/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
34.7	35.5	Sand with Gravel, 10YR8/2 (very pale brown) with some 10YR6/4 (light yellowish brown) mottling, loose, and moist. Sand is very fine quartz grains. Gravel is rounded to subrounded chert without iron patina, 0.2- inch diameter	
35.5	36.1	Silt, 10YR8/1 (white), soft, moderately plastic, and moist	
36.1	37.3	Silt with Sand, 7.5YR6/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, moderately soft, slightly plastic, and moist. Sand is very fine quartz grains	
37.3	37.9	Silty Clay, 7.5YR7/1 (light gray), moderately hard, plastic, and moist	
37.9	44.0	Silt, 10YR7/4 (very pale brown) mottled with 10YR8/2 (very pale brown), moderately soft, slightly plastic, and moist	
44.0	50.0	Clayey Silt, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling, moderately hard, plastic, and moist	
50.0	51.8	Silt, 7.5YR7/1 (light gray) with little 7.5YR7/6 (reddish yellow) mottling, soft to very soft, moderately plastic, and wet	HU3
51.8	52.2	Silt with Gravel, 7.5YR7/1 (light gray) with little 7.5YR7/6 (reddish yellow) mottling, soft to very soft, moderately plastic, and wet. Gravel is rounded chert without iron patina, 0.1- to 0.2-inch diameter	
52.2	52.6	Sand, 10YR8/1 (white), loose, and moist. Sand is fine quartz grains	
52.6	57.8	Silt, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling GRADING DOWN to 7.5YR7/4 (pink) with little 7.5YR8/1 (white) mottling, soft, moderately plastic, and moist	
57.8	59.7	Sand, 10YR8/1 (white) with some 10YR3/1 (very dark gray) staining (manganese?), loose, and very moist. Sand is fine quartz grains	HU4
59.7	60.0	Sandy Gravel, 10YR6/6 (brownish yellow), loose, and moist. Gravel is chert with iron patina, subrounded to subangular, 0.2- to 1.0-inch diameter. Sand is fine quartz grains	HU5

Plant North -2023.779, Plant East -5031.236

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	1.8	Silt with Gravel, 10YR7/2 (light gray), moderately hard, nonplastic, and dry. Gravel is subangular limestone, 0.3- to 1.0-inch diameter (dense gravel aggregate/DGA)	FILL
1.8	3.8	Silt, 10YR8/1 (white) with little 10YR8/8 (yellow) mottling, moderately hard, nonplastic, and dry	
3.8	13.9	Silt, 10YR7/2 (light gray) with variable mottling/staining by 10YR6/6 (brownish yellow), soft, nonplastic, and moist	
13.9	16.2	Silt, 10YR7/6 (yellow), moderately hard, nonplastic, and moist	
16.2	17.4	Silt, 10YR7/1 (light gray), very soft, nonplastic, and moist	
17.4	20.0	Silt with trace Gravel, 10YR7/4 (very pale brown) mottled with 10YR7/1 (light gray), moderately soft, slightly plastic, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3-inch diameter	HU1
20.0	20.5	Clay, 10YR6/2 (light brownish gray), moderately hard, plastic, and moist	
20.5	21.7	Sandy Silt, 10YR6/6 (brownish yellow), with blebs of clay, 10YR6/2 (light brownish gray); moderately hard, slightly plastic, and moist. Sand is very fine quartz grains.	
21.7	21.9	Gravel, 10YR6/6 (brownish yellow). Gravel is rounded to subrounded chert with iron patina, 0.3- to 0.8-inch diameter	
21.9	22.7	Silty Clay with some Gravel, 10YR7/2 (light gray), moderately hard, plastic, and moist. Gravel is rounded chert with iron patina, approximately 0.5-inch diameter	
22.7	25.0	Silty Sandy Gravel, 7.5YR6/6 (reddish yellow), hard, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter. Sand is very fine quartz grains	
25.0	26.8	Gravelly Sand, 10YR5/6 (yellowish brown), loose, and moist. Sand is fine quartz grains. Gravel is rounded chert with iron patina, 0.2- to 0.3-inch diameter	HU2
26.8	30.7	Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow) mottling and micro-laminations, moderately plastic, soft, and moist	
30.7	31.3	Silt with some Gravel, 10YR7/1 (light gray) with 10YR7/6 (yellow) mottling and micro-laminations, moderately plastic, soft, and moist. Gravel is subrounded chert with iron patina, 4 mm- to 0.7-inch diameter	
31.3	31.8	Silt, 10YR8/4 (very pale brown) GRADING DOWN to 10YR8/1 (white), soft, slightly plastic, and moist	

Plant North -2023.779, Plant East -5031.236

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
31.8	32.5	Sand with Gravel, 7.5YR7/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is rounded chert with iron patina, 0.2- to 1.0-inch diameter	
32.5	35.0	No recovery	NO RECOVERY
35.0	39.0	Silty Clay, 7.5YR8/1 (white) with abundant 7.5YR7/6 (reddish yellow) mottling and staining GRADING DOWN to little mottling and staining, moderately soft, plastic, and moist	
39.0	40.5	Silt, 10YR8/2 (very pale brown) mottled with 10YR6/2 (light yellowish brown) and 10YR7/6 (yellow), soft, slightly plastic, and moist	
40.5	43.3	Interlensing Silty Clay and Silt, 10YR8/1 (white) with heavy mottling by 10YR6/6 (brownish yellow) and some 2.5YR7/8 (light red), moderately soft, moderately plastic, and moist	
43.3	49.6	Silty Clay, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist	HU3
49.6	52.9	Silt with little Clay and Sand, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling, soft, slightly plastic, and moist. Sand is very fine quartz grains	
52.9	56.1	Silty Clay, 7.5YR8/1 (white) with abundant small mottles of 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist	
56.1	58.2	Silt, 7.5YR6/6 (reddish yellow), moderately hard, slightly plastic, and moist	
58.2	60.0	Sand with some blebs of Silt, 10YR8/1 (white) with some 10YR7/6 (yellow) mottling and some small blebs of 10YR3/1 (very dark gray) (manganese?), lightly consolidated, and very moist. Sand is very fine quartz grains	
60.0	60.4	Sand, 10YR8/1 (white) with few 10YR7/6 (yellow) laminations, lightly consolidated, and wet. Sand is fine quartz grains	HU4
60.4	60.9	Gravelly Sand, 10YR8/2 (very pale brown), loose, and wet. Sand distribution is bimodal: 70% fine quartz grains and 30% coarse to very coarse, subrounded to rounded, chert grains (with and without iron patina). Gravel is rounded to subrounded chert with iron patina, 4 mm- to 0.8-inch diameter	
60.9	62.5	Sandy Gravel, 10YR6/4 (light yellowish brown), loose, and wet. Gravel is rounded to subrounded chert with iron patina, 0.2- to 0.8-inch diameter. Sand distribution is bimodal, 65% fine to medium quartz grains and 35% coarse, subangular, chert grains	HU5

Plant North -2022.639, Plant East -4994.843

9/12/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	0.0	Silt, 10YR6/1 (gray), loose, and dry. Humic material	
0.0	0.2	and root zone	
		Gravelly Silt, 10YR7/1 (light gray), loose (powder),	
0.2	0.5	nonplastic, and dry. Gravel is subangular to rounded	Fill
		chert, 0.2- to 1.0-inch diameter	
0.5	2.2	Silt with some Gravel, 10YR7/4 (very pale brown),	
0.5	2.2	moderately hard, nonplastic, and slightly moist	
2.2	3.2	Silt, 10YR8/1 (white) with little 10YR7/6 (yellow)	
		mottling, hard, nonplastic, and slightly moist	
2.0	164	Sill, 10 YR8/2 (very pale brown) with variable molling	
5.2	10.4	by 10 Y R6/6 (brownish yellow), soft, honplastic, and	HU1
		Slightly Clavey Silt 10YR6/4 (light vellowish brown)	
16.4	20.1	with 10YR6/1 (gray) mottling moderately hard	
10.1	20.1	nonplastic and slightly moist	
		Silty Sand with Gravel, 7.5YR6/6 (reddish yellow),	
20.1	24.0	dense, and moist. Sand is fine quartz grains. Gravel is	
20.1	24.0	subangular to subrounded chert with light iron patina, 4	
		mm- to 0.4-inch diameter	
		Silt with little Gravel 10YR8/2 (very nale brown) soft	
24.0	25.0	slightly plastic and moist Gravel is subrounded chert	
	2010	without iron patina, 0.2- to 0.4-inch diameter	
		$\sum_{i=1}^{n} \frac{1}{i!} \sum_{i=1}^{n} \frac{1}{i!} \sum_{i=1}$	
		Sand with some Graver, 101 K //4 (very pare brown),	
25.0	25.5	quartz grains and 30% coarse, rounded, chart grains	
25.0	25.5	Gravel is subangular chert with iron patina 0.4-inch	
		diameter	HU2
		Sand SVD7/((noddiah college) lightle gangelideted	
25.5	26.3	said, 51 K //o (reduisil yellow), lightly consolidated,	
		and moist. Sand is very fine quartz grains	
26.3	28.2	Silty Sand with Gravel as 20.1 to 24.0 ft	
		Silty Sand, 10YR8/1 (white) mottled with 10YR7/6	
28.2	30.0	(yellow), firm/moderately soft, nonplastic, and moist.	
		Sand is very fine quartz grains	
		Silty Gravelly Sand, 7.5 Y R6/5 (reddisn yellow), firm	
30.0	36.1	to soft, honplastic, and moist to very moist. Sand size	
		chart 0.5 to 1.2 inch diameter	
		Sandy Silt, 7.5YR6/8 (reddish vellow) with some	
36.1	39.2	mottling by 7.5YR6/1 (gray), soft to very soft. plastic.	
		and very moist	
20.0	40.0	Silt, 7.5YR7/3 (pink) with 7.5YR8/1 (white) banding,	
39.2	40.0	stiff to firm, and slightly moist	
		Clay with little Silt, 7.5YR6/8 (reddish yellow) mottled	
40.0	40.9	with 10YR7/1 (light gray), very stiff to stiff,	
		nonplastic, and slightly moist	

Plant North -2022.639, Plant East -4994.843

9/12/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
40.9	42.9	Sandy Silt, 7.5YR7/6 (reddish brown) with 10YR7/1 (gray) and 7.5YR5/8 (strong brown) mottling, stiff to firm, and slightly moist	
42.9	45.0	Sandy Silt, 7.5YR6/8 (reddish yellow) with some 10YR7/1 (light gray) mottling, very firm to firm, and slightly moist. Sand is very fine quartz grains	
45.0	48.4	Clayey Sandy Silt, 7.5YR7/8 (reddish yellow) with slight mottling by 10YR7/1 (light gray) in sections and some 7.5YR5/8 (strong brown) speckling throughout, very firm, nonplastic, and slightly moist	
48.4	49.8	Clayey Silt with very little Sand, 10YR7/1 (light gray) with some 7.5YR6/8 (reddish yellow) mottling, firm, and slightly moist. Sand is very fine quartz grains	HU3
49.8	51.9	Silty Sand, 10YR7/6 (yellow), firm, and slightly moist. Sand is very fine quartz grains	
51.9	52.5	Silty Sand, 10YR7/1 (light gray), firm to very firm, and slightly moist. Sand is mostly very fine quartz grains but with trace of coarse, white, chert grains	
52.5	54.0	Silty Sand, 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	
54.0	55.0	Sandy Silty Clay, 10YR7/1 (light gray) mottled with 7.5YR6/8 (reddish yellow), firm to stiff, and slightly moist	
55.0	55.2	Sand, 7.5YR6/8 (reddish yellow), slightly loose, and moist. Sand is very fine to fine quartz grains	
55.2	58.2	Clay, 10YR8/1 (white) mottled with 7.5YR5/6 (strong brown), stiff to very stiff, and slightly moist	
58.2	59.7	Silty Sand, 7.5YR6/8 (reddish yellow), firm, and moist. Sand is fine quartz grains	
59.7	61.0	Sand, 10YR8/1 (white), loose, and wet/saturated	
61.0	61.3	Sand with Gravel, 10YR8/1 (white), loose, and wet/saturated	
61.3	62.5	Gravelly Silty Sand, 7.5YR6/8 (reddish yellow), very firm, and moist. Gravel is subangular to subrounded chert with iron patina, 0.5- to 1.2-inch diameter	HU4

Plant North -2048.082, Plant East -5212.811

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
(It bgs)	(It bgs)		
0.0	2.6	Gravelly Sand, 2.5 Y R5/6 (red), dense, and moist. Sand	E.11
0.0	3.0	is fine quartz grains. Gravel is subrounded chert with	Fill
		Silt 10XP7/1 (light grou) with some 10XP7/6 (vallow)	
3.6	7.5	silt, 101 K//1 (light gray) with some 101 K//6 (yenow)	
7.5	10.0	Democratic second and moist	
7.5	10.0		
10.0	12.5	Silt as 3.6 to 7.5 ft	
12.5	13.5	Sand, 10YR8/4 (very pale brown), dense, and moist.	
		Sand is very fine quartz grains	
13.5	14.7	Silt, 10 Y R //4 (very pale brown), soft, slightly plastic,	
		and moist Silt with little Gravel and little Clay, 10VP7/2 (light	
		(aray) mottled with 7 5VR6/6 (reddish vellow)	
14.7	15.0	moderately hard slightly to moderately plastic and	
14.7	15.0	moderately hard, slightly to moderately plastic, and	
		0.3-inch diameter	HUI
		Silt. 10YR7/2 (light gray), very soft, nonplastic, and	
15.0	15.5	moist. Slough	
		Silt with little Clay and little Gravel, 7.5YR7/2 (pinkish	
		gray) with 7.5YR7/6 (reddish yellow) staining,	
15.5	17.2	moderately hard, moderately plastic, and moist. Gravel	
		is subrounded to subangular chert without iron patina,	
		0.3- to 1.0-inch diameter	
		Sand with Gravel, 7.5YR7/4 (pink), firm, and moist.	
17.2	17.5	Sand is fine quartz grains. Gravel is subrounded chert	
		with iron patina, 0.4- to 0.6-inch diameter	
17.5	20.0	Permeameter sample - no description	
20.0	21.1	Silt with little Clay and little Gravel as 15.5 to 17.2 ft	
		Sand with Gravel, 7.5YR7/4 (pink), dense, and moist.	
21.1	23.8	Sand is fine quartz grains. Gravel is subangular to	
21.1	25.0	subrounded chert without(?) iron patina, 0.3- to 0.5-inch	
		diameter	
23.8	24.2	Sand, 7.5YR7/4 (pink), firm, and moist. Sand is fine to	
		medium quartz grains	
		Silt with some Gravel, 10YR//1 (light gray) with	
24.2	24.6	7.5 Y R //6 (reddish yellow) staining, soft, plastic, and	
		noist. Gravel is subrounded chert without(?) from	
		Sand 10VR8/2 (very pale brown) GRADING DOWN	
24.6	26.0	to 10YR8/4 (very pale brown) dense and moist Sand	
24.0	20.0	is fine quartz grains	
		Gravelly Sand with Silt, 10YR7/6 (yellow), dense, and	HU2
26.0	26.5	moist. Sand is fine quartz grains. Gravel is subrounded	
		chert without iron patina, 0.3- to 0.6-inch diameter	
		Silt with Sand, 10YR7/4 (very pale brown) mottled with	
26.5	28.5	10YR8/1 (white), soft, nonplastic, and moist. Sand is	
		fine quartz grains	

Plant North -2048.082, Plant East -5212.811

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology		Hydrogeologic Unit
28.5	30.0	Sand with Gravel, 10YR8/3 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 4 mm- to 0.6-inch diameter		
30.0	31.9	Sand with Gravel and some Silt, 7.5YR6/6 (reddish yellow). Sand is 80% fine to medium quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert without (?) iron patina, 4 mm- to 0.5-inch diameter		
31.9	32.7	Silt with Clay, 7.5YR6/6 (reddish yellow), moderately soft, plastic, and moist	ſ	
32.7	42.4	Silt, 7.5YR6/6 (reddish yellow) GRADING DOWN to 10YR7/6 (yellow) and then to 10YR8/3 (very pale brown) (over 41.0 to 42.4 ft), soft, slightly plastic, and moist		
42.4	50.0	Silt with little Clay, 7.5YR8/4 (pink) with some 7.5YR7/6 (reddish yellow) mottling, moderately soft, plastic, and moist		
50.0	52.1	Silt with Sand, 10YR8/1 (white) with 10YR8/6 (yellow) laminations, soft, nonplastic, and moist. Sand is fine quartz grains		
52.1	54.6	Silt with Sand, 5YR8/2 (pinkish white), soft, nonplastic, and moist. Sand is very fine quartz grains		HU3
54.6	55.4	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is very fine to fine quartz grains		
55.4	56.8	Silt with Sand, 10YR7/6 (yellow) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is fine quartz grains		
56.8	57.5	Silt with some Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), moderately hard, slightly plastic, and moist		
57.5	61.0	Silt with Sand, 7.5YR8/1 (white) mottled with 5YR6/6 (reddish yellow), soft, nonplastic, and moist. Sand is fine quartz grains		
61.0	64.6	Sand, 10YR8/3 (very pale brown), loose, and wet. Sand is fine quartz grains		
64.6	65.0	Sand with Gravel, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 1.0-inch diameter		HU4

Plant North -2047.983, Plant East -5179.833

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.3	Root zone and humic-rich soil, 10YR4/1 (dark gray)	
0.3	0.8	Silty Gravel (dense gravel aggregate/DGA), 10YR7/1 (light gray), loose, and moist. Gravel is subangular to subrounded limestone, 4-mm to 0.3-inch diameter	Fill
0.8	1.4	Silt with Gravel (fill), 10YR7/3 (very pale brown), soft, nonplastic, and moist. Gravel is rounded chert with iron patina, 0.7- to 1.0-inch diameter	
1.4	2.5	Silt with Gravel (fill) as 0.8 to 1.4 ft but interbedded 10YR5/1 (gray) and 10YR8/1 (white)	
2.5	15.2	Silt, 10YR8/2 (very pale brown) with 10YR6/6 (brownish yellow) mottling and few 10YR4/1 (dark gray) laminations, soft, nonplastic, and moist	HU1
15.2	16.5	Sand, 7.5YR7/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains	
16.5	18.7	Sand with some Gravel, 7.5YR7/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.5 to 0.8-inch diameter	
18.7	21.5	Slightly Clayey Silt, 10YR7/1 (light gray) with some 10YR7/6 (yellow) mottling, moderately hard, slightly plastic, and moist	
21.5	23.5	Gravel with Silt, 10YR7/1 (light gray) GRADING DOWN to 10YR5/6 (yellowish brown), hard, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.8-inch diameter	HU2
23.5	27.5	Sand with Gravel to Gravelly Sand, 10YR7/4 (very pale brown) with some 10YR8/1 (white) laminations, lightly consolidated and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.3- to 1.0-inch diameter	
27.5	35.2	Gravelly Sand, 10YR8/3 (very pale brown) mottled with 10YR8/1 (white), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.2- to 0.8-inch diameter	
35.2	39.6	Slightly Clayey Silt, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, slightly-to-moderately plastic, and moist	
39.6	42.5	Silty Sand, 7.5YR8/1 (white) heavily mottled with 7.5YR7/6 (reddish yellow), lightly consolidated/soft, nonplastic, and moist. Sand is very fine quartz grains	
42.5	48.4	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, moderately soft, moderately plastic, and moist	

Plant North -2047.983, Plant East -5179.833

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
48.4	49.9	Silt with Sand, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), soft, slightly plastic, and moist	
49.9	52.3	Sandy Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist	
52.3	53.4	Sand with some Gravel, 7.5YR8/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subangular chert with iron patina, 0.6- inch diameter	
53.4	53.8	Sand, 10YR7/6 (yellow) GRADING DOWN to 10YR8/1 (white), loose and moist. Sand is predominately (70%) fine grained but includes (30%) coarse, rounded chert grains	HU3
53.8	54.3	Sandy Gravel with Silt, 10YR5/1 (gray) (stained with manganese?), loose, and very moist. Gravel is rounded chert with iron patina, 0.4- to 0.6-inch diameter. Sand is fine grained	
54.3	56.8	Sand with Gravel, 7.5YR8/2 (pinkish white) with 7.5YR7/6 (reddish yellow) laminations, lightly consolidated, and moist. Sand is fine quartz grains. Gravel is rounded to subangular chert with iron patina, 0.2- to 0.4-inch diameter	
56.8	58.5	Clay, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations GRADING DOWN to 2.5YR8/1 (white) with 2.5YR7/6 (light red) laminations, soft, plastic, and moist	
58.5	60.2	Silt with Sand, 2.5YR8/1 (white) with 2.5YR7/6 (light red) laminations GRADING DOWNWARD to 10YR8/1 (white), soft, very slightly plastic, and moist. Sand is very fine quartz grains	
60.2	61.6	Sand, 10YR8.1 (white) with 10YR7/6 (yellow) laminations, lightly consolidated, and very moist. Sand is fine quartz grains	HU4
61.6	62.0	Sandy Gravel, 10YR8/2 (very pale brown), loose, and very moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.6-inch diameter	HU5

Plant North -2043.464, Plant East -5148.427

9/26/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.4	Silt, 10YR5/2 (grayish brown), soft (loose), nonplastic, and moist. Zone of roots and humic material	
0.4	1.7	Silt, 10YR6/3 (pale brown), soft, nonplastic, and moist. Note: some Gravel at 1.7 ft, subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter	Fill
1.7	16.0	Silt, 10YR8/2 (very pale brown), mottled with 10YR7/6 (yellow), soft, nonplastic, and moist	
16.0	17.8	Silt, 10YR8/1 (white) with frequent thin interbeds of Sand, 10YR7/6 (yellow). Silt is soft, nonplastic, and moist. Sand is very fine quartz grains, lightly consolidated, and moist	HU1
17.8	18.9	Sand, 7.5YR7/6 (reddish yellow), lightly consolidated, and moist. Sand is very fine quartz grains	
18.9	19.8	Slightly Clayey Silt, 10YR7/3 (very pale brown) with little 10YR7/6 (yellow) mottling, soft, plastic, and moist	
19.8	21.3	Clayey Silt with some Gravel, 10YR7/2 (light gray), soft, plastic, and moist. Gravel is subrounded to rounded chert without iron patina, 0.3- to 0.5-inch diameter	
21.3	25.0	Silty Gravelly Sand, 7.5YR6/4 (light brown), dense, and moist. Sand consists of 70% fine quartz grains and 30% coarse to very coarse, subrounded, chert grains. Gravel is subangular to subrounded chert without iron patina, 0.3- to 0.4-inch diameter	HU2
25.0	30.0	Silt, 10YR8/2 (very pale brown) mottled with 10YR8/6 (yellow), soft, moderately plastic, and moist	
30.0	32.3	Silt with Sand, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white), soft, slightly plastic, and moist. Sand is fine quartz grains	
32.3	33.6	Sand, 10YR8/2 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	
33.6	36.7	Silty Sand with Gravel, 10YR7/4 (very pale brown), dense, and moist. Sand consists of 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded chert without iron patina, 0.4- inch diameter	
36.7	38.0	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) with 7.5YR8/1 (white) mottling, soft, plastic, and moist	
38.0	41.0	Silt with Sand, 10YR8/2 (very pale brown), soft, nonplastic, and moist. Sand is very fine quartz grains	
41.0	48.0	Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, plastic, and moist	

Plant North -2043.464, Plant East -5148.427

9/26/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
48.0	49.0	Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
49.0	54.1	Sand, 7.5YR7/6 (reddish yellow) GRADING DOWN to 7.5YR8/1 (white), firm, and moist. Sand is very fine quartz grains	
54.1	55.3	Sand with Gravel, 10YR8/2 (very pale brown), loose, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.3- to 0.4-inch diameter	HU3
55.3	55.5	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains	
55.5	57.4	Clay, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) laminations, moderately hard, plastic, and moist	
57.4	59.4	Silt, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) laminations GRADING DOWN to massive 7.5YR8/1 (white), soft, moderately plastic, and moist	
59.4	61.2	Sand, 10YR8/1 (white), loose, and wet. Sand is very fine quartz grains	
61.2	62.5	Gravelly Sand, 10YR8/4 (very pale brown), loose, and wet. Sand is fine to medium, rounded, quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.7-inch diameter	HU4

Plant North -2043.219, Plant East -5088.804

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(It bgs)	(It bgs)		
0.0	2.7	Sand with Gravel to Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subrounded chert with iron patina, 0.3- to 0.50inch diameter	Fill
2.7	13.1	Silt, 10YR7/1 (light gray) with some 10YR7/6 (yellow) mottling, soft, nonplastic, and moist	HU1
13.1	14.8	Interbedded Fine Sand, 7.5YR6/6 (reddish yellow), and Very Fine Sand, 7.5YR8/1 (white); firm, and moist	
14.8	17.0	Gravelly Sand, 7.5YR5/6 (strong brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 0.6-inch diameter	
17.0	17.7	Sand, 10YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains	
17.7	21.3	Gravelly Sand as 14.8 to 17.0 ft	
21.3	21.7	Sand with Gravel, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.6-inch diameter	
21.7	22.3	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
22.3	26.0	Silt, 10YR8/4 (very pale brown) mottled with 10YR8/1 (white), soft, plastic to moderately plastic, and moist	HU2
26.0	27.1	Sand with little Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
27.1	28.0	Gravelly Sand, 10YR8/1 (white) mottled with 10YR8/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 4 mm- to 0.4-inch diameter	
28.0	28.8	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
28.8	30.0	Sandy Gravel, 10YR8/2 (very pale brown), dense, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter	
30.0	30.8	Sandy Gravel as 28.8 to 30.0 ft but with Silt	
30.8	32.4	Sandy Gravel as 28.8 to 30.0 ft	
32.4	37.0	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/2 (pinkish white), soft, plastic to moderately plastic, and moist	
37.0	40.8	Silt with Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), soft, plastic, and moist	
40.8	41.7	Silt with Clay as 37.0 to 40.8 ft but very soft	

Plant North -2043.219, Plant East -5088.804

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
41.7	43.0	Silt with Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR8/2 (very pale brown), moderately hard, moderately plastic, and moist	
43.0	47.4	Silt with Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately soft with blebs of moderately hard and blebs of soft, slightly to moderately plastic, and moist	HU3
47.4	49.5	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains. Note: with subrounded chert gravel with iron patina, 0.3-inch diameter, at 49.2 to 49.5 ft	
49.5	55.1	Silt with Clay, 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately hard, slightly plastic, and moist	
55.1	58.0	Silt with Sand, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR8/3 (very pale brown), soft, slightly plastic, and moist. Sand is fine quartz grains	
58.0	58.5	Sand, 10YR8/6 (yellow), firm, and moist. Sand is very fine quartz grains	
58.5	60.2	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
60.2	60.5	Sand with Silt and Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.3-inch diameter	HU4
60.5	62.0	Sand with a few Silt interbeds, 10YR8/2 (very pale brown), lightly consolidated to firm, and moist. Sand is fine quartz grains	
62.0	62.1	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is subrounded chert with iron patina, 0.3- inch diameter. Sand is fine quartz grains	HU5
62.1	62.5	Sand with a few Silt interbeds as 60.5 to 62.0 ft	

Plant North -2043.587, Plant East -5058.315

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.2	Silt, 10YR5/1 (gray), soft, nonplastic, and moist. Zone of roots and humic material	
0.2	1.2	Silt, 10YR6/3 (pale brown), soft, nonplastic, and moist	
1.2	5.0	Silt, 10YR7/1 (light gray), hard, nonplastic, and dry	
5.0	5.9	Silt, 10YR7/1 (light gray), moderately hard, nonplastic, and moist	
5.9	17.5	Silt, 10YR8/2 (very pale brown) with 10YR6/6 (brownish yellow) mottling, soft, slightly plastic, and moist	HU1
17.5	20.2	Silt with some Clay and Gravel, 10YR6/6 (brownish yellow) with 10YR8/2 (very pale brown) mottling, moderately soft, plastic, and moist. Gravel consists of subangular to subrounded chert without iron patina, 0.3-to 0.8-inch diameter	
20.2	21.1	Silty Sand with Gravel, 7.5YR6/6 (reddish yellow), moderately dense, and moist. Sand consists of 70% fine quartz grains and 30% medium, rounded, quartz grains. Gravel consists of subangular to subrounded chert with iron patina, 0.3- to 0.4-inch diameter	
21.1	21.4	Silt, 10YR7/1 (light gray), moderately soft, nonplastic, and moist	
21.4	22.6	Silty Sand with some Gravel, 7.5YR5/6 (strong brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.4-inch diameter	
22.6	25.1	Silt, 10YR8/2 (very pale brown) with little 10YR7/6 (yellow) mottling, moderately hard, slightly plastic, and moist	HU2
25.1	25.5	Sandy Gravel, 7.5YR6/6 (reddish yellow)	
25.5	28.0	Silt with trace of Gravel, 7.5YR7/6 (reddish yellow) mottled with 7.5YR7/1 (light gray), soft, slightly plastic, and moist. Gravel is rounded chert with iron patina, 1.0-inch diameter	
28.0	33.0	Silt with little Gravel, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling GRADING DOWN to 10YR7/3 (very pale brown), soft, nonplastic, and moist. Gravel is rounded chert without iron patina, 0.4- to 0.8-inch diameter	
33.0	35.0	Silty Sand with Gravel, 10YR6/6 (brownish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with and without iron patina, 0.2 - to 0.6-inch diameter	
35.0	37.8	Slightly Clayey Silt, 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, plastic, and moist	
37.8	42.0	Silt, 10YR7/2 (light gray) mottled with 10YR6/6 (yellow), soft, moderately plastic, and moist	

Plant North -2043.587, Plant East -5058.315

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
42.0	42.2	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
42.2	51.6	Silty Clay, 7.5YR7/1 (light gray) mottled with 7.5YR6/6 (reddish yellow), moderately hard, moderately plastic, and moist	
51.6	52.7	Sand with little Gravel, 10YR8/1 (white) GRADING DOWN to 10YR8/4 (very pale brown), firm, and moist. Sand is very fine to fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.4- to 0.5-inich diameter	HU3
52.7	53.5	Silty Clay as 42.2 to 51.6 ft	
53.5	54.7	Silty Sand, 10YR8/3 (very pale brown) GRADING DOWN to 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains	
54.7	58.8	Silt with some Clay, 10YR7/6 (yellow) with mottling/laminations of 10YR8/1 (white), moderately hard, moderately plastic, and moist	
58.8	59.9	Silt, 10YR8/4 (very pale brown) with 10YR7/6 (yellow) laminations, soft, slightly plastic, and moist	
59.9	61.8	Sand, 10YR8/4 (very pale brown), loose, and wet. Sand is very fine quartz grains	ни
61.8	62.3	Silt, 10YR8/2 (very pale brown), soft, moderately plastic, and moist	
62.3	62.5	Sandy Gravel, 5YR5/3 (brown), loose, and wet. Gravel is subrounded to rounded chert with iron patina, 0.4- to 1.0-inch diameter. Sand is fine quartz grains	HU5

Plant North -2045.429, Plant East -5030.721

9/13/2012 & 9/17/2012

Depth Depth Lithology Hydrogeologic Unit (ft bgs) 0.0 1.2 Surface soil and pea gravel Fill 1.2 5.0 Glit, 10YR8/1 (white) with little SYR6/8 (reddish vellow), moting, and dry. Fill 5.0 6.5 Silt, 10YR8/1 (white) with traces of 5YR6/8 (reddish vellow), sightly plastic, and moist to very moist. Fill 6.5 100 Silt, 10YR8/1 (white) motile dwith SYR6/8 (reddish vellow), sightly plastic, and moist. Fill 11.2 12.0 Silt, 10YR8/1 (light gray), soft, slightly plastic, and moist. Fill 12.0 12.6 Silt, 10YR7/1 (light gray), soft, slightly plastic, and moist. Fill 12.0 12.6 Silt, 10YR7/1 (light gray), firm, and slightly moist. Silt vill (light gray), firm, and slightly moist. 13.7 14.5 Silt, 10YR8/1 (very pale brown), firm, and slightly moist. HU1 14.5 15.0 and dry to slightly moist. Sand is very fine grained. HU1 15.0 15.6 Sandy Silt, 2:YR8/6 (reddish yellow) motile with 10YR7/1 (light gray). Fill 15.0 Silt, 7:SYR6/8 (reddish yellow) motile dwith 10YR7/1 (light gray). Fill Silt with firth gray, firm	Start	End		
010 020 1.2 Surface soil and pea gravel Fill 1.2 5.0 Silt, 10YR8/1 (white) with little 5YR6/8 (reddish vellow) mottling, and dry Fill 5.0 6.5 Silt, 10YR8/1 (white) with little sets of 5YR6/8 (reddish vellow), slightly plastic, and moist to very moist Silt, 10YR8/1 (white) with traces of 5YR6/8 (reddish vellow), slightly plastic, and moist to very moist 10.0 11.2 (redish vellow), firm, and moist to very moist Silt, 10YR7/1 (light gray) mottled with 5YR6/8 11.2 12.0 Silt, 10YR7/1 (light gray), firm, slightly plastic, and moist Silt, 10YR7/1 (light gray), firm, all slightly moist 12.0 11.2 (redish vellow), firm, and slightly moist Silt, 10YR6/1 (gray) with slight mottling by 7.5YR6/8 13.7 14.5 (redish vellow), firm, and slightly moist Silt, 10YR6/1 (gray) with slight mottling by 7.5YR6/8 14.5 5.0 and ry to slightly moist. Sand is very fine quartz grains Silt, 10YR6/1 (gray) with slight moist. Sand ranges from fine to coarse grained and subangular 15.6 15.6 Sandy Silt, 2YR6/6 (red) sh yellow) with slight Clayey Silt, 7.5YR6/8 (red) sh yellow), which slightly moist. 16.5 17.4 7.5YR6/8 (red) sh yellow) wortled with 10YR7/1 (light gray) form, and slightly moist. Silt slightly moist. 17.4 20.0 Clayes Silt, 10YR6/1 (gray) with some 2.5YR5/8 (red) mottling, firm, slightly plastic, and slightly moist. Silt slightly moist. Gravel is su	Depth (ft bgs)	Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0 1.2 Surface soil and pea gravel Fill 1.2 5.0 1.1 (DYR8/1 (white) with lift Ift SYR6/8 (reddish vellow), and dry to slightly moist 5.0 6.5 Silt, 10YR8/1 (white) with lift staces of SYR6/8 (reddish vellow), and dry to slightly moist 6.5 10.0 Silt, 10YR8/1 (white) moitt and moist 10.0 11.2 Silt, 10YR7/1 (light gray) motted with 5YR6/8 (reddish vellow), slightly moist 11.2 12.0 Silt, 10YR7/1 (light gray), soft, slightly plastic, and moist 11.2 12.0 Silt, 10YR7/1 (light gray), soft, slightly plastic, and moist 12.0 12.6 Silt, 10YR7/1 (light gray), firm, all slightly moist 13.7 14.5 Silt, 10YR6/1 (wellow), firm, and slightly moist 13.7 14.5 Silt, 10YR6/1 (wellow) which slight motiling by 7.5YR6/8 (reddish yellow) in the dry to slightly moist. 15.0 15.6 Sandy Silt, 2.5YR5/6 (red), and slightly moist. 15.0 15.6 Sandy Silt, 2.5YR5/6 (red), and slightly moist. 15.8 16.5 Silt, 7.5YR6/8 (reddish yellow) motted with 10YR7/1 (light gray) motting, firm to stiff, and slightly moist 16.5 17.4 7.5YR6/1 (gray) with some 2.5YR5/8 (red) moist 17.4 20.0 Clayey Silt, 10YR6/1 (gray) with some	(It bgs)	(It bgs)		
1.2 5.0 Silt, 10YR8/1 (white) with little SYR68 (reddish 5.0 6.5 Silt, 10YR8/1 (white) with traces of 5YR6/8 (reddish yellow), sliphdy plastic, and moist to very moist 6.5 100 Silt, 10YR8/1 (white) with gray) mottled with 5YR6/8 (reddish yellow), sliphdy plastic, and moist to very moist 10.0 11.2 Silt, 10YR7/1 (light gray), soft, slightly plastic, and moist 11.2 12.0 Silt, 10YR7/1 (light gray), firm, and moist 12.0 12.6 Silt, 10YR7/1 (light gray), firm, and slightly plastic, and moist 13.7 Silt, 10YR7/1 (light gray), firm, and slightly moist 13.7 Silt, 10YR6/1 (gray) with slight mottling by 7.5YR6/8 14.5 Silt, 10YR8/1 (weight whith sight mottling by 7.5YR6/8 15.0 and yro slightly moist. Sand is very fine quartz grains 15.0 15.6 Sandy Silt, 2.5YR5/6 (red), and slightly moist. Sand ranges from fine to coarse grained and subangular 15.6 15.8 Sandy Silt, 2.5YR5/6 (red) shy ellow) wottle with 10YR7/1 (light gray), firm, and slightly moist. 16.5 17.4 7.5YR6/8 (reddish yellow) woith slight 15.6 15.8 Sandy Silt, 2.5YR5/6 (red), and slightly moist. 16.5 17.4 SYR7/1 (light gray) mottling, firm to stiff, and slightly moist.	0.0	1.2	Surface soil and pea gravel	Fill
Yellow) mothing, and dry 5.0 6.5 5.0 6.5 6.5 10.0 Silt, 10YR8/1 (while) with traces of SYR6/8 (reddish vellow), slightly plastic, and moist to very moist 10.0 11.2 Silt, 10YR7/1 (light gray) mottled with SYR6/8 (reddish vellow), slightly plastic, and moist to very moist 11.2 12.0 Silt, 10YR7/1 (light gray), soft, slightly plastic, and moist 12.0 12.6 Silt, 10YR7/1 (light gray), firm, alightly plastic, and moist 12.0 12.6 Silt, 10YR7/1 (light gray), firm, and slightly moist 13.7 14.5 Silt, 10YR6/1 (gray) with slight mottling by 7.5YR6/8 (reddish yellow), firm, and slightly moist 14.5 15.0 15.0 15.6 15.8 and dry to slightly moist. Sand is very fine grained 15.0 15.6 15.8 Sandy Silt, 2.5YR5/6 (redd), and slightly moist. Sand 15.8 16.5 Silt, 7.5YR6/8 (reddish yellow) with slight 16.5 17.4 Silt, 10YR6/1 (gray) with some 2.5YR5/8 (red) motist 17.4 20.0 Clayey Silt, 7.5YR6/6 (reddish yellow), loose, and motist. Gravel	1.2	5.0	Silt, 10YR8/1 (white) with little 5YR6/8 (reddish	
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21.7 iron patina, 4-mm to 0.4-inch diameter. Sand is fine grained 21.7 22.2 Silt, 10YR7/1 (light gray) with 10YR7/4 (very pale brown) mottling, soft, slightly plastic, and moist	21.2	21.7	moist. Gravel is subrounded to subangular chert with	
21.7 22.2 Silt, 10YR7/1 (light gray) with 10YR7/4 (very pale brown) mottling soft slightly plastic and moist	21.2	21.7	iron patina, 4-mm to 0.4-inch diameter. Sand is fine	
21.7 22.2 Silt, IUYK//I (light gray) with IUYK//4 (very pale brown) mottling, soft, slightly plastic, and moist			grained	
	21.7	22.2	SIIT, IUYK//I (light gray) with IUYK//4 (very pale	

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
22.2	23.7	Sandy Gravel, 10YR7/4 (very pale brown), loose and moist. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.7-inch diameter. Sand consists of 60% fine grains and 40 % coarse, rounded, chert grains	
23.7	26.4	Sand with Gravel, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with light iron patina, 0.3- to 0.8-inch diameter	HU2
26.4	26.8	Sand with little Gravel, 10YR8/2 (very pale brown) stained with 10YR7/4 (reddish yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with light iron patina, 0.3 to 0.4-inch diameter	
26.8	32.2	Silt with Sand, 10YR8/1 (very pale brown) mottled with 10YR7/6 (yellow), moderately soft, nonplastic, and moist. Sand is fine quartz grains	
32.2	33.9	Sandy Gravel, 7.5YR6/6 (reddish yellow), dense, and moist. Gravel is subangular to subrounded chert without iron patina, 0.3- to 0.8-inch diameter. Sand is fine grained	
33.9	34.1	Sand, 10YR8/1 (white), lightly consolidated, and moist. Sand is fine quartz grains	
34.1	34.6	Sandy Gravel, 10YR8/2 (very pale brown), lightly consolidated, and moist. Gravel is subangular chert with light iron patina, 0.2- to 0.4-inch diameter. Sand is fine grained	
34.6	36.3	Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/3 (pink), soft, very plastic, and moist	
36.3	40.0	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) with 7.5YR8/1 (white) mottling, soft, moderately plastic, and moist	
40.0	42.4	Silt with some Sand, 10YR8/2 (very pale brown) with frequent mottling by 10YR7/6 (yellow), moderately hard, nonplastic, and moist. Sand is fine quartz grains	
42.4	47.5	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately hard to hard, slightly plastic, and moist	
47.5	51.1	Silt, 7.5YR8/1 (white) with some 7.5YR7/6 (reddish yellow) mottling, soft, moderately plastic, and moist	11112
51.1	51.9	Silt as 47.5 to 51.1 with Gravel. Gravel is rounded chert without iron patina, 4-mm to 0.3-inch diameter	ноз
51.9	52.1	Gravelly Sand with "salt and pepper" texture - 10YR8/1 (white) and 10YR5/1 (gray) - loose, and moist. Sand consists of both fine grains and rounded coarse grains. Gravel is subrounded chert without iron patina, 4-mm to 0.5-inch diameter	

Plant North -2045.429, Plant East -5030.721 9/13/2012 & 9/17/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
52.1	55.0	Silt, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling, moderately soft, nonplastic, and moist	
55.0	59.9	Silt with minor interbeds of Silt with Sand, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist. Sand is fine quartz grains	
59.9	60.8	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
60.8	61.2	Sand as 59.9 to 60.8 ft but with 7.5YR8/1 (white) and 7.5YR7/6 (reddish yellow) "beds"	HU4
61.2	62.2	Sand as 59.9 to 60.8 ft but colored 7.5YR8/4 (pink)	
62.2	62.5	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is subangular chert with iron patina, 4- mm to 0.8-inch diameter. Sand is fine grained	HU5

Plant North -2048.2, Plant East -4995.49

8/17/2012

Start Denth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		or obcorder out
0.0	1.2	Soil - made land - limestone gravel	FILL
1.2	2.6	Silt, 10YR7/3 (very pale brown) with some mottling by 10YR8/1 (white), loose to slightly firm, and dry to slightly moist	
2.6	6.0	Silt, 10YR8/1 (white) with mottling by 10YR7/8 (yellow), slightly moist	
6.0	10.0	Silt, 10YR7/1 (light gray) mottled and speckled with 10YR6/8 (brownish yellow), firm GRADING DOWN to soft, and slightly moist to moist	
10.0	12.4	Silt, 10YR7/1 (light gray) mottled with 7.5YR6/8 (reddish yellow), soft, and slightly moist	
12.4	14.0	Silt, 10YR7/2 (light gray) speckled with 10YR7/8 (yellow), firm, and slightly moist	
14.0	15.0	Silt with little Clay, 10YR6/6 (brownish yellow) banded with 7.5YR6/6 (reddish yellow), firm, and slightly moist	HU1
15.0	16.4	Silt with very little Sand, 10YR7/3 (very pale brown), soft to firm, and moist. Sand is very fine quartz grains	
16.4	18.0	Silt with little Clay, 10YR7/8 (yellow), firm, and moist	
18.0	19.5	Clayey Silt, 10YR7/8 (yellow), firm, slightly plastic, and moist	
19.5	20.0	Gravelly Clayey Silt, 10YR7/8 (yellow), very firm to stiff, and slightly moist. Gravel is subangular chert, 0.2- to 0.5-inch diameter	
20.0	25.0	Sandy Silt with some Gravel, 7.5YR5/8 (strong brown) mottled with 7.5YR7/1 (light gray) and 7.5YR6/1 (gray), firm, and moist. Gravel is subrounded chert, 0.2- to 0.8-inch diameter	
25.0	25.7	Silty Sand, 7.5YR7/1 (light gray), firm, and very moist. Sand consists of fine and coarse grains. Coarse grains are 1- to 3-mm in diameter and colored white and rose	
25.7	27.0	Silty Sand, 7.5YR7/6 (reddish brown) with inclusions of 7.5YR8/1 (white), firm, and moist. Sand consists of fine and coarse grains. Coarse grains are 1- to 3-mm in diameter (trace subangular grains, 5- to 6-mm diameter)	
27.0	27.2	Silty Sand, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains	
27.2	28.0	Gravelly Silty Sand, 7.5YR6/8 (reddish yellow). Sand is fine to coarse (1- to 4-mm diameter), subangular grains. Gravel is subangular to subrounded chert, 0.5 to 0.8-inch diameter	HU2
28.0	30.6	Silty Sand with trace Gravel, 10YR7/1 (light gray), firm, and moist. Sand is fine quartz grains. Gravel is colored rose and white, 0.5-inch diameter	

Plant North -2048.2, Plant East -4995.49

8/17/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
30.6	33.0	Gravelly Sand, 7.5YR6/8 (reddish yellow), semi-loose, and very moist. Sand is coarse grains (1- to 5-mm diameter). Gravel is subangular chert, 0.2- to 0.5-inch diameter	
33.0	33.4	Silty Sand with little Gravel, 10YR7/1 (light gray), firm, and moist	
33.4	35.9	Silty Gravelly Sand, 7.5YR6/6 (reddish yellow),moderately soft to firm, and moist. Gravel (10% of soil) is subangular chert, 0.2- to 1.0-inch diameter	
35.9	37.5	Sandy Silt, 7.5YR7/8 (reddish brown) with inclusions of 7.5YR7/1 (light gray), soft to firm, and moist	
37.5	39.4	Silty Clay, 7.5YR7/1 (light gray) speckled with 7.5YR3/1 (very dark gray), firm, slightly plastic to plastic, and moist	
39.4	40.0	Silt, 10YR6/3 (pale brown) with zones of 10YR4/1 (dark gray), moderately soft, moderately plastic, and moist	
40.0	42.6	Silt, 10YR7/1 (light gray), soft, moderately plastic, and moist	
42.6	45.0	Very Clayey Silt, 10YR7/3 (very pale brown) mottled with 5YR5/8 (yellowish red), firm to stiff, plastic, and slightly moist	
45.0	48.0	Silt, 7.5YR5/8 (strong brown) with some 7.5YR7/1 (light gray) banding, firm, slightly plastic, and slightly moist	
48.0	49.0	Silty Clay, 7.5YR5/8 (strong brown) with 7.5YR7/1 (light gray) banding, firm, plastic, and slightly moist	111.12
49.0	51.3	Silt with trace Sand, 10YR7/1 (light gray), soft, and very moist. Sand is very fine quartz grains	1105
51.3	52.2	Sandy Silt, 10YR6/8 (yellowish brown), with 10YR7/2 (light gray) mottling, firm, and slightly moist. Sand is very fine quartz grains	
52.2	52.4	Gravelly Sandy Silt, 10YR6/8 (yellowish brown), with 10YR7/2 (light gray) mottling, firm, and slightly moist. Sand is very fine quartz grains	
52.4	55.0	Clayey Silt, 10YR7/2 (light gray) with 10YR7/8 (yellow) mottling, firm, plastic, and slightly moist	
55.0	57.5	Silty Clay, 10YR7/1 (light gray) with vertical mottling by 2.5YR4/8 (red), stiff, moderately plastic, and slightly moist	
57.5	58.8	Sandy Silt, 10YR7/6 (yellow) with laminations of 7.5YR6/8 (reddish yellow), firm, and moist	
58.8	60.8	Clayey Silt, 10YR7/2 (light gray) mottled with 7.5YR6/8 (reddish yellow), firm, and slightly moist	
60.8	62.0	Sand, 7.5YR6/8 (reddish yellow), soft to loose, and wet	

Plant North -2048.2, Plant East -4995.49	8/17/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
62.0	62.7	Sand, 10YR8/1 (white), loose, and wet. Sand is very fine quartz grains	HU4
62.7	64.5	Silt, 10YR8/1 (white), soft, plastic, and wet	
64.5	65.0	Sand and Gravel, wet. Sand is composed of fine and coarse grains. Gravel is subrounded chert, 0.5- to 1.0-inch diameter	HU5
Plant North -2043.984, Plant East -4973.547

9/17/2012

Start Depth	End Depth	Lithology		Hydrogeologic Unit
(ft bgs)	(ft bgs)			
		Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand		
0.0	3.1	is fine quartz grains. Gravel is subrounded to		Fill
		subangular chert with iron patina, 4 mm- to 0.5-inch		
			-	
2.1	15.0	Silt, 10 Y R //2 (light gray) mottled with 10 Y R //4 (very		
3.1	15.2	pale brown), soft, nonplastic to slightly plastic, and		
		moist Silt with little Clay and Gravel 10VR7/2 (light grav)		
		with some 10VP7/3 (very pale brown) mottling		HU1
15.2	18.6	moderately hard moderately plastic and moist Gravel		
13.2	10.0	is rounded to subangular chert without iron pating 0.3-		
		inch diameter		
		Gravely Sand with little Silt, 10YR5/4 (yellowish		
10.6	10.0	brown), firm, and slightly moist. Sand is fine quartz		
18.6	18.9	grains. Gravel is subangular to subrounded chert		
		without(?) iron patina, 4 mm- to 0.4-inch diameter		
		Silty Sand with some Gravel, 10YR7/2 (light gray),		
18.0	10.0	firm, and moist. Sand is very fine quartz grains. Gravel		
10.9	19.9	is subrounded to subangular chert without iron patina,		
		0.3- to 0.4-inch diameter		
		Silty Sand with little Gravel, 7.5YR7/2 (pinkish gray),		
		firm, and moist. Sand consists of 70% fine quartz		
19.9	21.4	grains and 30% very coarse, subrounded, chert grains.		
		Gravel is subrounded chert without(?) iron patina, 4		
		mm- to 0.3-inch diameter		
21.4	22.6	to 10VP7/6 (vallow) mottled with 10VP8/1 (white)		
21.4	22.0	firm and moist Sand is very fine quartz grains		
		Gravelly Sand with Silt, 10YR6/6 (brownish vellow).		
		dense, and moist. Sand is fine quartz grains. Gravel is		
22.6	23.6	subrounded to subangular chert without iron patina. 0.4-		
		to 0.8-inch diameter		HU2
22.6	25.1	Sand, 7.5YR7/6 (reddish yellow), firm, and moist.		
23.6	25.1	Sand is fine quartz grains		
		Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with		
25.1	25.9	7.5YR8/1 (white), soft, slightly plastic, and moist.		
		Sand is fine quartz grains		
		Sand with Gravel, 7.5YR6/8 (reddish yellow) with		
	• • •	some 7.5YR8/1 (white) mottling, firm-to-dense, and		
25.9	28.1	moist. Sand is fine quartz grains. Gravel is subrounded		
		to subangular chert without iron patina, 4 mm- to 0.8-		
		Inch diameter Sand 10VP7/3 (vory pale brown) firm and moist		
28.1	29.1	Sand, 101 K //3 (very pare brown), 11111, and moist.		
20.1	30.0	Sand us fille quality granis		
27.1	50.0	Sand with Gravel 10VR6/4 (light vellowish brown)		
		firm-to-dense and moist Sand is 80% fine quartz		
30.0	32.1	grains and 20% coarse subrounded chert grains		
50.0	52.1	Gravel is subrounded chert with(?) iron pating 0.3 to		
		0.9-inch diameter		

Plant North -2043.984, Plant East -4973.547

9/17/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology		Hydrogeologic Unit
32.1	35.6	Silt, 7.5YR7/4 (pink), soft, moderately plastic, and moist		
35.6	37.5	Silt with Sand, 10YR8/3 (very pale brown), soft, nonplastic, and moist. Sand is very fine quartz grains		
37.5	44.9	Silt GRADING DOWN to Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic to plastic, and moist		
44.9	48.1	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), very soft, moderately plastic, and moist		
48.1	48.6	Silty Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains		IIII2
48.6	50.1	Silt as 44.9 to 48.1 ft		HU3
50.1	50.8	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains		
50.8	51.2	Clay, 7.5YR6/4 (light brown) mottled with 7.5YR8/1 (white), moderately hard, plastic, and moist		
51.2	54.6	Silt with Clay, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling, moderately soft, moderately plastic, and moist		
54.6	55.6	Clay as 50.8 to 51.2 ft		
55.6	57.4	Silt with some Sand, 10YR8/3 (very pale brown), soft, slightly plastic, and moist. Sand is fine quartz grains		
57.4	62.7	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains		
62.7	65.0	Sand with Gravel, 10YR8/3 (very pale brown), firm, and wet. Sand is 80% fine quartz grains and 20% coarse, rounded, chert gains. Gravel is rounded to subrounded chert without iron patina, 4 mm- to 0.5- inch diameter		HU4

Plant North -2066.264, Plant East -5194.135

Start	End	Lithology	Undrogoologia Unit
Depin (ft bos)	Depth (ft bos)	Lithology	Hydrogeologic Unit
(10 055)	(10 050)	Missing	
0.0	5.0	Fill: Sandy Silty Gravel. 10YR7/1 (light grav). loose.	
3.8	4.2	and moist. Gravel is rounded chert, 0.8- to 1.1-inch	
		diameter. Sand is fine quartz grains	Missing and Fill
		Fill: Gravelly Sand, 2.5YR6/8 (light red), loose, and	Missing and Fill
4.2	4.8	moist. Sand is fine quartz grains. Gravel is rounded	
1.8	4.0	Wood fragments 10VP2/1 (black)	
4.0	4.7	Silt, 10YR7/1 (light gray) with greenish tinge, soft,	
4.9	5.0	nonplastic, and moist	
5.0	5.1	Silt as 4.9 to 5.0 ft	HU1
		Silt, 10YR8/1 (white) mottled with 10YR7/6 (vellow),	
5.1	17.2	moderately soft to soft, nonplastic, and moist	
		Sand, 7.5YR7/6 (reddish yellow), lightly consolidated,	
17.2	19.5	and moist. Sand is very fine GRADING DOWN to fine	
		quartz grains	
		Sand with Gravel, 10YR//4 (very pale brown), hard, and moist. Sand is find quarta grains. Gravel is	
19.5	19.8	subrounded to subangular chert 0.2- to 0.4-inch	
		diameter	
		Clayey Silt with some Gravel, 10YR7/1 (light gray),	
19.8	21.7	hard, moderately plastic, and slightly moist. Gravel is	
		diameter	
		Sandy Silt with Gravel 10YR7/2 (light grav)	
		moderately soft, slightly plastic, and moist. Sand is fine	
21.7	23.0	quartz grains. Gravel is subangular to subrounded chert	
		without iron patina, 4 mm- to 0.6-inch diameter	
		Sandy Gravel with Silt, 10YR7/4 (very pale brown),	HI12
23.0	24.7	hard, and moist. Gravel is rounded to subrounded chert	1102
		without iron patina, 0.3- to 0.7-inch diameter. Sand is	
		Sandy Silt, 10YR8/1 (white) mottled with 10YR7/6	
24.7	25.7	(yellow), moderately soft, nonplastic, and moist	
		Sand, 10YR7/6 (yellow) with some 10YR8/1 (white)	
25.7	27.3	laminations, lightly consolidated, and moist. Sand is	
		tine quartz grains Sandy Silt with some Gravel 7 5YR8/2 (ninkish white)	
		mottled with 7.5YR8/1 (white). moderately soft.	
27.3	32.5	nonplastic, and moist. Sand is fine quartz grains.	
		Gravel is rounded to subrounded chert with iron patina,	
		0.3- to 1.0-inch diameter	
		Sandy Shity Gravel, 10YK //4 (very pale brown), lightly consolidated and moist. Gravel is rounded to	
32.5	35.7	subrounded chert with iron patina. 0.3- to 1.0-inch	
		diameter. Sand is fine quartz grains	

Plant North -2066.264, Plant East -5194.135

L	Start	End		
l	Depth	Depth	Lithology	Hydrogeologic Unit
l	(ft bgs)	(ft bgs)		
ŀ		× 8,	Clayey Silt 10YR7/4 (nink) very soft slightly plastic	
l	35.7	37.4	and moist	
ŀ			Sandy Silt_10VR8/1 (white) mottled with 10VR7/6	
l	37.4	45.0	(vellow) soft nonplastic and moist	
ŀ			Silt 7 5VR7/4 (nink) mottled with 7 5VR8/1 (white)	
l	45.0	46.0	soft moderately plastic and moist	
ŀ			soft, moderatery plastic, and moist	
l			Silt with Gravel, 7.5YR6/6 (reddish yellow), soft,	
l	46.0	46.3	moderately plastic, and moist. Gravel is rounded to	
l			subrounded chert with iron patina, 0.3-inch diameter	
ŀ			Silt. 7.5YR6/6 (reddish vellow), soft, moderately	
l	46.3	46.5	plastic, and moist	
ŀ			Sand, 7.5YR7/6 (reddish yellow) mottled with	
l			7.5YR8/1 (white), lightly consolidated/ moderately	
l	46.5	48.1	soft, slightly plastic, and moist. Sand is very fine quartz	
l			grains	
ľ	40.1	5 0.0	Clayey Silt, mottled 7.5YR7/4 (pink) and 7.5YR8/1	
l	48.1	50.0	(white), soft to moderately soft, plastic, and moist	
ľ			Sandy Silt, 7.5YR8/2 (pinkish white) mottled with	
l	50.0	517	7.5YR7/4 (pink) and with some 7.5YR3/1 (very dark	
l	50.0	51.7	gray) blebs (manganese?), soft, moderately plastic to	
			slightly plastic, and moist	
ſ			Sand, 7.5YR8/2 (pinkish white) GRADING DOWN to	
l	51.7	52.1	7.5YR7/6 (reddish yellow), lightly consolidated, and	
L			moist. Sand is fine quartz grains	
l	52.1	523	Clay, 7.5YR7/2 (pinkish gray), moderately soft, plastic,	
L	52.1	52.5	and moist	
l			Sand, 7.5YR7/4 (pink) with few 7.5YR8/1 (white)	
l	52.3	54.5	laminations, lightly consolidated, and moist. Sand is	HU3
L			fine quartz grains	
l			Gravelly Sand, 7.5YR 7/4 (pink), loose, and very moist.	
l	54.5	54.8	Sand is fine quartz grains. Gravel is subrounded to	
l			rounded chert with iron patina, 0.3- to 0.8-inch	
ŀ			diameter	
l			Sand with trace Graver, 7.5 F K 7/4 (pink), 100se, and	
l	54.8	55.9	very moist. Sand is line quartz grains. Gravel is	
l			o 2 includies to subrounded chert with from patina, 4 mm- to	
ŀ			0.3-men diameter	
l			Sandy Gravel, 7.5YR7/4 (pink), loose, and very moist.	
l	55.9	56.2	Gravel is rounded to subrounded chert with iron patina,	
l			4 mm- to 0.3-inch diameter. Sand is fine quartz grains	
ŀ			Sand 10YR8/4 (very nale brown) loose and wet	
l	56.2	56.4	Sand is very fine quartz grains	
┠			Gravelly Sand, 10YR6/6 (brownish vellow), loose and	
l			moist. Sand is predominately fine quartz grains but	
I	564	56.8	includes coarse subrounded chert grains Gravel is	
I	20.1	20.0	rounded to subrounded chert with iron patina 0.2- to	
l			1.0-inch diameter	

Plant North -2066.264, Plant East -5194.135

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
56.8	58.4	Slightly Clayey Silt, 10YR8/1 (white) with abundant 10YR7/6 (yellow) laminations, moderately soft, moderately plastic, and moist	
58.4	59.8	Clayey Silt, 5YR8/1 (white) with abundant 5YR7/8 (reddish yellow) laminations, moderately soft, plastic, and moist	
59.8	62.6	Silt, 10YR8/6 (yellow) with 10YR8/1 (white) mottling, soft, slightly plastic, and moist	
62.6	64.2	Sand, 10YR8/4 (very pale brown) with 10YR7/6 (yellow) laminations GRADING DOWN to 10YR8/1 (white), lightly consolidated, and moist. Sand is very fine to fine quartz grains	
64.2	65.0	Gravelly Sand, 10YR8/2 (very pale brown), loose, and moist. Sand is predominately fine quartz grains but includes 15 to 20% coarse, subangular, chert grains. Gravel is subrounded to rounded chert with iron patina, 0.2- to 1.0-inch diameter	HU4

Plant North -2065.901, Plant East -5119.305

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	0.5	Silt, 10YR6/3 (pale brown), soft (crumbles to powder), nonplastic, and dry	
0.5	3.4	Sandy Gravel, 5YR5/8 (yellowish red), loose, and moist. Gravel is rounded to subrounded chert with iron patina, 0.2- to 0.8-inch diameter. Sand is fine quartz grains	Fill
3.4	5.0	Silt, 10YR7/1 (light gray) with green tinge, moderately soft, nonplastic, and slightly moist	
5.0	15.0	Silt, 10YR7/1 (light gray) with some 10YR7/6 (yellow) mottling	
15.0	18.4	Silt, 10YR6/4 (light yellowish brown) with some 10YR7/1 (light gray) mottling	HU2
18.4	22.3	Clayey Silt, 10YR7/2 (light gray), moderately hard, slightly to moderately plastic, and slightly moist. Trace of subrounded to subangular chert gravel (with little iron patina), 0.2- to 0.4-inch diameter	
22.3	25.0	Silty Sandy Gravel, 10YR6/3 (pale brown), dense/hard, and moist. Gravel is subangular chert with little iron patina, 4 mm- to 0.3-inch diameter. Sand is fine quartz grains	
25.0	28.8	Interbedded Sand and Silt, 10YR6/4 (light yellowish brown) with some 10YR8/1 (white) mottling, lightly consolidated/soft, nonplastic to slightly plastic, and moist. Sand is very fine quartz grains	
28.8	33.1	Gravelly Sand, 10YR6/3 (pale brown) mottled with 10YR8/1 (white), moderately dense/hard, and moist. Sand is very fine quartz grains. Gravel is subrounded chert with light iron patina, 0.3- to 1.1-inch diameter	HU3
33.1	34.5	Gravelly Sand as 28.8 to 33.1 ft but with some Clay	
34.5	35.8	Sand, 10YR7/4 (very pale brown), lightly consolidated, and moist. Sand is fine quartz grains	
35.8	37.5	Silty Sandy Gravel, 10YR7/2 (light gray), moderately dense/hard, and moist. Gravel is rounded to subangular chert with iron patina, 0.3- to 1.0-inch diameter. Sand is fine quartz grains	
37.5	38.7	Silty Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, lightly consolidated/soft, nonplastic, and moist. Sand is fine quartz grains	
38.7	39.8	Clayey Silt, 10YR7/2 (light gray), soft, plastic, and very moist	
39.8	40.6	Sand, 10YR8/1 (white), loose, and wet. Sand is very fine quartz grains	
40.6	42.4	Clayey Silt, 10YR8/2 (very pale brown) with light 10YR7/6 (yellow) mottling, moderately soft, moderately plastic, and moist	

Plant North -2065.901, Plant East -5119.305

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
42.4	43.4	Sand, 10YR8/2 (very pale brown), lightly consolidated, and very moist. Sand is fine quartz grains	
43.4	45.8	Clayey Silt, 10YR8/2 (very pale brown) with light mottling by 10YR7/6 (yellow), moderately soft, moderately plastic, and moist	
45.8	49.6	Silt with Sand, 10YR8/2 (very pale brown) with some 10YR7/4 (very pale brown) mottling and laminations, soft, slightly plastic to nonplastic, and moist. Sand is very fine quartz grains	111/2
49.6	52.4	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) mottling, lightly consolidated, and moist. Sand is very fine quartz grains	HUS
52.4	54.2	Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations and staining, lightly consolidated and moist. Sand is fine quartz grains	
54.2	56.9	Gravelly Sand, 10YR7/2 (light gray), loose, and moist. Sand is fine to medium quartz grains. Gravel is subrounded to rounded chert without iron patina, 0.3- to 0.4-inch diameter	
56.9	58.4	Clayey Silt, 7.5YR7/4 (pink) with some 7.5YR7/1 (light gray) mottling, soft, moderately plastic, and moist	
58.4	60.0	Silt with some Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, soft, slightly plastic, and moist. Sand is fine quartz grains	
60.0	60.2	Clay, 10YR8/1 (white), soft, plastic, and moist	
60.2	62.0	Sand with Silt, 10YR8/1 (white) with some 10YR7/6 (yellow) mottling, lightly consolidated/soft, nonplastic, and moist. Sand is very fine quartz grains	
62.0	63.5	Sand, 10YR7/6 (yellow), lightly consolidated, and moist. Sand is fine quartz grains	HU4
63.5	63.8	Clay as 60.0 to 60.2 ft	
63.8	64.0	Sandy Gravel, 10YR6/4 (light yellowish brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.2- to 0.4-inch diameter. Sand is equal parts fine quartz grains and medium and coarse, subrounded, chert grains	HU5

Plant North -2066.201, Plant East -5088.967

9/6/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.4	Fill: Silty Gravel, 10YR7/1 (light gray), loose, nonplastic, and dry. Gravel is subangular limestone, 4 mm- to 0.6-inch diameter (dense gravel aggregate/DGA)	Fill
0.4	3.8	Fill: Silty Sandy Gravel, 2.5YR5/8 (red), moderately dense/hard, and moist. Gravel is subrounded to subangular chert with iron patina, 0.4- to 1.0-inch diameter. Sand is fine quartz grains	
3.8	5.1	Silt, 10YR7/1 (light gray), soft, nonplastic, and moist	
5.1	14.8	Silt, 10YR7/3 (very pale brown) mottled with 10YR7/1 (light gray), soft, nonplastic to slightly plastic, and moist	
14.8	15.8	Silt, 10YR8/3 (very pale brown), moderately hard, nonplastic, and slightly moist	
15.8	17.3	Sand, 10YR8/2 (very pale brown) with little 10YR7/4 (very pale brown) mottling, lightly consolidated/soft, nonplastic, and moist. Sand is very fine quartz grains	HU1
17.3	21.6	Clayey Silt with trace of Gravel, 10YR7/1 (light gray), moderately hard, slightly to moderately plastic, and moist. Gravel is rounded chert with light iron patina, 0.2- to 0.3-inch diameter	
21.6	25.5	Gravelly Sand with Silt, 10YR7/4 (very pale brown), dense/hard, and moist. Sand is predominately fine quartz grains but includes some coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 0.2- to 0.8-inch diameter	
25.5	26.4	Clayey Silt, 10YR7/3 (very pale brown) with blebs of 10YR8/1 (white), soft, plastic, and moist	
26.4	28.1	Interbeds of Sand (fine quartz grains) and Clayey Silt, 7.5YR7/8 (reddish yellow) with blebs of 7.5YR8/1 (white), soft, slightly plastic, and moist	HU2
28.1	33.8	Sandy Silt, 10YR8/2 (very pale brown) with light 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist	
33.8	35.5	Gravelly Sand with Silt, 10YR8/2 (very pale brown) with 10YR8/1 (white) mottling GRADING DOWN to 7.5YR7/4 (pink), dense/hard, and moist. Sand is fine to medium quartz grains. Gravel is rounded to subangular chert with iron patina, 0.2- to 0.8-inch diameter	
35.5	37.9	Clayey Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, plastic, and moist	
37.9	42.8	Slightly Clayey Silt, 10YR8/1 (white) with heavy 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist	

Plant North -2066.201, Plant East -5088.967

9/6/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
42.8	53.3	Silt, 10YR8/2 (very pale brown) mottled with 10YR6/6 (brownish yellow), moderately soft, slightly plastic, and moist	HU3
53.3	58.6	Silty Sand, 10YR8/1 (white) GRADING DOWN to 10YR7/6 (yellow) mottled with 10YR8/1 (white), lightly consolidated/soft, nonplastic to slightly plastic, and moist. Sand is fine quartz grains	
58.6	60.8	Clayey Silt, 10YR8/1 (white) with light 10YR7/6 (yellow) laminations, moderately soft, plastic, and moist	
60.8	65.6	Sand, 10YR8/4 (very pale brown) GRADING DOWN to 10YR8/1 (white), lightly consolidated, and very moist. Sand is fine quartz grains	HU4
65.6	66.0	Sandy Gravel, 7.5YR8/2 (pinkish white), loose, and wet. Gravel is subrounded to subangular chert with iron patina, 0.3- to 1.0-inch diameter. Sand is 85% fine quartz grains and 15% coarse, subangular, chert grains	HU5

Plant North -2065.945, Plant East -5059.023

9/27/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.2	Sandy Gravel, 2.5YR6/6 (light red), dense, and moist. Gravel is subangular to subrounded chert with iron patina, 0.4- to 0.8-inch diameter. Sand is fine quartz grains	FILL
2.2	6.0	Silt, 10YR7/2 (light gray) mottled with 10YR6/1 (gray), moderately hard, nonplastic, and moist	
6.0	14.7	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist	
14.7	15.8	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand is very fine quartz grains	
15.8	16.7	Interbedded Silt, 7.5YR7/4 (pink), soft, slightly plastic, and moist AND Sand, 7.5YR6/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains	IIIII
16.7	19.0	Clay, 7.5YR7/6 (reddish yellow), moderately hard, plastic, and moist	HUI
19.0	20.0	Clay with some Silt and some Gravel, 10YR7/2 (light gray) with 10YR7/4 (very pale brown) mottling. Gravel is subangular chert without iron patina, 0.3- to 0.4-inch diameter AND rounded chert without iron patina, 0.6-inch diameter	
20.0	23.8	Silt with Sand, 10YR8/1 (white) with 10YR7/6 (yellow) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
23.8	25.7	Silty Gravel with Sand, 7.5YR6/6 (reddish yellow) with some 7.5YR3/1 (very dark gray) stain (manganese?), dense, and moist. Gravel is subrounded to subangular chert without iron patina, 4-mm to 0.6- inch diameter. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains	
25.7	26.1	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
26.1	26.4	Gravelly Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is rounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter	HU2
26.4	33.1	Silt with Sand, 10YR8/3 (very pale brown) with 10YR7/6 (yellow) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
33.1	34.7	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains	
34.7	35.2	Silty Gravel with Sand, 7.5YR6/4 (light brown), dense, and moist. Gravel is subrounded chert without iron patina, 4-mm to 0.4-inch diameter	
35.2	39.5	Silt with Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, plastic, and moist	

Plant North -2065.945, Plant East -5059.023

9/27/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
39.5	43.2	Silt, 10YR8/1 (white) mottled with 10YR7/6 (yellow), soft, slightly plastic, and moist	
43.2	44.9	Silt with Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white)	
44.9	48.0	Silt, 10YR8/2 (very pale brown) mottled with 7.5YR5/8 (strong brown), moderately soft, moderately plastic, and moist	
48.0	48.9	Clay with Silt, 10YR8/3 (very pale brown), moderately hard, plastic, and moist	
48.9	49.6	Silt with Sand and Gravel, 10YR8/2 (very pale brown), moderately hard, nonplastic, and moist. Sand is very fine quartz grains. Gravel is subrounded chert without iron patina, 4-mm to 0.7-inch diameter	
49.6	50.0	Sand, 10YR8/1 (white) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	HU3
50.0	51.0	Clay with Silt, 10YR8/2 (very pale brown) mottled with 7.5YR7/6 (reddish yellow), moderately hard, plastic, and moist	
51.0	54.9	Silt with Sand, 10YR8/1 (white) mottled with 10YR7/6 (yellow) and 7.5YR7/6 (reddish yellow), moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
54.9	56.8	Clay with some Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately soft, plastic, and moist	
56.8	58.1	Sand, 10YR8/2 (very pale brown) with 10YR8/6 (yellow) staining, lightly consolidated, and moist. Sand is very fine quartz grains	
58.1	60.2	Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, moderately plastic, and moist	
60.2	65.0	Sand, 10YR8/2 (very pale brown) with 7.5YR8/4 (pink) mottling, lightly consolidated, and moist. Sand is very fine quartz grains	HU4
65.0	65.2	Sandy Gravel, 10YR4/2 (dark grayish brown) (stained with manganese?), loose, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter. Sand is fine quartz grains	HU5

Plant North -2066.342, Plant East -5029.003

9/21/2012

Depth (ft bgs) Lithology Hydrogeologic Unit (ft bgs) Gravelly Sand, 2.5YR6/4 (light reddish brown), loose, and moist. Sand is 80% fine quartz grains and 20% File 0.0 2.1 coarse, subrounded, quartz grains, Gravel is subangular to subrounded chert with iron patina, 4-mm to 0.5-inch diameter Fill 2.1 5.1 Sill, 10/R7/1 (light gray), moderately soft, nonplastic, and moist Fill 5.1 17.6 Sill, 10/R7/2 (light gray) with 10/R7/6 (yellow) mottling, soft, slightly plastic, and moist HU1 7.6 Sill, 10/R7/2 (light gray) with 10/R7/6 (yellow), moderately hard, moderately plastic, and moist HU1 20.1 Clin controling by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist HU1 20.1 Gravelly Sand with some Silt, 7.5YR6/4 (light brown), mottling by 7.5YR7/7 (prediab rown), flows, and wet. Sand is very fine quartz grains HU1 20.1 21.6 Sand, Silt with some Clay, 10YR7/3 (very pale trown), soft, slightly plastic, and moist. Sand is very fine quartz grains HU2 21.6 22.8 Sand, IVR7/3 (very pale trown), lose, and moist. Gravel is subrounded to subrounded chert with iron patina, 0.3 - to 0.8 - inch diameter. Sand is fine quartz grains HU2 22.8 Sand, IVR7/3 (very pale trown), form, and moist. Sand Gravel with	Start	End		
(ft bgs) (ft bgs) Fill 0.0 2.1 coarse, subrounded, quartz grains. Gravel is subangular to subrounded chert with iron patina, 4-mm to 0.5-inch diameter Fill 2.1 5.1 Silt, 10YR7/1 (light gray), moderately soft, nonplastic, and moist. Fill 3.1 17.6 Bilt, 10YR7/2 (light gray) with 10YR7/6 (yellow) moist Fill 3.1 7.6 Bilt, 10YR7/2 (light gray) with 10YR7/6 (yellow) moist HU1 17.6 18.3 Sand, 7.5YR64 (light brown), loose, and wet. Sand is very fine quartz grains HU1 20.1 Sand, 7.5YR64 (light brown), loose, and wet. Sand (light some Silt, 7.5YR64 (light brown), moderately hastic, and moist HU1 20.1 Carcelly Sand with some Silt, 7.5YR64 (light brown), moderately hastic, and moist Sand Silt with some Cay, 10YR8/2 (very pale 21.6 22.0 Sandy Silt with some Cay, 10YR8/2 (very pale brown), soft, sightly plastic, and wet 23.7 24.3 Silt GRADING DOWN to Sand, 10YR7/3 (very pale brown), loose, and moist. 24.3 Silt With some Clay and little Gravel I, 10YR7/4 (very pale brown), soft, sightly plastic, and moist. 23.7 24.3 Silt With some Clay and little Gravel I, 00X8.7 (very pale HU2 24.3 Sodo gravel	Depth	Depth	Lithology	Hydrogeologic Unit
Gravelly Sand, 2.5YR64 (light reddish brown), loose, and moist. Sand is 80% fine quartz grains and 20% Fill 0.0 2.1 coarse, subrounded, quartz grains. Gravel is subangular to subrounded chert with iron patina, 4-mm to 0.5-inch diameter Fill 2.1 5.1 Silt, 10YR7/2 (light gray), moderately soft, nonplastic, and moist Fill 17.6 Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist HU1 18.3 Sand, 7.5YR64 (light brown), loose, and wet. Sand is very fine quartz grains HU1 20.1 Silt with futle Clay, 7.5YR8/1 (while) with heavy and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter HU1 21.6 Sandy Silt with some Silt, 7.5YR64 (light brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter HU1 21.6 Sandy Silt with some Clay and little Gravel, 10YR7/3 (very pale brown), soft, slightly plastic, and moist. Sand is very fine quartz grains HU2 22.8 Sand, 10YR7/3 (Very pale brown), firm, and moist. Sand is fine quartz grains HU2 24.3 Solt GRADING DOWN to Sand, 10YR7/3 (very pale brown), sock, slightly plastic, and moist. Sand is fine quartz grains. HU2 26.0 27.0 Sand is fine quartz grains. Silt With Sine Clay and little Gravel,	(ft bgs)	(ft bgs)		
and moist. Sand is 80% fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 4-mm to 0.5-inch diameter Fill 2.1 5.1 17.6 Silt, 10YR7/2 (light gray), moderately soft, nonplastic, and moist Fill 5.1 17.6 Silt, 10YR7/2 (light gray), imoderately soft, nonplastic, and moist HU1 17.6 18.3 vort, fine quartz grains HU1 18.3 20.1 motifing, soft, slightly plastic, and moist HU1 18.3 20.1 motifing, soft, slightly plastic, and moist HU1 20.1 21.6 Gravelly Sand with some Silt, 7.5YR8/1 (white) with heavy inmoderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter HU1 21.6 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and moist HU2 22.8 23.7 brown), soft, and inite Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter, Sand is fine quartz grains HU2 24.3 26.0 27.0 Sand is fine quartz grains 30.0 32.5 Slit GRADING DOWN to 7.5YR8/2 (pinkish white), diameter, 7.5YR7/4 (pink), moderately hand, slightly plastic, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.8-inch diameter, 7.5YR7/4 (pink), moderately hand, slightly plastic, and moist.			Gravelly Sand, 2.5YR6/4 (light reddish brown), loose,	
0.0 2.1 coarse, subrounded, quartz grains. Gravel is subangular to subrounded chert with iron patina, 4-mm to 0.5-inch diameter Fill 2.1 5.1 Silt, 10YR7/2 (light gray), moderately soft, nonplastic, and moist Fill 2.1 5.1 Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist HU1 17.6 Silt, 0YR7/2 (light brown), loose, and wet. Sand is very fine quartz grains HU1 20.1 Silt with little Clay, 7.5YR8/1 (white) with heavy inform of the soft is by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist HU1 20.1 21.6 Gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter HU1 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, nonplastic, and moist. Gravel pating grains Silt GRADING DOWN to Sand, 10YR7/3 (very pale brown), loose, and wet. Sand is very fine quartz grains HU2 22.7 24.3 Sandy Gravel with little Silt as 24.3 to 26.0 ft Silt with some Clay and little Gravel, 10YR7/1 (light gray), moderately hard, plastic, and moist. Sand is fine quartz grains HU2 24.3 26.0 Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains HU2 25.0 Silt with little Silt as 24.3 to 26.0 ft Silt with intle Silt as 24.3 to 26.0 ft 30.0 32.5 Silt			and moist. Sand is 80% fine quartz grains and 20%	
diameter 2.1 5.1 311, 107R7/1 (light gray), moderately soft, nonplastic, and moist and moist 17.6 511, 107R7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist 17.6 18.3 Sand, 7.57K6/4 (light brown), loose, and wet. Sand is 18.3 20.1 mottling by 7.5YR7/6 (reddish yellow), moderately plastic, and moist 20.1 Gravelly Sand with some Silt, 7.5YR6/4 (light brown), loose, and wet. Sand is fine quartz grains. 20.1 Class of and with some Silt, 7.5YR6/4 (light brown), loose, and wet. Sand is fine quartz grains. 21.6 Class of Silt with some Clay, 10YR2/2 (very pale brown), loose, and wet. Sand is fine quartz grains. 22.0 22.8 Silt with some Clay and little Gravel, 10YR7/1 (light grav), moderately hard, plastic, and moist. 22.7 24.3 Silt with some Clay and little Gravel, 10YR7/1 (light grav), moderately hard, plastic, and moist. 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/1 (light grav), moderately hard, plastic, and moist. 24.3 26.0 subrounded chert with iron patina, 0.3- to 0.8-inch diameter. 27.0 Sand is fine quartz grains HU2 24.3 Sand is fine quartz grains Sand is fine quartz grains 30.0 S	0.0	2.1	coarse, subrounded, quartz grains. Gravel is subangular	Fill
diameter 2.1 5.1 Silt, 10YR7/1 (light gray), moderately soft, nonplastic, and moist 5.1 17.6 Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) motifing, soft, stightly plastic, and moist 17.6 18.3 Sand, 7.5YR6/4 (light brown), loose, and wet. Sand is very fine quartz grains Silt with little Clay, 7.5YR8/1 (white) with heavy motifing by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist 20.1 Gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iroon patina, 4-mm to 0.4-inch diameter 21.6 22.0 22.0 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand is very fine quartz grains Silt GRADING DOWN to Sand, 10YR7/3 (very pale brown), soft, slightly plastic, and moist 23.7 brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3 to 0.8-inch diameter. Sand is fine quartz grains 24.3 26.0 27.0 27.3 30.0 32.5 Silt, 10YR7/4 (pink), moderately hard, plastic, and moist. Sand is fine quartz grains 30.0 32.5 Silt, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist. Sand is fine quartz grains 30.0 32.5			to subrounded chert with iron patina, 4-mm to 0.5-inch	
2.1 Silt, 10YR7/1 (light gray), moderately soft, nonplastic, and moist 3.1 17.6 Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist 17.6 18.3 Sand, 7.5YR6/4 (light brown), loose, and wet. Sand is is very fine quartz grains 20.1 Silt with little Clay, 7.5YR8/1 (white) with heavy mottling by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist. HU1 20.1 Cla moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter Sand, 10YR7/3 (Very pale brown), loose, and wet. 21.6 22.0 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand, 10YR7/3 (Very pale brown), loose, and wet. 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand is very fine quartz grains Silt GRADING DOWN to Sand, 10YR7/3 (very pale 22.8 Sand, 10YR7/3 (Very pale brown), firm, and moist. Sand of Gravel with little Silt, 10YR7/2 (very pale brown), loose, and moist. HU2 24.3 26.0 Sand, Gravel with little Silt as 24.3 to 26.0 ft Silt with 10YR8/2 (very pale brown) motist. HU2 26.0 27.0 Sand, 10YR8/2 (very pale brown), firm, and moist. Sand with Gravel, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist. Sand, 10YR8/2 (very pale brown) motist. Sand, 10YR8/2			diameter	
21 21 21 and moist 311 17.6 Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist 17.6 117.6 Sand, 7.5YR6/4 (light brown), loose, and wet. Sand is were fine quartz grains HU1 17.6 18.3 vert fine quartz grains Silt with little Clay, 7.5YR8/1 (white) with heavy 18.3 11.0 18.3 20.1 mottling by 7.5YR8/1 (white) with heavy 18.3 11.0 18.3 20.1 mottled with some Silt, 7.5YR6/4 (light brown), moderately plastic, and moist 11.0 20.1 21.6 gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately plastic, and moist 11.0 20.1 21.6 gravelly Sand with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet 11.0 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. 11.0 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/3 (very pale brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3 to 0.8-inch diameter. Sand is fine quartz grains 11.0 24.3 26.0 27.0 Sand, 10YR7/2 (very pale brown), firm, and moist. 11.0 25.0 27.0 Sand, 10YR7/2 (very pale brown), firm, and moist. 11.0<	21	51	Silt, 10YR7/1 (light gray), moderately soft, nonplastic,	
5.1 17.6 Sit, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist Sand, 7.5YR6/4 (light brown), loose, and wet. Sand is very fine quartz grains 17.6 18.3 20.1 Sit with fitte Clay, 7.5YR8/4 (white) with heavy hard, moderately plastic, and moist 20.1 Cravelly Sand with some Sit, 7.5YR6/4 (light brown), moderately phard, moderately plastic, and moist 20.1 21.6 21.6 22.0 Sand, 0YR7/3 (Very pale brown), loose, and wet. Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand is very fine quartz grains Sitt GRADING DOWN to Sand, 10YR7/3 (very pale verw), moderately hard, plastic, and moist. Sandy Gravel with little Sitt, 10YR7/4 (very pale verw), brown, soft, nonplastic, and moist. Sand is fine quartz grains. 27.0 27.3 Sand, is fine quartz grains. Sand, is fine quartz grains.	2.1	5.1	and moist	
mottling, soft, slightly plastic, and moist 17.6 18.3 18.3 vand, 7.5YR6/4 (light brown), loose, and wet. Sand is very fine quartz grains Silt with little Clay, 7.5YR8/1 (white) with heavy 18.3 20.1 20.1 mottring by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately dense, and moist. 20.1 21.6 gravelly Sand with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand is very fine quartz grains and is Very fine quartz grains Sand (GRADING DOWN to Sand, 10YR7/3 (very pale 22.8 23.7 brown), soft, nonplastic, and moist. sand of arvel with little Silt, 10YR7/4 (very pale 24.3 26.0 subrounded chert with iron patina, 0.3- to 0.8-inch diameter. sand, 01VR8/2 (very pale brown), firm, and moist. 30.0 32.5 Silt, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist. 30.0 32.5 Silt, 7.5YR7/4 (pink), moderatel	5.1	17.6	Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow)	
17.6 18.3 Sand, 7.5 YR04 (light brown), loose, and wet. Sand is HU1 18.3 Silt with little Clay, 7.5 YR8/1 (white) with heavy Silt with little Clay, 7.5 YR8/1 (white) with heavy 18.3 20.1 motting by 7.5 YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist 20.1 21.6 Gravelly Sand with some Silt, 7.5 YR6/4 (light brown), iron patina, 4-mm to 0.4-inch diameter 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, sightly plastic, and wet. 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. 23.7 brown), soft, sightly plastic, and moist. Sand is func quartz grains 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/3 (very pale brown), loose, and moist. 24.3 26.0 brown), soft, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3 to 0.8-inch diameter. Sand is fine quartz grains 27.0 27.3 Sandy Gravel with little Silt, 10YR7/4 (very pale brown) 27.0 27.3 Sandy Gravel with little Silt as 24.3 to 26.0 ft 30.0 32.5 Silt with little Silt as 24.3 to 26.0 ft 30.1 Silt with little Silt as 24.3 to 26.0 ft 30.2 Silt with Gravel, 7.5YR7/6 (reddish yellow) Gravel with lit			mottling, soft, slightly plastic, and moist	
very fine quartz grains Silt with litte Clay, 7.5YR8/1 (white) with heavy 18.3 20.1 mottling by 7.5YR7/6 (reddish yellow), moderately hard, moderately plastic, and moist Gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. grains 22.8 23.7 Silt GRADING DOWN to Sand, 10YR7/3 (very pale brown), soft, nonplastic, and moist. Gravel is fine quartz grains 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/1 (light gray), moderately hard, plastic, and moist. Sand y Gravel with little Silt 10YR7/4 (very pale brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter. Sand is fine quartz grains 27.0 27.3 Sand, 10YR8/2 (very pale brown) 27.3 Sand, 0YR8/2 (very pale brown) 30.0 32.5 Silt, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist. Sand with Gravel, 7.5YR7/4 (pink) soft, nonplastic, and moist. Sand is very fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.8- inch diameter <td>17.6</td> <td>18.3</td> <td>Sand, 7.5 Y R6/4 (light brown), loose, and wet. Sand is</td> <td>HUI</td>	17.6	18.3	Sand, 7.5 Y R6/4 (light brown), loose, and wet. Sand is	HUI
18.3 20.1 motting by 7.5YR/6 (reddish yellow), moderately hard, moderately plastic, and moist 20.1 motting by 7.5YR/6 (reddish yellow), moderately framework (light brown), moderately dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. Sand is fine quartz grains 22.8 Sand, 10YR7/3 (Very pale brown), loose, and moist. Sand is very fine quartz grains 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/1 (light grav), moderately hard, plastic, and moist 24.3 Sandy Gravel with little Silt, 10YR7/4 (very pale 24.3 Sand (10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains 26.0 brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter. Sand is fine quartz grains 27.0 27.3 Sandy Gravel with little Silt as 24.3 to 26.0 ft Silt with little Silt of plastic, and moist. Sand is fine quartz grains 30.0 30.0 32.5 Sald of fine quartz grains 30.0 Sand with Gravel, 7.5YR7/6 (reddish yellow) GRADING DOWN to 7.5YR8/2 (pinkish white), dense, and moist. Sand is very fine quartz grains. Gravel is subrounded			very fine quartz grains	
18.3 20.1 morting by 7.5 YR/6 (redists) yellow), moderately plastic, and moist. 20.1 Gravelly Sand with some Silt, 7.5YR6/4 (light brown), moderately plastic, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet. 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. 22.1 Sand, Silt with some Clay and little Gravel, 10YR7/3 (very pale brown), soft, nonplastic, and moist. 22.8 23.7 brown), soft, nonplastic, and moist. 23.7 24.3 Silt with some Clay and little Gravel, 10YR7/1 (light gray), moderately hard, plastic, and moist 24.3 26.0 brown), loose, and moist. Gravel is subangular to subrounded chert with irron patina, 0.3- to 0.8-inch diameter. Sand is fine quartz grains. 27.0 Sandy Gravel with little Silt as 24.3 to 26.0 ft Silt with little Sand, 10YR8/2 (very pale brown) Silt with little Sand, 10YR8/2 (very pale brown) 27.3 30.0 motist. Sand is fine quartz grains. 30.0 32.5 Sand with Gravel, 7.5YR7/6 (yellow), soft, nonplastic, and moist. Sand with Gravel, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist. 32.5 34.0 dense, and moist. Sand is very fine quartz grains. Gravel is s	10.2	20.1	Sift with fittle Clay, 7.54 K8/1 (white) with neavy	
20.1 21.6 20.1 21.6 grains. Gravel is subrounded to subangular chert with iron patina, 4-mm to 0.4-inch diameter 21.6 22.0 Sandy Silt with some Clay, 10YR8/2 (very pale brown), soft, slightly plastic, and wet 22.0 22.8 Sand, 10YR7/3 (Very pale brown), loose, and wet. Saind is very fine quartz grains Silt GRADING DOWN to Sand, 10YR7/3 (very pale 22.8 23.7 prown), soft, nonplastic, and moist. Sand is fine quartz grains Silt With some Clay and little Gravel, 10YR7/1 (light gray), moderately hard, plastic, and moist Sandy Gravel with little Silt, 10YR7/4 (very pale prown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter. Sand is fine quartz grains 26.0 27.0 Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains 27.0 27.3 Sandy Gravel with little Silt as 24.3 to 26.0 ft Silt with bittle Sand, 10YR8/2 (very pale brown) 27.0 27.3 Sandy Gravel, 7.5YR7/6 (reddish yellow) GRADING DOWN to 7.5YR8/2 (pinkish white), 30.0 32.5 Silt, 7.5YR7/4 (pink), moderately hard, slightly plastic, an	18.3	20.1	mottling by 7.5 Y R 7/6 (reddisn yellow), moderately	
20.1 21.6 District State Stat			naru, moderately plastic, and moist Gravelly Sand with some Silt 7 5VP6/4 (light brown)	
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34.0 35.0 Sand, for K//o (yenow), finn, and moist. Sand is very fine to fine quartz grains 35.0 39.0 Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft. plastic, and moist			Sand 10VR7/6 (vellow) firm and moist Sand is yory	
35.0 39.0 Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, plastic, and moist	34.0	35.0	fine to fine quartz grains	
35.0 39.0 soft, plastic, and moist			Clay 7 5YR7/4 (nink) mottled with 7 5YR8/1 (white)	
	35.0	39.0	soft, plastic, and moist	

Plant North -2066.342, Plant East -5029.003

9/21/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Ну	drogeologic Unit
39.0	42.6	Silt with little Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist. Sand is very fine quartz grains		
42.6	47.1	Silt with little Clay, 10YR7/3 (very pale brown) with 10YR7/6 (yellow) and 10YR7/1 (light gray) mottling, soft, slightly plastic, and moist		
47.1	50.0	Silt with Clay, 7.5YR7/1 (light gray) mottled with 7.5YR7/4 (pink), soft, moderately plastic, and moist		
50.0	51.6	Silt, 10YR7/1 (light gray), soft, moderately plastic, and moist		HU3
51.6	52.6	Silt with Sand, 10YR7/1 (light gray), firm/moderately soft, nonplastic, and moist. Sand is very fine quartz grains		
52.6	53.7	Sand, 7.5YR7/6 (reddish yellow) with 7.5YR8/1 (white) mottling, firm, and moist. Sand is fine quartz grains		
53.7	58.4	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white), soft, moderately plastic, and moist		
58.4	61.0	Clay with Silt, 10YR8/2 (very pale brown), soft, plastic, and moist		
61.0	64.4	Sand, 10YR8/2 (very pale brown) GRADING DOWN to 10YR7/3 (very pale brown), lightly consolidated to loose, and moist to wet. Sand is very fine quartz grains		HU4
64.4	65.0	Silt with little Clay, 10YR8/1 (white), soft, moderately plastic, and moist		
65.0	65.1	Sand as 61.0 to 64.4 ft		
65.1	65.2	Sandy Gravel. Gravel is subangular chert with iron patina, 0.4- to 1.0 inch diameter		HU5

Plant North -2066.381, Plant East -4994.899

Start Depth	End Depth	Lithology	Hydrogoologic Unit
(ft bgs)	(ft bgs)	Limblogy	nyur ogeologic Unit
0.0	1.0	Concrete and gravel	FILL
1.0	5.0	Silt 10YR7/1 (light gray) firm and moist	
1.0	5.0	Silt, 10YR7/1 (light gray) mottled with 7.5YR7/8	
5.0	7.0	(reddish vellow), firm, and slightly moist	
		Silt, 10YR7/1 (light gray) mottled with 7.5YR7/8	
7.0	10.0	(reddish yellow) and containing blebs of 10YR4/1	
		(dark gray), firm, and slightly moist	
		Silt, 10YR7/1 (light gray) with slight mottling by	
10.0	13.5	10YR6/8 (brownish yellow), moderately firm, and	
		slightly moist	
13.5	15.0	Silt, 10YR6/8 (brownish yellow), moderately firm, and	
		slightly moist	
15.0	18.5	Silt, 10 Y R //4 (very pale brown), firm, and slightly	HU1
		moist	
		Gravelly Silty Clay, 10YR7/2 (light gray) intermixed	
18 5	20.0	with 10YR5/8 (dark yellowish brown), stiff, and	
10.5	20.0	slightly moist. Gravel is subrounded chert with and	
		without (white) iron patina, 0.5- to 1.2-inch diameter	
		Silty Clayey Sand with trace Gravel, 10YR5/6	
20.0	23.5	(yellowish brown), firm, and slightly moist. Sand is	
		medium to coarse grained	
		Clayey Sand, 10YR7/1 (light gray) mottled with	
23.5	25.0	10YR6/8 (brownish yellow), firm, and slightly moist.	
		Sand is fine to medium quartz grains	
		Clayey Gravelly Sand, 7.5YR5/8 (strong brown), firm,	
25.0	28.7	and slightly moist. Sand is fine to coarse grained.	
		Gravel is subrounded to subangular chert, 0.5- to 0.8-	
		inch diameter	11112
28.7	30.0	Silty Sand, $10 \text{ Y R} //2$ (light gray), semi-firm, and	HU2
		Silgnuy moist Silty Gravally Sand 7 5VP6/8 (raddish vallow) Sand	
30.0	35.0	is medium to coarse quartz grains. Gravel (5 to 10% of	
50.0	55.9	sample) is chert 0.2 to 1.0 -inch diameter	
		Intermixed Silts, 10YR7/1 (light gray) and 7.5YR7/8	
35.9	41.0	(reddish vellow), moderately soft, and very moist	
41.0	41.5	Sandy Silt, 10YR5/4 (yellowish brown), moderately	
41.0	41.5	soft, and moist	
41.5	11.5	Silt, 10YR7/1 (light gray) mottled with 5YR6/8	
+1.5		(reddish yellow)	
44.5	45.0	Silty Sand, 10YR7/2 (light gray), firm, and slightly	
	12.0	moist	
1.5.0		Silty Sand, 7.5YR7/1 (light gray) mottled with	
45.0	52.0	/.5 Y Ko/8 (reddish yellow), moderately firm, and	
		slightly moist	
		Silty Gravelly Sand, 10YR7/1 (light gray) mottled with	11112
52.0	55.0	7.5YR6/8 (reddish yellow), firm, and slightly moist.	поз
		Gravel is subrounded chert, 0.2- to 0.8-inch diameter	
			I I

Plant North -2066.381, Plant East -4994.899

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
55.0	56.3	Clayey Silt, 10YR7/1 (light gray) mottled with 7.5YR5/8 (strong brown), stiff, and moist	
56.3	57.0	Sand, 10YR7/1 (light gray), loose, and saturated (flowing)	
57.0	57.5	Silty Clay, 7.5YR5/8 (strong brown), firm, and slightly moist	
57.5	58.6	No recovery	
58.6	60.9	Clayey Silt, 5YR7/6 (reddish yellow) mottled with 5YR8/1 (white), moderately hard, slightly plastic, and moist	
60.9	62.1	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) laminations, lightly consolidated, and moist. Sand is very fine quartz grains	
62.1	63.7	Silt, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, soft, slightly plastic, and moist	HU4
63.7	64.1	Sand, 10YR8/1 (white), loose, and wet. Sand is very fine quartz grains	
64.1	64.4	Gravelly Sand, 10YR7/3 (very pale brown), loose, and wet. Sand is very fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.2- to 0.5-inch diameter	
64.4	65.0	Sandy Gravel, 10YR7/4 (very pale brown), loose, and wet. Gravel is subangular to subrounded chert with iron patina, 0.3- to 1.0-inch diameter. Sand is 80% very fine quartz grains and 20% coarse, rounded, chert with iron patina grains	HU5

Plant North -2066.175, Plant East -4974.143

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
		Gravelly Silt, 10YR7/1 (light gray), loose, and slightly	
0.0	1.8	moist. Gravel is subangular limestone, 0.2- to 0.4-inch	FILL
		diameter (dense gravel aggregate/DGA)	
1.8	42	Silt, 10YR7/1 (light gray) with light blue tinge, soft,	
1.0	1.2	nonplastic, and slightly moist	
		Silt, 10YR8/2 (very pale brown) with variable mottling	
4.2	14.9	by 10 Y R //6 (yellow), soft, slightly plastic, and moist.	
		(manganese?) beginning at 13.0 ft	
		Silt. 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling.	
14.9	18.9	moderately soft, moderately plastic, and moist	
		Clever Silt with little Grouel 10VB7/1 (light grou)	
		moderately hard to hard, slightly to moderately plastic	
18.9	20.6	and moist Gravel is rounded chert predominately 0.3-	HU1
		inch diameter but up to 0.7-inch diameter	
		Crosselles Conducith Cilt 7 5VDC/C (Deddich collow)	
		firm and maint Sand is year fine quartz graine Gravel	
20.6	21.1	is subangular to subrounded chert with iron pating. A	
		mm- to 0.4-inch diameter	
		Clayey Silt with some Gravel, 7.5YR7/1 (light gray)	
21.1	22.2	mottled with 7.5YR7/6 (reddish yellow), moderately	
		soft, plastic, and moist	
22.2	22.5	Silt, 10YR8/1 (white), soft, nonplastic, and moist	
22.5	23.2	Sand, 7.5YR6/6 (reddish yellow), firm, and moist.	
		Sand is fine quartz grains	
23.2	23.6	Gravelly Sand with Silt as 20.6 to 21.1 ft	
22.6	24.0	Silt with Sand, 7.5 Y R8/1 (white) with little 7.5 Y R7/6	
23.0	24.9	(yellow) motuling, moderately solt, nonplastic, and	
		moist. Sand is very fine quartz granis	
		Sandy Gravel, 7.5YR7/4 (pink), dense, and slightly	
24.9	26.0	moist. Gravel is subangular chert with no-to-little iron	
		patina, 4-mm to 0.6-inch diameter. Sand is 60% fine	
		quartz granis and 40% coarse, rounded, chert granis	
		Silty Gravelly Sand, 10YR7/4 (very pale brown),	
26.0	27.2	dense, and moist. Sand is fine quartz grains. Gravel is	
		to 1.0 inch diameter	
		Slightly Clavey Silt 7 5YR7/6 (reddish yellow)	
27.2	28.9	mottled with 7.5YR8/1 (white), soft, moderately	HU2
		plastic, and moist	
		Silty Gravelly Sand, 7.5YR5/6 (strong brown), dense,	
		and moist. Sand is 60% fine quartz grains and 40%	
28.9	33.2	coarse, rounded, chert grains. Gravel is subrounded to	
		subangular chert with iron patina, 4 mm- to 0.7-inch	
		diameter	

Plant North -2066.175, Plant East -4974.143

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
33.2	34.5	Sand GRADING DOWN to Sand with Gravel, 7.5YR8/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subangular chert with iron patina, 0.4- to 0.5-inch diameter	
34.5	35.3	Sandy Gravel with Silt, 10YR5/1 (gray) (stained with manganese?) GRADING DOWN to 10YR6/4 (light yellowish brown), dense, and moist. Gravel is subangular to subrounded chert with iron patina, 4 mm- to 0.8-inch diameter. Sand is fine quartz grains	
35.3	39.0	Slightly Clayey Silt, 7.5YR7/4 (pink) with 7.5YR7/1 (light gray) mottling GRADING DOWN to 7.5YR6/1 (gray), moderately hard, slightly plastic, and moist	
39.0	42.1	Silt, 10YR7/3 (very pale brown), moderately soft to moderately hard, slightly plastic, and moist	
42.1	43.6	Slightly Clayey Silt, 10YR6/2 (light brownish gray), moderately hard, moderately plastic, and moist	
43.6	44.8	Silt, 10YR6/3 (pale brown), moderately soft, nonplastic, and moist	
44.8	47.0	Slightly Clayey Silt as 42.1 to 43.6 ft	1
47.0	50.5	Slightly Clayey Silt, 7.5YR6/8 (reddish yellow) mottled with 7.5YR7/1 (light gray), moderately hard, slightly plastic, and moist	HU3
50.5	54.6	Silt, 10YR8/3 (very pale brown) mottled with 10YR7/1 (light gray) and 10YR7/6 (yellow), moderately soft, slightly plastic, and moist	
54.6	58.3	Slightly Clayey Silt, 7.5YR8/4 (pink) mottled with 7.5YR8/1 (white) and 7.5YR6/8 (reddish yellow), moderately hard, slightly plastic, and moist	
58.3	61.0	Silt with Sand, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, nonplastic, and moist. Sand is very fine quartz grains	
61.0	63.0	Sand, 10YR8/3 (very pale brown) with some 10YR7/8 (yellow) laminations, firm, and moist. Sand is very fine quartz grains	HU4
63.0	64.0	Silt, 10YR8/1 (white) with 10YR7/6 (yellow) laminations, loose, nonplastic, and moist]
64.0	65.0	Gravelly Sand, 7.5YR7/3 (pink), loose, and wet. Sand is 80% fine quartz grains and 20% coarse, subangular, chert grains. Gravel is subangular to subrounded chert with iron patina, 4 mm- to 1.0-inch diameter	HU5

Plant North -2085.988, Plant East -5035.164

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	3.9	Silty Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.4- to 0.6-inch diameter	FILL
3.9	14.9	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic to slightly plastic, and moist	
14.9	15.2	Sand, 10YR8/1 (white), dense, and moist. Sand is very fine quartz grains	
15.2	18.3	Silt, 10YR6/6 (brownish yellow) mottled with 10YR8/2 (very pale brown), soft, nonplastic, and moist	HU1
18.3	19.8	Silty Clay, 10YR7/1 (light gray), moderately hard, moderately plastic, and moist	
19.8	20.9	Silt with some Gravel, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist. Gravel is rounded chert without iron patina, 0.5- inch diameter	
20.9	21.5	Sand with Gravel, 7.5YR6/6 (reddish yellow), lightly consolidated, and moist. Sand is fine to medium, rounded, quartz grains. Gravel is subangular chert without iron patina, 0.3- to 0.4-inch diameter	
21.5	22.3	Silty Gravel with Sand, 7.5YR6/4 (light brown), dense, and moist. Gravel is rounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter. Sand is fine quartz grains	
22.3	22.8	Clay, 10YR7/1 (light gray), moderately soft, plastic, and moist	
22.8	24.4	Gravelly Sand, 7.5YR7/4 (pink) with some staining by 7.5YR3/1 (very dark gray) (manganese?), firm, and moist. Sand is fine quartz grains. Gravel is subangular chert with iron patina, 0.4- to 0.6-inch diameter	
24.4	26.8	Sand with Gravel, 10YR7/3 (very pale brown), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.4- to 0.6-inch diameter	HU2
26.8	27.4	Sandy Gravel, 10YR8/3 (very pale brown), loose, and moist. Gravel is rounded to subrounded chert without iron patina, 0.3- to 0.4-inch diameter	
27.4	30.9	Silt, 10YR7/3 (very pale brown) with little mottling by 10YR8/1 (white), soft, nonplastic, and moist	
30.9	31.7	Silt with some Gravel, 10YR7/3 (very pale brown) with little mottling by 10YR8/1 (white), soft, plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.4-inch diameter	

Plant North -2085.988, Plant East -5035.164

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
31.7	32.5	Sand with Gravel, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.4- inch diameter	
32.5	35.0	No recovery	NO RECOVERY
35.0	35.6	Silt with little Clay and Gravel, 10YR7/4 (very pale brown), soft, moderately plastic, and moist. Gravel is rounded chert without iron patina, 4-mm to 0.3-inch diameter	
35.6	39.5	Silt with little Clay, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white), soft, plastic, and moist	
39.5	43.1	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/4 (very pale brown), soft, nonplastic, and moist	
43.1	45.0	Silt with little Clay, 10YR7/1 (light gray) with some 10YR6/6 (brownish yellow) mottling, moderately hard, plastic, and moist. Note: red tinge over 44.5 to 45.0 ft	
45.0	47.5	Silt with Sand, 10YR8/1 (white) with some 10YR6/6 (brownish yellow) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
47.5	53.0	Silt with Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist. Sand is very fine quartz grains	
53.0	53.4	Sand, 10YR8/1 (white) with 2.5YR8/3 (pink) tinge, firm, and moist. Sand is very fine quartz grains	HU3
53.4	54.5	Sandy Gravel, 10YR8/1 (white) with some 10YR7/6 (yellow) staining, firm/moderately consolidated, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter. Sand is fine quartz grains	
54.5	55.0	Sand with some Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.4- to 0.8-inch diameter	
55.0	56.9	Silt with some Clay, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, soft, slightly to moderately plastic, and moist	
56.9	58.4	Silt with some Sand, 10YR8/2 (very pale brown), soft, slightly plastic, and moist. Sand is very fine quartz grains	
58.4	59.1	Sand, 10YR8/1 (white), loose, and wet. Sand is very fine quartz grains	
59.1	61.1	Silty Sand with Silt interbeds, 10YR8/1 (white) with 10YR7/6 (yellow) laminations, lightly consolidated, and moist. Sand is very fine quartz grains	
61.1	62.6	Sand, 10YR8/6 (yellow), firm, and moist. Sand is very fine quartz grains	

Plant North -2085.988, Plant East -5035.164

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
62.6	64.6	Sand, 10YR8/3 (very pale brown), loose, and wet. Sand is very fine quartz grains	HU4
64.6	65.0	Silt, 10YR8/1 (white), soft, plastic, and moist	
65.0	65.3	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
65.3	67.5	Sandy Gravel, 10YR6/3 (pale brown), loose, and wet. Gravel is subangular to subrounded chert, 0.3- to 1.0- inch diameter. Sand is 75% fine to medium, rounded, quartz grains and 25% coarse, rounded, chert grains. Note: 10YR5/1 (gray) staining (manganese?) over 66.1 to 66.5 ft	HU5

Plant North -2096.095, Plant East -5089.217

9/6/2012

Start	End		
Depth	Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	1.0	No description	
1.0	4.0	Sandy Gravel, 2.5YR6/6 (light red), moderately dense/hard, and moist. Gravel is subrounded chert with	Fill
1.0	4.0	iron patina, 0.3- to 0.4-inch diameter. Sand is fine quartz grains	
4.0	5.0	Silt, 10YR7/1 (light gray) with bluish tinge, moderately hard, nonplastic, and moist	
5.0	15.0	Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow) staining and mottling, soft, nonplastic, and moist	
15.0	18.5	Slightly Clayey Silt with some Sand, 7.5YR7/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, soft, moderately plastic, and moist	
18.5	19.9	Clayey Silt, 10YR7/1 (light gray) with 10YR7/4 (very pale brown) mottling, moderately hard to hard, moderately plastic, and moist	HU1
19.9	20.0	Sand, 10YR6/6 (brownish yellow), loose, and moist. Sand is very coarse, angular, chert grains	
20.0	20.9	Silt, 10YR6/6 (brownish yellow), soft, slightly plastic, and moist	
20.9	23.4	Clayey Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow) mottling, moderately hard, moderately plastic, and moist. Trace chert gravel without iron patina, rounded, 0.2-inch diameter	
23.4	24.0	Sandy Gravel with Silt, 7.5YR5/6 (strong brown), moderately dense/hard, and moist. Gravel is subangular chert with light iron patina, 0.2- to 0.3-inch diameter	
24.0	24.8	Sandy Silt, 10YR8/1 (white), soft, nonplastic, and moist	
24.8	25.0	Sandy Gravel, 10YR6/6 (brownish yellow), loose, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3-inch diameter. Sand is fine quartz grains	
25.0	25.7	Silt, 10YR6/4 (light yellowish brown), soft, moderately plastic, and moist	
25.7	29.8	Interbedded Silt with some Sand and slightly Clayey Silt, 10YR8/1 (white) with light 10YR7/6 (yellow) staining and mottling, moderately soft, slightly to moderately plastic, and moist	HU2
29.8	30.0	Sandy Gravel, 10YR6/6 (brownish yellow), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter. Sand is fine quartz grains	
30.0	30.5	Sand, 7.5YR7/4 (pink), lightly consolidated, and moist. Sand is fine quartz grains	
30.5	33.1	Sandy Gravel as at 29.8 to 30.0 ft	
33.1	34.4	Sandy Gravel as above but with silt	

Plant North -2096.095, Plant East -5089.217

9/6/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
34.4	34.7	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is rounded to subangular chert with iron patina, 0.3- to 1.0-inch diameter. Sand is fine to medium quartz grains	
34.7	38.6	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, moderately plastic, and moist	
38.6	44.3	Silt, 10YR8/2 (very pale brown) with light 10YR7/6 (yellow) laminations, soft, nonplastic, and soft	
44.3	45.1	Clay, 10YR7/1 (light gray) with 10YR6/4 (light yellowish brown) mottling, moderately soft, plastic, and moist	
45.1	46.6	Silt, 10YR7/3 (very pale brown), soft, nonplastic, and moist	
46.6	54.5	Sand, 10YR8/2 (very pale brown) with some light 10YR7/6 (yellow) laminations, lightly consolidated, and moist. Sand is very fine grains	
54.5	54.7	Sandy Gravel, 10YR6/3 (pale brown), loose, and moist. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter. Sand is very fine quartz grains	HU3
54.7	55.0	Sand as at 46.6 to 54.5 ft	
55.0	56.9	Sand, 10YR7/6 (yellow) with light 10YR8/1 (white) mottling, lightly consolidated, and moist. Sand is fine quartz grains	
56.9	58.4	Slightly Clayey Silt, 10YR8/2 (very pale brown) with light 10YR7/6 (yellow) laminations, moderately soft, slightly plastic, and moist	
58.4	59.9	Sand, 10YR8/1 (white), lightly consolidated, and moist. Sand is very fine quartz grains	
59.9	62.4	Silt, 10YR8/3 (very pale brown), soft, nonplastic, and moist	
62.4	65.8	Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations and staining, firm, and moist. Sand is very fine grains	HU4
65.8	66.0	Gravelly Sand, 10YR8/1 (white), loose, and moist. Sand is fine quartz grains. Gravel is rounded chert with iron patina, 0.3- to 0.7-inch diameter	

Plant North -2095.823, Plant East -5058.897

9/27/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	2.5	Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter	FILL
2.5	5.5	Silt, 10YR7/2 (light gray) with green tinge, moderately hard, nonplastic, and moist	
5.5	18.0	Silt, 10YR7/2 (light gray) with 10YR7/6 (yellow) mottling, moderately soft to soft, nonplastic, and moist	
18.0	20.0	Silt with Clay, 10YR8/2 (very pale brown) mottled with 10YR7/1 (light gray), moderately hard to hard, moderately plastic, and moist	HU1
20.0	22.7	Silt with some Clay, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), moderately hard, moderately plastic, and moist	
22.7	23.0	Silty Gravel with Sand, 10YR4/4 (dark yellowish brown), firm, and moist. Gravel is subrounded chert without iron patina, 0.4- to 0.8-inch diameter. Sand is fine quartz grains	
23.0	23.2	Silt, 10YR5/6 (yellowish brown), soft, nonplastic, and moist	
23.2	24.6	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains	
24.6	25.6	Sandy Gravel, 10YR7/4 (very pale brown), dense, and moist. Gravel is subangular to subrounded chert without iron patina, 4-mm to 0.6-inch diameter. Sand is fine quartz grains	
25.6	26.6	Sandy Gravel with Silt, 10YR6/6 (brownish yellow), dense, and moist. Gravel is subangular to subrounded chert without iron patina, 4-mm to 0.6-inch diameter. Sand is fine quartz grains	HU2
26.6	30.8	Silt with Sand, 10YR7/4 (very pale brown) mottled with 10YR8/4 (very pale brown), soft, nonplastic, and moist. Sand is very fine quartz grains	
30.8	31.7	Clay with Silt, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling and strong 2.5YR6/6 (light red) staining at 30.9 to 31.1 ft, moderately hard, moderately plastic, and moist	
31.7	32.6	Silt, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), moderately soft, slightly plastic, and moist	
32.6	33.5	Silt with Sand, 10YR8/2 (very pale brown), moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
33.5	35.2	Sand, 10YR7/8 (yellow), firm, and moist. Sand is fine quartz grains	
35.2	36.5	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR7/6 (yellow), soft, moderately plastic, and moist	

Plant North -2095.823, Plant East -5058.897

9/27/2012

Start Depth	End Depth	Lithology		Hydrogeologic Unit
(ft bgs)	(ft bgs)	6		
	-	Silt, 10YR8/2 (very pale brown) with some 10YR7/6		
36.5	46.1	(yellow) laminations, soft, nonplastic, and moist		
		Sand, 10YR8/2 (very pale brown) with 10YR7/6		
46.1	51.5	(yellow) laminations, firm, and moist. Sand is very fine		
		quartz grains		
		Silt with little Gravel, 10YR8/2 (very pale brown) with		
51.5	52.5	light 2.5YR6/6 (light red) staining, soft, nonplastic, and		
		moist. Gravel is rounded chert without iron patina, 0.4-		
		to 0.6-inch diameter		
		Gravelly Sand, 10YR8/2 (very pale brown), lightly		
52.5	55 1	consolidated, and very moist. Sand is very fine quartz		
52.5	55.1	grains. Gravel is rounded to subrounded chert without		
		iron patina, 4-mm to 0.7-inch diameter		
		Sand, 10YR8/2 (very pale brown) with few 10YR7/6		HU3
55.1	56.0	(yellow) laminations, lightly consolidated, and wet.		
		Sand is very fine quartz grains		
		Sand GRADING DOWN to poorly sorted Sandy		
		Gravel, 10YR7/3 (very pale brown), firm, and wet.		
56.0	56.4	Sand is medium, rounded, quartz grains (above) and		
20.0		fine to medium, rounded, quartz grains (below). Gravel		
		is rounded to subrounded chert without iron patina, 4-		
		mm to 0.4-inch diameter.		
56.4	57.1	Silt with some Clay, 7.5 Y R 7/4 (pink) mottled with		
		Silt 10VR8/2 (very pale brown) with 10VR8/6		
57.1	58.3	(vellow) laminations soft nonplastic and moist		
		Sand, 10YR8/2 (very pale brown) with 7.5YR7/4		
58.3	59.3	(pink) laminations, lightly consolidated, and wet. Sand		
		is very fine quartz grains		
50.0	60.0	Silt, 10YR8/2 (very pale brown), moderately soft,		
59.3	60.9	nonplastic, and moist		
60.0	62.6	Sand, 10YR8/4 (very pale brown), firm, and wet. Sand		
00.9	03.0	is very fine quartz grains		HU4
63.6	64.0	Silt as 59.3 to 60.9 ft		
		Sandy Gravel, 7.5YR7/6 (reddish yellow), firm, and		
64.0	64.4	moist. Gravel is subrounded chert with iron patina, 4-		
04.0	U -	mm to 0.5-inch diameter. Sand is very fine quartz		
		grains		
64.4	67.7	Sand, 10YR7/4 (very pale brown), firm, and wet. Sand		HU5
		is very fine quartz grains		
		wet Gravel is subrounded chart with iron pating 0.2		
67.7	68.0	to 0.5-inch diameter. Sand is very fine to fine quartz		
		grains		

Plant North -2096.132, Plant East -4994.506

9/11/2012

Start Denth	End Denth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	20	Concrete and subgrade gravel	Fill
0.0	2.0	Silt 10YR6/1 (gray) speckled with 10YR3/1 (very	1 111
2.0	5.0	dark gray) firm and dry to slightly moist	
	10.0	Silt, 10YR7/1 (light gray) mottled with 7.5YR7/8	
5.0	10.0	(yellow), firm, nonplastic, and dry to slightly moist	
10.0	11.5	Silt as above but soft and moist	
		Silt, 10YR7/1 (light gray) with some mottling by	
11.5	15.0	10YR6/4 (light yellowish brown), firm, nonplastic, and	
		slightly moist	
15.0	17.5	Silt, 10YR7/2 (light gray), slightly soft, slightly plastic,	HU1
15.0	17.5	and moist	
		Silty Sand with trace Gravel, 7.5YR6/8 (reddish	
17.5	18.0	yellow), slightly loose, and very moist. Sand is fine to	
		medium quartz grains. Gravel is subangular chert with	
		11ron patina, U.8-1nch diameter Clavay Sandy Silt 7 5VP6/1 (gray) with some	
18.0	20.0	mottling by 7 5VR6/8 (reddish vallow) firm to very	
10.0	20.0	firm and slightly moist	
		Clavey Gravelly Sand, 7.5YR6/8 (reddish brown).	
• • • •		firm, and slightly moist. Sand ranges from fine to	
20.0	26.0	coarse grains. Gravel is subangular chert, 0.5-to 0.8-	
		inch diameter	
26.0	28.0	Silty Sand, 10YR7/2 (light gray), firm, and moist.	
20.0	28.0	Trace white chert gravel, 0.8-inch diameter	
28.0	30.5	Clayey Sandy Silt, 7.5YR8/1 (white) with 7.5YR6/8	HU2
20.0	50.5	(reddish yellow) laminations, firm, and moist	
		Gravelly Silty Sand, 10Y R6/8 (brownish yellow), firm,	
30.5	33.0	and slightly moist. Sand is fine to coarse, subangular,	
		quartz grains. Gravel is subangular chert, 0.3- to 0.5-	
		Silty Sand 10VR7/1 (light gray) semi-firm and very	
33.0	36.2	moist Sand is fine quartz grains	
		Silty Clay with little Sand. 7.5YR5/8 (strong brown)	
36.2	40.0	with slight mottling by 10YR7/1 (light gray), firm to	
		stiff, very plastic, and slightly moist to moist	
		Clavery Silt 10VR8/2 (very pale brown) mottled with	
40.0	45.0	10 VR6/8 (brownish vellow), soft to slightly soft very	
40.0	45.0	plastic and very moist Trace fine quartz sand	
		plastic, and very moist. Trace the quartz sand	
45.0	47.5	Clayey Silt as above with trace of subrounded chert	
		gravel, 0.2-inch diameter	
175	50 1	and very moist to slightly wet. Sand is yory fine quert	
47.5	32.1	and very moist to slightly wet. Sand is very fine quartz	
		Silty Gravelly Sand, 10YR4/6 (dark vellowish brown)	HU3
52.1	53.1	firm, and slightly moist. Gravel is subangular chert 03	
	00.1	to 1.2-inch diameter	
EQ 1	<i>EE</i> 0	Silty Sand, 10YR5/3 (brown) mottled with 7.5YR6/8	
55.1	55.2	(reddish yellow), firm, and slightly moist.	

Plant North -2096.132, Plant East -4994.506

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
55.2	57.5	Silty Clay with trace Gravel, 10YR7/2 (very pale brown) mottled with 10YR6/8 (brownish yellow)	
57.5	58.0	Gravelly Silty Clay, 10YR7/2 (very pale brown) mottled with 10YR6/8 (brownish yellow). Gravel is white, subrounded, chert	
58.0	61.9	Silty Sand, 10YR7/1 (light gray), soft, and very moist to wet. Sand is very fine quartz grains	
61.9	62.5	Sand, 10YR8/3 (very pale brown), firm to slightly loose, and wet. Sand is fine quartz grains	
62.5	64.9	Sand as above but loose and saturated	HU4
64.9	65.0	Sand and Gravel. Gravel is chert, 0.2- to 0.4-inch diameter	

Plant North -2115.892, Plant East -5065.208

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.8	Concrete residue from drilling through road bed	
0.8	1.2	Silt, 10YR6/1 (gray), hard, nonplastic, and dry	
1.2	2.1	Gravelly Sand, 5YR7/8 (reddish yellow), loose, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	FILL
2.1	3.6	Silt, 10YR7/1 (light gray), moderately soft, nonplastic, and slightly moist	
3.6	18.1	Silt, 10YR8/2 (very pale brown) mottled with 10YR6/6 (brownish yellow), soft, nonplastic, and moist	11111
18.1	21.8	Slightly Clayey Silt with trace Gravel, 10YR7/1 (light gray) with 10YR6/6 (brownish yellow) mottling, moderately hard, slightly to moderately plastic, and moist. Gravel is rounded chert without iron patina, 0.2- inch diameter	HUI
21.8	23.9	Gravelly Sand with Silt, 10YR7/4 (very pale brown), moderately dense/hard, and moist. Sand is 60% fine quartz grains and 40% coarse, subangular, chert grains. Gravel is subangular to rounded chert without iron patina or with light patina, 0.3- to 0.8-inch diameter	
23.9	25.1	Sand, 10YR8/1 (white) with light 10YR7/6 (yellow) staining, firm, and moist. Sand is very fine quartz grains	
25.1	26.6	Gravelly Sand, 10YR7/4 (very pale brown), loose, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.5- to 1.0-inch diameter	
26.6	30.1	Clayey Silt with Gravel, 10YR7/1 (light gray) with little 10YR7/6 (yellow) mottling, moderately soft, moderately plastic, and moist. Gravel is subrounded to rounded chert without iron patina, 0.4- to 0.6-inch diameter	HU2
30.1	31.0	Silty Gravelly Sand, 7.5YR7/6 (reddish yellow), moderately dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.2- to 0.4-inch diameter	
31.0	31.4	Sand, 7.5YR6/8 (reddish yellow), lightly consolidated, and moist. Sand is very fine quartz grains	
31.4	32.3	Silt, 10YR8/1 (white), soft, nonplastic, and moist	
32.3	34.7	Silty Sandy Gravel, 10YR7/3 (very pale brown), dense to moderately dense, and moist. Gravel is subrounded to subangular chert with light iron patina, 4-mm to 0.7- inch diameter. Sand is fine quartz grains	

Plant North -2115.892, Plant East -5065.208

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
34.7	39.3	Slightly Clayey Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), very soft, moderately plastic, and moist	
39.3	46.3	Silt, 10YR8/2 (very pale brown) with little 10YR7/6 (yellow) mottling, soft, slightly plastic, and moist	
46.3	48.6	Silty Sand, 10YR8/2 (very pale brown), lightly consolidated, nonplastic, and very moist. Sand is very fine quartz grains	
48.6	51.9	Sand, 10YR8/1 (white) with light 10YR7/6 (yellow) laminations, lightly consolidated, and moist. Sand is very fine quartz grains	HU3
51.9	52.9	Gravelly Sand, 10YR7/6 (yellow), lightly consolidated to loose, and moist. Sand is very fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.5- to 0.6-inch diameter	
52.9	56.3	Sand, 10YR7/3 (very pale brown) GRADING DOWN to 10YR7/6 (yellow) with few 5YR6/8 (reddish yellow) laminations, lightly consolidated, and very moist. Sand is fine quartz grains	
56.3	59.9	Silt with Sand, 10YR8/2 (very pale brown), very soft, nonplastic, and very moist	
59.9	65.8	Sand, 10YR8/3 (very pale brown) with some 10YR7/6 (yellow) laminations GRADING DOWN to 5YR6/6 (reddish yellow), lightly consolidated to loose, and wet. Sand is very fine quartz grains	HU4
65.8	66.3	Gravel, 10YR8/4 (very pale brown), loose, and wet. Gravel is subrounded to rounded chert with no iron patina or light iron patina, 0.2- to 0.5-inch diameter	HUS
66.3	67.5	Sand with Gravel, 7.5YR7/6 (reddish yellow), loose, and wet. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.2- to 0.5-inch diameter	1105

Plant North -2114.246, Plant East -5040.02

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	0.4	Concrete residue from drilling through road bed Gravelly Silt, 10YR7/1 (light gray), loose/soft, nonplastic, and slightly moist. Gravel is subangular limestone, 0.3- to 0.5-inch diameter (dense gravel aggregate/DGA)	FILL
1.1	2.0	Sandy Gravel, 2.5YR5/4 (reddish brown), dense, and moist. Gravel is subrounded chert with iron patina, 0.2- to 0.6-inch diameter. Sand is fine quartz grains	
2.0	3.0	Silt, 10YR7/1 (light gray) with green/blue tinge, moderately soft, nonplastic, and slightly moist	
3.0	17.3	Silt, 10YR7/1 (light gray) mottled and stained with 10YR7/6 (vellow), soft, nonplastic, and moist	HU1
17.3	21.5	Slightly Clayey Silt, 10YR7/2 (light gray) with heavy mottling by 10YR7/6 (yellow), moderately hard, slightly plastic, and moist	
21.5	22.6	Sandy Gravel, 10YR4/4 (dark yellowish brown), dense, and moist. Gravel is subangular to rounded chert with and without iron patina, 4-mm to 1.1-inch diameter. Sand is fine quartz grains	
22.6	23.0	Sand, 5YR5/4 (reddish brown), firm, and moist. Sand is fine quartz grains	
23.0	23.5	Silty Clay, 10YR7/3 (very pale brown), moderately soft, moderately plastic, and moist	
23.5	24.1	Sandy Gravel as 21.5 to 22.6 ft	
24.1	24.4	Sand, 10YR4/3 (brown), dense, and moist. Sand is poorly sorted, ranging from fine to coarse, rounded, quartz grains	
24.4	25.2	Sand, 10YR8/2 (very pale brown), firm, and moist.	
25.2	26.5	Silty Sandy Gravel, 10YR7/3 (very pale brown), dense, and moist. Gravel is subangular to subrounded chert with and without iron patina, 0.2- to 0.6-inch diameter. Sand is 40% fine quartz grains and 60% coarse, angular, chert grains	
26.5	27.1	Gravelly Sand, 7.5YR7/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.5-inch diameter	HU2
27.1	27.4	Silt with Sand, 7.5YR8/4 (pink), moderately soft, nonplastic, and moist. Sand is fine quartz grains	
27.4	30.0	Silt with Sand, 10YR8/1 (white) with light 10YR7/6 (yellow) mottling GRADING DOWN to 10YR7/1 (light gray), moderately soft to soft, slightly plastic, and moist. Sand is very fine quartz grains	
30.0	33.5	Sand, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) laminations, firm, and moist. Sand is very fine quartz grains	

Plant North -2114.246, Plant East -5040.02

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
33.5	34.4	Silty Gravelly Sand with blebs of Clay, 10YR6/4 (light yellowish brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.2- to 0.4-inch diameter	
34.4	35.6	Sand, 10YR6/6 (brownish yellow), firm, and moist. Sand is very fine quartz grains	
35.6	40.0	Slightly Clayey Silt, 7.5YR6/6 (reddish yellow) with 7.5YR8/1 (white) mottling, soft, moderately plastic, and moist	
40.0	42.2	Slightly Clayey Silt, 10YR8/2 (very pale brown) with light 10YR7/6 (yellow) mottling, soft, moderately plastic, and moist	
42.2	44.7	Slightly Clayey Silt, 5YR7/2 (pinkish gray), soft, moderately plastic, and moist	
44.7	45.0	Sand, 7.5YR7/2 (pinkish gray), firm, and moist. Sand is very fine quartz grains	
45.0	49.3	Interbedded slightly Clayey Silt and Silt, 10YR8/1 (white) with some 10YR7/6 (yellow) mottling, soft, slightly to moderately plastic, and moist	111.12
49.3	55.0	Sand, 10YR8/1 (white), lightly consolidated, and moist. Sand is very fine quartz grains	HUS
55.0	56.6	Sand with trace Gravel, 10YR8/4 (very pale brown) with 10YR6/6 (brownish yellow) laminations from 55.6 to 56.6 ft, firm, and moist. Sand is very fine quartz grains. Gravel is subrounded to rounded chert without iron patina, 0.2- to 0.4-inch diameter	
56.6	57.9	Silty Clay, 7.5YR7/2 (pinkish gray) with 7.5YR6/6 (reddish yellow) mottling, moderately hard, moderately plastic, and moist	
57.9	61.9	Silt, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) staining and laminations, soft, nonplastic, and moist	
61.9	65.0	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) and 10YR6/6 (brownish yellow) laminations, firm, and very moist. Sand is very fine quartz grains	HU4
65.0	65.2	Gravelly Sand, 10YR8/3 (very pale brown), loose, and wet. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.2- to 0.4-inch diameter	HU5

Plant North -2131.264, Plant East -5088.823

9/7/2012

Start Denth	End Denth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)	Linitiogy	nyur ogeologie omit
0.0	1.0	Silty Gravel, 10YR7/1 (light gray), loose, and slightly moist. Gravel is subangular to subrounded limestone (dense gravel aggregate/DGA), 4 mm- to 0.3-inch diameter	
1.0	1.7	Silty Gravel as 0.0 to 1.0 ft but moist	Fill
1.7	2.1	Silty Sandy Gravel, 2.5YR5/4 (reddish brown), dense, and moist. Gravel is subrounded chert with iron patina, 4 mm- to 0.4-inch diameter. Sand is fine quartz grains.	
2.1	3.0	Silt, 10YR7/1 (light gray), hard, nonplastic, and slightly moist	
3.0	15.0	Silt, 10YR7/2 (light gray) mottled with 10YR6/6 (brownish yellow), soft, nonplastic, and moist	
15.0	16.3	Silt as 3.0 to 15.0 ft but colored 10YR7/3 (very pale brown)	
16.3	22.3	Clayey Silt with some Gravel, 10YR7/4 (very pale brown) with little 10YR7/1 (light gray) mottling GRADING DOWN to 10YR6/2 (light brownish gray), moderately hard, slightly plastic, and moist. Gravel is rounded to subrounded chert without iron patina, 0.2- inch diameter	HUI
22.3	23.0	Gravelly Sand, 7.5YR6/6 (reddish yellow), firm to dense, and moist. Sand is predominately fine quartz grains but includes some coarse, rounded, quartz grains. Gravel is subrounded to subangular chert with iron pating 0.2- to 0.4-inch diameter	
23.0	24.2	Silt, 10YR8/2 (very pale brown) with 10YR6/6 (brownish yellow) mottling/laminations, moderately soft, slightly plastic, and moist	
24.2	26.0	Sandy Gravel, 7.5YR6/6 (reddish yellow), dense, and moist. Gravel is subrounded to subangular chert with iron patina, 0.2- to 0.8-inch diameter. Sand is fine quartz grains	
26.0	29.8	Interbedded Clayey Silt, moderately soft, plastic, and moist AND Sandy Silt, soft, nonplastic, and moist. Both are colored 10YR8/1 (white) mottled/laminated with 10YR7/6 (yellow)	n02
29.8	30.6	Sand, 10YR8/4 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	
30.6	33.5	Gravelly Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 0.3-inch diameter	
33.5	36.0	Gravelly Sand as 30.6 to 33.5 ft but with Silt	
36.0	44.2	Slightly Clayey Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), very soft, slightly plastic, and moist	

Plant North -2131.264, Plant East -5088.823

9/7/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
44.2	45.0	Silt, 7.5YR7/2 (pinkish gray) with 7.5YR7/4 (pink) mottling, soft, plastic, and moist	
45.0	49.9	Slightly Clayey Silt as 36.0 to 44.2 ft. Includes little 10YR3/1 (very dark gray) blebs (manganese?)	
49.9	51.5	Sand, 7.5YR8/4 (pink), loosely consolidated, and moist. Sand is fine quartz grains	
51.5	51.8	Sand, 7.5YR8/4 (pink), firm, and moist. Sand is medium, rounded, quartz grains GRADING DOWN to mix of medium, rounded, quartz grains and very coarse, subangular, chert grains	
51.8	52.7	Sand, 10YR8/2 (very pale brown), lightly consolidated, and wet. Sand is very fine quartz grains	
52.7	53.1	Gravelly Sand, 10YR8/4 (very pale brown), loose, and moist. Sand is a mix of fine quartz grains and coarse, subangular, chert grains. Gravel is rounded to subrounded chert without iron patina, 4 mm- to 0.4- inch diameter	HU3
53.1	55.1	Sand, 10YR8/2 (very pale brown), lightly consolidated, and very moist. Sand is very fine quartz grains	
55.1	55.5	Sand, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) staining, firm, and moist. Sand is fine quartz grains	
55.5	56.4	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is rounded to subangular chert without iron patina, 0.2- to 0.8-inch diameter. Sand is equal portions of fine and medium, rounded, quartz grains	
56.4	61.4	Silt, 10YR8/3 (very pale brown) with light 10YR7/6 (yellow) laminations, soft, slightly plastic, and moist	
61.4	66.1	Sand, 10YR7/6 (reddish yellow), loose, and wet. Sand is fine quartz grains	
66.1	66.5	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is subrounded to subangular chert with iron patina, 0.2- to 1.0-inch diameter. Sand is fine quartz grains	HU4

Plant North -2125.771, Plant East -4995.046

9/11/2012

Start	End			
Depth	Depth	Lithology		Hydrogeologic Unit
(ft bgs)	(ft bgs)			
		Silty dark brown soil over Gravel and Sand, white to		
0.0	1.7	medium gray. Gravel is limestone. Sand is coarse		Fill
		grains.		
1.7	5.0	Silt, 10YR8/1 (white), soft, and dry	ĺ	
5.0	85	Silt, 10YR7/1 (light gray) speckled with 10YR8/4		
5.0	0.5	(very pale brown), firm, and moist		
8.5	10.0	Silt, 7.5YR7/1 (light gray), soft to very soft, slightly		
10.0	10.5	plastic, and very moist		
10.0	12.5	Permeameter sample - no description		
12.5	15.0	Silt, 10YR7/1 (light gray), soft, nonplastic, and moist		
15.0	16.1	Silt with Sand, 10YR6/6 (brownish yellow), soft,		HUI
		nonplastic, and moist. Sand is fine quartz grains		
		Silty Gravelly Sand, IUY R5/4 (yellowish brown),		
16.1	175	moderately loose, and moist. Sand is 70% line quartz		
10.1	17.5	Gravel is subrounded chert with iron pating 0.3 inch		
		diameter		
17.5	10.6	Silt with Clay, 10YR6/2 (light brownish gray), hard,		
17.5	19.6	slightly to moderately plastic, and slightly moist		
		Sandy Gravel, 10YR6/6 (brownish yellow), dense, and	ĺ	
19.6	20.0	moist. Gravel is rounded to subrounded chert without		
1,10		iron patina, 0.3- to 1.0-inch diameter. Sand is fine		
		quartz grains		
20.0	21.0	silt, 104 K5/3 (brown), very solt, moderately plastic,		
		Sandy Gravel, 7.5YR6/6 (reddish vellow), dense, and		
• • •	22.0	moist. Gravel is subrounded to rounded chert without		
21.0		iron patina, 0.3- to 0.4-inch diameter. Sand is fine		
		quartz grains		
22.0	24.5	Permeameter sample - no description		
24.5	25.0	Sand Gravel as 21.0 to 22.0 ft but gravel ranges up to		
24.3	25.0	0.8-inch diameter		
		Sandy Gravel, 10YR5/4 (yellowish brown), dense, and		
25.0	26.2	moist. Gravel is subangular to subrounded chert with		
		iron patina, 4 mm- to 0.7-inch diameter. Sand is fine		
		quartz grains Silt with Clay and some Gravel 10VR7/1 (light gray)		
		hard moderately plastic and slightly moist Gravel is		
26.2	27.2	subrounded to rounded chert without iron patina.		
	_/	mostly 0.3-inch diameter but some 0.8- to 1.0-inch		
		diameter		
		Silty Gravelly Sand, 7.5YR7/6 (reddish yellow), dense,		
27.2	28.6	and moist. Sand is fine quartz grains. Gravel is rounded		
21.2	20.0	to subrounded chert without iron patina, 0.3- to 0.5-		HU2
		inch diameter		
28.6	28.9	Silt, $7.5 \mathrm{YR}/6$ (reddish yellow) mottled with $7.5 \mathrm{YR}/1$		
		(white), soft, nonplastic, and moist		

Plant North -2125.771, Plant East -4995.046

9/11/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
28.9	30.5	Slightly Clayey Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow) mottling, hard, slightly plastic, and slightly moist	
30.5	32.0	Silty Sand, 10YR7/8 (yellow) with 10YR7/1 (light gray) mottling, firm/moderately soft, (nonplastic), and moist. Sand is very fine quartz grains	
32.0	34.1	Silty Sandy Gravel, 7.5YR6/6 (reddish yellow), dense, and moist. Gravel is subangular to subrounded chert without iron patina or with light iron patina, 4 mm- to 0.5-inch diameter. Sand is 80% fine quartz grains and 20% coarse, subangular, chert grains	
34.1	35.0	Sandy Gravel, 7.5YR6/8 (reddish yellow), dense, and moist. Gravel is subrounded to rounded chert without iron patina, 0.3- to 0.5-inch diameter. Sand is 80% fine quartz grains and 20% coarse, subangular, chert grains	
35.0	35.3	SLOUGH: Silt, 10YR5/4 (yellowish brown), very soft, nonplastic, and very moist	
35.3	37.5	Sandy Gravel as 34.1 to 35.0 ft but gravel ranges up to 0.8-inch diameter	
37.5	40.0	Permeameter sample - no description	No Description
40.0	43.9	Silt, 10YR8/3 (very pale brown) with little 10YR8/1 (white) mottling, soft, moderately plastic, and moist	
43.9	44.7	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) laminations, firm, and moist. Sand is very fine quartz grains	
44.7	47.4	Silt, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling, soft, nonplastic, and moist	
47.4	49.7	Silt with some Clay, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, moderately soft to soft, plastic, and moist	HU3
49.7	53.2	Sand with some Gravel, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, lightly consolidated, and moist. Sand is fine quartz grains. Gravel is rounded to subrounded chert without iron patina, 0.3- to 0.5-inch diameter	
53.2	60.1	Sand interbedded with Clayey Silt, 10YR8/1 (white) with 10YR7/6 (yellow) laminations and staining and some 2.5YR7/8 (light red) blebs, moist. Sand is lightly consolidated, fine, quartz grains. Clayey Silt is soft and moderately plastic	
60.1	66.2	Sand, 10YR8/4 (very pale brown) with some 10YR7/6 (yellow) laminations, loose, and wet. Sand is fine quartz grains	

Plant North -2125 771	Plant East -4995 046
1 Iant North -2123.771,	1 Iant Last -+775.0+0

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
66.2	67.5	Sandy Gravel, 10YR6/6 (brownish yellow), loose, and wet. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 1.0-inch diameter. Sand is 85% fine quartz grains and 15% medium, rounded, quartz grains	HU4

Plant North -2048.759, Plant East -5231.166

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.4	Silt, 10YR6/3 (pale brown), soft, nonplastic, and slightly moist. Zone of roots and humic material	
0.4	3.7	Silt, 10YR8/2 (very pale brown) with little 10YR6/6 (brownish yellow) mottling, soft (crumbles to powder), nonplastic, and moist GRADING DOWN to dry	HU1
3.7	16.4	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, slightly plastic, and moist	
16.4	18.0	Gravelly Sand, 7.5YR6/4 (light brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular chert with iron patina, 0.3- to 0.6-inch diameter	
18.0	18.7	Sand, 7.5YR6/4 (light brown), firm, and moist. Sand is fine to medium, subrounded, quartz grains	
18.7	20.2	Silt, 7.5YR7/1 (light gray) mottled with 7.5YR7/6 (reddish yellow), moderately soft, moderately plastic, and moist	
20.2	20.5	Gravelly Sand, 7.5YR7/3 (pink), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3-inch diameter	
20.5	20.9	Sand, 10YR7/4 (pink), firm, and moist. Sand is very fine quartz grains	
20.9	21.4	Gravelly Sand as 20.2 to 20.5 ft	
21.4	23.1	Sandy Gravel, 7.5YR7/3 (pink), dense, and moist. Gravel is subangular chert without iron patina, 0.3-to 0.6-inch diameter. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Note: 20.5 to 23.1 ft is a coarsening downward sequence	
23.1	23.6	Silty Sand with little Gravel, 10YR7/3 (very pale brown), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded to rounded chert without iron patina, 0.4- to 0.5-inch diameter	HU2
23.6	25.1	Sand with Gravel, 10YR6/3 (pale brown), dense, and moist. Sand is 80% fine quartz grains and 20% coarse to very coarse, subrounded, chert grains. Gravel is subrounded chert without iron patina, 0.3-inch diameter	
25.1	25.6	Sand with Gravel as 23.6 to 25.1 ft but sand is medium, subrounded, quartz grains	
25.6	28.3	Sand with little Gravel, 7.5YR7/4 (pink), firm, and moist. Sand is fine quartz grains. Gravel is subangular chert with iron patina, 0.3- to 0.5-inch diameter	
28.3	28.6	Sandy Gravel, 7.5YR7/4 (pink), dense, and moist. Gravel is subrounded to rounded chert without iron patina, 4 mm - to 0.4-inch diameter	
Plant North -2048.759, Plant East -5231.166

9/24/2012

Start Donth	End Donth	Lithology	Hydrogoologia Unit
(ft bgs)	(ft bas)	Littiology	Hydrogeologic Unit
(It bgs)	(It bgs)		
		Sand with some Gravel, IOYR//4 (very pale brown),	
28.6	31.4	firm, and moist. Sand is very fine quartz grains. Gravel	
		is subrounded chert without iron patina, 0.6 to 0.8-inch	
		diameter	
		Sandy Gravel, 10 Y R6/6 (brownish yellow), dense, and	
21.4	25.0	moist. Gravel is subrounded to subangular chert without	
31.4	35.0	iron patina, 4 mm- to 1.0-inch diameter. Sand is 80%	
		fine quartz grains and 20% coarse to very coarse,	
25.0	25.5	subrounded, chert grains	
35.0	35.5	Silty Clay, 7.5 YR 7/3 (pink), soft, plastic, and moist	
35.5	35.7	Silty Sand, 7.5YR7/3 (pink), lightly consolidated, and	
		moist. Sand is fine quartz grains	
35.7	36.6	Slightly Clayey Silt, 7.5 Y R8/2 (pinkish white), soft,	
	2.4.0	plastic, and moist	
36.6	36.8	Silty Sand as 35.5 to 35.7 ft	
36.8	39.9	Silt, 2.5YR7/1 (light reddish gray), soft, moderately	
		plastic, and moist	
20.0	10.1	Silt with Sand, 10Y R8/2 (very pale brown) with	
39.9	43.1	10YR//6 (yellow) laminations, soft, nonplastic, and	
		moist. Sand is very fine quartz grains	
42.1	11.0	Silt, 10 Y R8/2 (very pale brown) with 10 Y R7/6 (yellow)	
43.1	44.6	laminations, moderately hard, slightly to moderately	
		plastic, and moist Clay with Silt 7 5VP6/6 (raddish vallow) mottled with	
11.6	46.0	7 5VP8/1 (white) moderately soft moderately plastic	
44.0	40.0	and moist	
		Silt 10YR7/4 (very pale brown) with some 10YR8/1	
46.0	48.0	(white) mottling soft nonplastic and moist	HU3
		Sand. 10YR7/4 (very pale brown) mottled with	
48.0	50.9	10YR8/1 (white), firm, and moist. Sand is very fine	
		quartz grains	
50.9	52.4	Silt with little Clay, 7.5 Y R //4 (pink) with light	
		7.5 Y R //1 (light gray) mottling, soft, plastic, and moist	
		Silty Sand 10VP7/6 (vallaw) with 10VP8/1 (white)	
52.4	54.4	mottling firm and moist Sand is yory fine quartz grains	
		motting, mm, and moist. Sand is very mie quartz grams	
		Sandy Gravel, 7.5YR6/6 (reddish yellow), firm, and	
54.4	55 5	moist. Gravel is rounded to subangular chert without	
51.1	55.5	iron patina, 0.3- to 1.0-inch diameter. Sand is very fine	
		quartz grains	
55.5	55.9	Sand, 7.5YR6/6 (reddish yellow), firm, and moist. Sand	
	00.9	is very fine quartz grains	
		Silt, 10YR8/2 (very pale brown) with 10YR7/6 (vellow)	
55.9	60.0	laminations, soft, slightly plastic, and moist	
60.0	61.2	Sand, 10YR8/1 (white), loose to lightly consolidated,	
00.0	01.5	and wet. Sand is very fine quartz grains	
			I I

211-A-028

Plant North -2048.759, Plant East -5231.166

9/24/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
61.3	62.1	Gravelly Sand, 10YR8/1 (white), firm, and wet. Sand is fine quartz grains. Gravel is rounded to subrounded chert without iron patina, 0.4- to 1.0-inch diameter	HU4
62.1	62.5	Gravelly Sand, 10YR7/6 (yellow), loose, and wet. Sand is fine to medium, rounded, quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.8- to 1.0-inch diameter	

Plant North -2066.748, Plant East -5214.094

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.4	Silt, 10YR5/2 (grayish brown), soft (noncohesive), nonplastic, and dry. Zone or roots and humic material	
0.4	3.8	Silt, 10YR8/2 (very pale brown) with little 10YR7/6 (yellow) mottling, moderately hard, nonplastic, and dry	HU1
3.8	16.3	Silt, 10YR7/2 (light gray) mottled with 10YR7/6 (yellow), soft, slightly plastic, and moist	
16.3	17.0	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
17.0	19.2	Sand with little Gravel, 7.5YR6/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains. Gravel is rounded to subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
19.2	21.7	Silt, 10YR8/2 (very pale brown) mottled with10YR7/4 (very pale brown), moderately hard, nonplastic to slightly plastic, and moist	
21.7	23.3	Silt with some Gravel and little Clay, 10YR8/2 (very pale brown) mottled with10YR7/4 (very pale brown), moderately hard, plastic, and moist. Gravel is rounded chert without iron patina, 0.3- to 0.5-inch diameter	
23.3	25.5	Gravelly Sand, 7.5YR6/4 (light brown), dense, and moist. Sand is 70% fine quartz grains and 30% coarse to very coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 0.4-inch diameter	
25.5	28.9	Sand GRADING DOWN to Sand with Gravel, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) staining, lightly consolidated to firm, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.4- to 0.5-inch diameter	HU2
28.9	29.6	Silt with some Clay and little Gravel, 10YR7/2 (light gray), soft, plastic, and moist. Gravel is subangular chert with iron patina, 0.4- to 0.6-inch diameter	
29.6	29.9	Sandy Silt with little Gravel, 10YR7/2 (light gray), soft, nonplastic, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
29.9	32.6	Gravelly Sand, 7.5YR7/4 (pink), dense, and moist. Sand is 70% fine quartz grains and 30% coarse to very coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, mostly 0.3-inch diameter but some 0.7- to 1.0-inch diameter	
32.6	34.0	Sand, 7.5YR7/4 (pink), lightly consolidated, and moist. Sand is very fine quartz grains	

Plant North -2066.748, Plant East -5214.094

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
34.0	35.3	Gravelly Sand with Silt, 7.5YR5/6 (strong brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3-to 0.6-inch diameter	
35.3	40.0	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/4 (very pale brown), soft, plastic, and moist	
40.0	42.5	Silt with Sand, 7.5YR8/3 (pink) with some 7.5YR7/6 (reddish yellow) laminations, soft, moderately plastic, and moist. Sand is very fine quartz grains	
42.5	48.1	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic to plastic, and moist	
48.1	49.9	Sand with Silt, 10YR7/4 (very pale brown) mottled with 10YR8/2 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	111.12
49.9	52.1	Sand, 10YR8/1 (white) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine to fine quartz grains	105
52.1	56.9	Sandy Gravel, 10YR8/2 (very pale brown), lightly consolidated, and moist. Gravel is subrounded chert without iron patina, 0.3- to 0.6-inch diameter. Sand is fine quartz grains	
56.9	60.0	Clay with Silt, 10YR8/2 (very pale brown) with 10YR8/4 (very pale brown) laminations, soft, plastic, and moist	
60.0	62.3	Silt, 10YR8/2 (very pale brown), soft, moderately plastic, and moist	
62.3	63.1	Sand, interbedded 10YR8/1 (white) and 10YR8/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
63.1	63.6	Silt, 10YR8/4 (very pale brown), soft, nonplastic, and moist	HU4
63.6	64.0	Sand, 10YR7/6 (yellow), loose, and wet. Sand is very fine quartz grains	
64.0	65.0	Sandy Gravel, 10YR7/6 (yellow), stained 10YR6/2 (light brownish gray) at 64.8 to 65.0 ft (manganese?), loose, and wet. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.8-inch diameter. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains	HU5

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	5.0	No recovery	Missing
5.0	18.6	Silt, 10YR7/2 (light gray) with 10YR7/4 (very pale brown) mottling and a few 10YR3/1 (very dark gray) blebs (manganese?), soft, nonplastic, and moist	
18.6	21.2	Clay with Silt and some Gravel, 10YR7/2 (light gray) with 10YR6/8 (brownish yellow) mottling, moderately hard, plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.4- to 0.5-inch diameter	HU1
21.2	22.7	Silty Sand with Gravel, 10YR7/2 (light gray), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.5-inch diameter	
22.7	24.0	Sandy Gravel, 7.5YR6/6 (reddish yellow), dense, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.5-inch diameter. Sand is 70% fine quartz grains and 30% coarse to very coarse, subangular, chert grains. Suspect DNAPL presence based on PID trend and distinct smell	
24.0	25.1	Silty Gravelly Sand, 7.5YR6/6 (reddish yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.4- to 0.7-inch diameter	
25.1	26.2	Sand with little Gravel, 7.5YR7/4 (pink), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.3-inch diameter	
26.2	27.6	Interbedded Silt and Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations. Silt is soft, nonplastic, and moist. Sand is very fine quartz grains, lightly consolidated, and moist	HU2
27.6	28.9	Sand, 10YR8/2 (very pale brown) mottled with 10YR6/6 (brownish yellow), lightly consolidated, and moist. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains	
28.9	31.0	Gravelly Sand, 10YR7/4 (very pale brown), dense, and moist. Sand is 80% fine quartz grains and 20% coarse to very coarse, subangular, chert gains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.5-inch diameter	
31.0	31.8	Sand with little Gravel, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.4- to 0.6-inch diameter	
31.8	32.7	Silty Gravelly Sand as 24.0 to 25.1 ft	

Plant North -2027.362, Plant East -5204.628

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
32.7	33.9	Silt GRADING DOWN to Silt with Sand, 7.5YR7/1 (light gray) mottled with 7.5YR6/6 (reddish yellow), soft, moderately plastic to nonplastic, and moist. Sand is very fine quartz grains	
33.9	35.5	Gravelly Sand as 28.9 to 31.0 ft	
35.5	37.5	Silt, 10YR7/3 (very pale brown), soft, slightly plastic, and moist	
37.5	39.9	Silt with Sand, 10YR8/2 (very pale brown), soft, nonplastic, and moist. Sand is very fine quartz grains	
39.9	45.0	Clayey Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately hard, moderately plastic, and moist	
45.0	48.4	Silt, 7.5YR7/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, moderately hard, slightly plastic, and moist	
48.4	49.5	Silt, 7.5YR8/1 (white) with 7.5YR7/8 (reddish yellow) mottling, soft, nonplastic, and moist	
49.5	50.5	Sand, 10YR8/2 (very pale brown), firm to dense, and moist. Sand is very fine quartz grains	
50.5	53.1	Slightly Clayey Silt, 7.5YR8/2 (pinkish white) with some 7.5YR7/8 (reddish yellow) mottling, soft, plastic, and moist	HU3
53.1	54.9	Sand with little Gravel, 10YR8/1 (white), lightly consolidated, and moist. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains. Gravel is rounded chert without iron patina, 0.5- to 1.0-inch diameter	
54.9	55.4	Sandy Gravel, 10YR8/1 (white), loose, and moist. Gravel is subangular to subrounded chert without iron patina, 0.3- to 1.0-inch diameter. Sand is fine quartz grains	
55.4	56.4	Sand, 10YR8/4 (very pale brown), loose, and wet. Sand is very fine quartz grains	
56.4	57.8	Silt, 7.5YR8/4 (pink) with some 7.5YR7/6 (reddish yellow) laminations, soft, slightly plastic, and moist	
57.8	61.5	Sand, 10YR8/1 (white), lightly consolidated, and moist. Sand is very fine quartz grains	
61.5	65.0	Gravelly Sand, 10YR7/6 (yellow), loose, and wet. Sand is fine to medium, rounded, quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.4- to 0.7-inch diameter	HU4

Plant North -2136.286, Plant East -5040.074

9/26/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.5	Sand with Gravel, 2.5YR6/8 (light red), loose, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3-inch diameter	Fill
0.5	4.6	Silt, 10YR7/1 (light gray) with bluish tinge, soft, nonplastic, and moist (suspected fill material)	
4.6	20.0	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist	
20.0	20.7	Clay with some Silt and some Gravel, 10YR7/2 (light gray) with some 10YR7/6 (yellow) mottling, moderately hard, plastic, and moist. Gravel is subrounded chert without iron patina, 0.3- to 0.4-inch diameter	HU1
20.7	22.7	Silty Gravelly Sand, 7.5YR5/6 (strong brown) GRADING DOWN to 7.5YR7/6 (reddish yellow), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subangular, chert grains. Gravel is subangular to subrounded chert without iron patina, 0.3- to 1.0-inch diameter	
22.7	24.2	Silt, 10YR7/1 (light gray), moderately soft, moderately plastic, and moist	
24.2	25.6	Gravelly Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.8-inch diameter	
25.6	28.1	Sandy Gravel with some Silt, 7.5YR6/4 (light brown), dense, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.6-inch diameter. Sand is 60% fine quartz grains and 40% coarse-to-very- coarse, subangular, chert grains	HU2
28.1	30.8	Sand with some Gravel, firm-to-dense, and moist. Sand is very fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
30.8	32.5	Silty Gravel with Sand, 7.5YR6/4 (light brown), dense, and moist. Gravel is subangular to subrounded chert without iron patina, 0.3- to 1.0-inch diameter. Sand is 80% fine quartz grains and 20% coarse, rounded, chert grains	
32.5	33.3	Silt with some Gravel and little Clay, 10YR6/4 (light yellowish brown) mottled with 10YR8/1 (white), moderately soft, slightly plastic, and moist	
33.3	36.2	Silty Sand with Gravel, 10YR7/4 (very pale brown), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded chert without iron patina, 0.4- to 0.7- inch diameter	
36.2	38.3	Clayey Silt, 7.5YR7/4 (pink) with 7.5YR7/2 (pinkish gray) mottling, moderately hard, plastic, and moist	

Plant North -2136.286, Plant East -5040.074

9/26/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit	
38.3	42.5	Silt GRADING DOWN to Silt with Sand, 7.5YR7/1 (light gray) with 7.5YR7/4 (pink) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains		
42.5	44.1	Sand, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) laminations, firm, and moist. Sand is very fine quartz grains		
44.1	45.3	Silt with little Clay, 10YR7/4 (very pale brown) with 10YR7/1 (light gray) mottling, soft, plastic, and moist		
45.3	48.2	Silt, 10YR7/4 (very pale brown) with mottling by 10YR7/6 (yellow) and 2.5YR6/6 (light red) (2.5YR6/6 prominent from 46.8 to 47.4 ft), soft, slightly plastic, and moist		
48.2	51.0	Sand, 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains GRADING Down to fine quartz grains. Note: 0.05-ft horizon of 10YR3/1 (very dark gray) staining at 48.8 ft (manganese?)		
51.0	53.4	Sand with Gravel interbedded with Sandy Gravel, 10YR8/3 (very pale brown), firm, and moist. Sand is very fine quartz grains. Gravel ranges from subangular chert with 0.3-inch diameter to rounded chert without iron patina. 0.5-inch diameter	HU3	
53.4	54.2	Sand, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) laminations, firm, and wet. Sand is very fine quartz grains		
54.2	55.1	Sand with Gravel, 10YR7/3 (very pale brown), firm-to- dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert trains. Gravel is subrounded chert without iron patina, 4 mm- to 0.3- inch diameter		
55.1	55.6	Sand as at 53.4 to 54.2 ft but without laminations. Sand is very fine quartz grains		
55.6	56.2	Sand with Gravel as at 54.2 to 55.1 ft		
56.2	56.6	Sand, 10YR7/6 (yellow), lightly consolidated, and moist. Sand is very fine quartz grains		
56.6	57.0	Clayey Silt, 10YR8/2 (very pale brown), moderately hard, moderately plastic, and moist		
57.0	58.1	Silt, 10YR8/3 (very pale brown), moderately soft, slightly plastic, and moist		
58.1	59.9	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) laminations, slightly consolidated, and moist. Sand is very fine quartz grains		
59.9	60.7	Clayey Silt as at 56.6 to 57.0 ft		
60.7	66.0	Sand, 10YR8/4 (very pale brown), lightly consolidated to loose, and wet. Sand is very fine quartz grains. Note: 65.0 to 66.0 ft appears to be 'flowing sand' - no structure.	HU4	

211-A-031

		9/26/2012	
Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
66.0	66.0	Subrounded chert Gravel without iron patina, 0.4- to 1.0-inch diameter	HU5

Plant North -1999.905, Plant East -5031.516

9/28/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	0.2	Silt, 10YR4/1 (dark gray), soft (loose), nonplastic, and moist. Zone of roots and humic material	
0.2	1.5	Silt, 10YR6/3 (pale brown), soft, nonplastic, and moist	
1.5	4.0	Silt, 10YR7/2 (light gray), soft, nonplastic, and moist	
4.0	5.5	Silt, 10YR7/1 (light gray), moderately hard, nonplastic, and dry	11111
5.5	19.8	Silt, 10YR7/2 (light gray) with 7.5YR7/6 (reddish yellow) mottling, soft, nonplastic, and moist	нот
19.8	20.6	Silty Sand with Gravel, 10YR7/4 (pink), dense, and moist. Sand is fine quartz grains. Gravel is subangular to rounded chert, with and without iron patina, 0.3- to 0.5-inch diameter	
20.6	21.1	Silty Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, plastic, and moist	
21.1	22.6	Silty Sandy Gravel, 7.5YR7/4 (pink) with little 7.5YR8/1 (white) mottling, dense, and moist. Gravel is subangular to rounded chert with iron patina, 4 mm- to 0.8-inch diameter. Sand is 70% fine quartz grains and 30% coarse, rounded, chert grains	
22.6	23.8	Silt, 10YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow) GRADING DOWN to 10YR8/1 (white), moderately soft, moderately plastic, and moist	
23.8	25.0	Sand, 10YR8/3 (very pale brown) mottled with 10YR8/1 (white), firm, and moist. Sand is very fine quartz grains	
25.0	25.2	Silt with Gravel, 7.5YR7/1 (light gray), soft, plastic, and moist. Gravel is subrounded chert with iron patina, 0.4- to 1.0-inch diameter	
25.2	25.6	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
25.6	30.5	Silt, 10YR8/1 (white) with 10YR7/6 (yellow) mottling and staining, soft, nonplastic, and moist	HU2
30.5	31.6	Silt with little Gravel, 10YR7/1 (light gray), soft, nonplastic, and moist. Gravel is subrounded chert without iron patina, 1.0-inch diameter	
31.6	33.2	Gravelly Sand, 10YR8/3 (very pale brown) mottled with 10YR8/1 (white), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter	
33.2	34.3	Sandy Gravel with Silt, 10YR7/4 (very pale brown) GRADING DOWN to 10YR7/2 (light gray), dense, and moist. Gravel is subangular chert with iron patina, 4 mm- to 1.0-inch diameter. Sand is fine quartz grains	

Plant North -1999.905, Plant East -5031.516

9/28/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
34.3	35.1	Sand with Gravel, 10YR7/4 (very pale brown), loose, and wet. Sand is very fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.7-inch diameter	
35.1	37.9	Clay with some Silt, 7.5YR7/4 (pink) GRADING DOWN to 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, plastic, and moist	
37.9	38.3	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand is very fine quartz grains	
38.3	47.6	Silt with some Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately hard, slightly to moderately plastic, and moist	
47.6	50.0	Silt, 10YR7/6 (yellow) with some 10YR8/1 (white) mottling, soft to moderately soft, nonplastic, and moist	HU3
50.0	54.6	Silt with Clay, 10YR8/1 (white) with some 7.5YR7/4 (pink) mottling GRADING DOWN to 7.5YR7/4 (pink) with 10YR8/1 (white) mottling, moderately hard, plastic, and moist	
54.6	55.0	Sandy Silt, 7.5YR7/6 (reddish yellow), soft, nonplastic, and moist. Contains trace, subrounded, chert gravel without iron patina, 1.0-inch diameter	
55.0	57.4	Sand, 7.5YR7/6 (reddish yellow) with frequent mottling by 7.5YR4/1 (dark gray), firm, and moist. Sand is very fine quartz grains	
57.4	57.9	Gravel with Sand, 7.5YR6/4 (light brown), dense, and moist. Gravel is subangular to angular chert with iron patina, 4 mm- to 1.1-inch diameter. Sand is 80% fine quartz grains and 20% coarse, angular, chert grains	HU4
57.9	58.2	Sand as 55.0 to 57.4 ft	
58.2	60.0	Sandy Gravel, 7.5YR7/4 (pink), loose, and wet. Gravel is subangular chert with iron patina, 0.4- to 0.7-inch diameter. Sand is fine quartz grains	

Plant North -2094.976, Plant East -5216.53

10/1/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(It bgs)	(It bgs)		
0.0	0.2	Fill: Silt, 10YR4/1 (dark gray), soft, nonplastic, and	
		moist. Zone of roots and humic material	
0.0	0.0	Fill: Silty Gravel, 10Y R6/2 (light brownish gray),	
0.2	0.6	loose, and moist. Gravel is subangular limestone, 0.3-	17:11
		Inch diameter Eilly Silty Sondy Group 2 5VD5/8 (red) dongs and	Fill
		moist Gravel is subangular to subrounded chert with	
0.6	3.0	iron pating 4 mm to 0.4 inch diameter Sand is fine	
		auartz grains	
3.0	4.2	Silt, 10YR7/1 (light gray), soft, nonplastic, and moist	HU1
4.2	15.3	Silt, 10YR7/2 (light gray) mottled with 10YR7/4 (very	
		pale brown), soft, nonplastic, and moist	
15.3	16.0	Silty Sand, 10YR8/2 (very pale brown), dense, and dry.	
		Sand is very fine quartz grains	
16.0	19.0	Sand, 7.5 Y K6/6 (readisn yellow), 11rm, and moist.	
		Salu is fille quartz grafits Silty Gravel 7 5YR6/4 (light brown) dense and moist	
19.0	197	Gravel is subangular to angular chert with iron nating	
17.0	17.7	0.3- to 0.7-inch diameter	
		Clavev Silt, 10YR7/2 (light gray), moderately hard.	
19.7	20.0	slightly plastic, and moist	
20.0	20.6	Silt with Sand. Sand is very fine quartz grains	
20.6	21.0	Clavey Silt as 19.7 to 20.0 ft	
20.0	21.0	Silty Gravelly Sand, 7.5YR6/4 (light brown), dense.	
		and moist. Sand is 80% fine quartz grains and 20%	
21.0	25.0	coarse, subrounded, chert grains. Gravel is subrounded	
		to subangular chert with iron patina, 0.3- to 0.7-inch	
		diameter	
25.0	26.5	Sand, 10YR8/2 (very pale brown), firm, and moist.	
23.0	20.3	Sand is very fine quartz grains	
		Sand with Gravel, 10YR8/2 (very pale brown), firm,	
26.5	27.0	and moist. Sand is very fine quartz grains. Gravel is	
		subrounded chert with iron patina, 0.4- to 0.8-inch	
		diameter	
27.0	27.4	Sand, 7.5 Y K //6 (readisn yellow), very firm, and moist.	
		Sand is line quartz grains Silt with little Sand 10XR7/3 (very pale brown)	HU2
27.4	28.0	moderately soft moderately plastic and moist Sand is	
27.4	20.0	coarse rounded chert grains	
		Sandy Gravel, 7.5YR7/4 (pink). dense, and moist.	
28.0	30.1	Gravel is subrounded to subangular chert with and	
_0.0	20.1	without iron patina, 0.3- to 0.7-inch diameter	
20.1	20.5	Sand, 7.5YR7/6 (reddish yellow), firm, and moist.	
30.1	30.5	Sand is fine quartz grains	
		Sandy Gravel, 10YR7/4 (very pale brown), dense, and	
30.5	30.9	moist. Gravel is subrounded to rounded chert with and	
		without iron patina, 0.4- to 0.8-inch diameter	
			I

Plant North -2094.976, Plant East -5216.53

10/1/2012

Start	End		
Depth (ft har)	Depth (ft has)	Lithology	Hydrogeologic Unit
(It bgs)	(It bgs)		
30.9	31.8	Sand as 30.1 to 30.5 ft	
31.8	32.5	Sandy Gravel, 10YR6/6 (brownish yellow), dense, and moist. Gravel is subrounded to subangular chert, 0.3- to 0.8-inch diameter. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains	
32.5	34.3	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains	
34.3	35.3	Sandy Gravel as 31.8 to 32.5 ft	
35.3	35.5	Sand as 32.5 to 34.3 ft	
35.5	35.8	Sandy Gravel as 31.8 to 32.5 ft	
35.8	42.4	Silt, 10YR8/2 (very pale brown) with few 10YR7/6 (yellow) laminations, soft, nonplastic to slightly plastic, and moist	
42.4	44.4	Silt with Sand, 10YR8/2 (very pale brown) with few 7.5YR7/6 (reddish yellow) laminations, soft, nonplastic, and moist. Sand is very fine quartz grains	
44.4	48.3	Sand, 10YR8/2 (very pale brown) with few 7.5YR7/6 (reddish yellow) laminations, firm, and moist. Sand is very fine quartz grains	
48.3	53.3	sand with Silt interbeds, 10YR8/3 (very pale brown) mottled with 10YR8/2 (very pale brown), soft, nonplastic to moderately plastic, and moist. Sand is very fine quartz grains	HU3
53.3	54.9	Sand, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains	
54.9	57.5	Gravelly Sand, 10YR8/1 (white) with 2.5YR8/3 (pink) mottling, firm, and moist. Sand is fine quartz grains. Gravel is subangular to rounded chert without iron patina, 0.3- to 1.0-inch diameter	
57.5	57.9	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is very fine quartz grains	
57.9	61.6	Slightly Clayey Silt, 7.5YR8/1 (white) with 7.5YR7/4 (pink) laminations, soft, moderately plastic, and moist	
61.6	64.1	Sand, 10YR8/3 (very pale brown), loose, and wet. Sand is very fine quartz grains	
64.1	65.1	Silt, 10YR8/1 (white), soft, plastic, and moist	HU4
65.1	66.8	Sand, 10YR8/1 (white), loose, and wet. Sand is fine quartz grains	
66.8	67.5	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is subangular to subrounded chert with iron patina, 0.4- to 1.0-inch diameter. Sand is fine quartz grains	HU5

Plant North -2105.517, Plant East -5240.028

10/2/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	0.5	Silt, 10YR5/2 (grayish brown), soft, nonplastic, and moist. Zone of roots and humic material	
0.5	1.8	Silty Gravel, 10YR4/1 (dark gray), loose, and moist. Gravel is subangular limestone (0.3- to 0.8-inch diameter (dense gravel aggregate/DGA)	Fill
1.8	3.5	Silt, 10YR7/2 (light gray) with some 7.5YR7/6 (reddish yellow) mottling, soft, nonplastic, and moist	
3.5	5.1	Silt, 10YR8/2 (very pale brown), hard, nonplastic, and dry	
5.1	12.6	Silt, 10YR7/1 (light gray) with some 7.5YR7/6 (reddish yellow) mottling, soft, nonplastic, and moist	HU1
12.6	14.0	Silt, 10YR7/4 (very pale brown), moderately hard, nonplastic, and moist	
14.0	15.5	Silt with Sand, 10YR8/1 (white), moderately hard to hard, nonplastic, and dry. Sand is very fine quartz grains	
15.5	18.6	Sand with some Gravel, 7.5YR6/6 (reddish yellow), lightly consolidated, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.8- to 1.0-inch diameter	
18.6	23.5	Silt with Clay and some Gravel, 10YR7/1 (light gray), moderately hard, moderately plastic, and moist. Gravel is rounded chert without iron patina, 0.3- to 0.8-inch	
23.5	24.3	Gravelly Sand, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.4-inch diameter	
24.3	26.4	Silty Sand with some Gravel, 10YR7/3 (very pale brown), firm to dense, and moist. Sand is very fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter	
26.4	26.9	Gravelly Sand, 7.5YR6/6 (reddish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter	
26.9	27.4	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains	
27.4	27.9	Clayey Silt with Sand, 10YR7/3 (very pale brown) mottled with 7.5YR7/4 (pink), moderately hard, moderately to slightly plastic, and moist. Sand is fine quartz grains	HU2
27.9	28.2	Silt with Clay and some Gravel as at 18.6 to 23.5 ft	
28.2	28.4	Gravelly Sand as at 26.4 to 26.9 ft	
28.4	28.7	Silty Sand with some Gravel as at 24.3 to 26.4 ft	

Plant North -2105.517, Plant East -5240.028

10/2/2012

Start	End		
Depth	Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
		Silt with some Sand, 10YR7/6 (yellow) mottled with	
28.7	29.7	10YR8/1 (white), soft, nonplastic, and moist. Sand is	
		very fine quartz grains	
		Gravelly Sand, 7.5YR7/6 (reddish yellow), dense, and	
		moist. Sand is 80% fine quartz grains and 20% coarse,	
29.7	30.9	subrounded, chert grains. Gravel is subrounded to	
		rounded chert without iron patina, 0.3- to 0.4-inch	
		diameter	
20.0		Sand, 10YR ^{7/4} (very pale brown) finely mottled with	
30.9	32.2	10YR8/1 (white), firm, and moist. Sand is fine quartz	
		grains Silty Sandy Gravel 7 5VP6/4 (light brown) dense	
		and moist Gravel is subrounded to rounded chert	
32.2	34.5	without iron pating 0.3, to 0.8 inch diameter. Sand is	
52.2	54.5	70% fine quartz grains and 30% coarse rounded chert	
		orains	
		Gravelly Sand, 7.5 Y Ro/6 (reddish yellow), dense, and	
34.5	35.2	moist. Sand is 80% fine quartz grains and 20% coarse,	
		subangular, chert grains. Gravel is subrounded chert	
		without iron patina, 0.4- to 1.0-inch diameter	
		Silt, 7.5YR8/1 (white) mottled with 7.5YR6/6 (reddish	
35.2	43.2	yellow) GRADING DOWN to 10YR7/3 (very pale	
		brown), soft, nonplastic, and moist	
12.0	40.4	Sand, 10 Y R8/2 (very pale brown) with some 10 Y R //6	
43.2	49.4	(yellow) staining, firm, and moist. Sand is very line	
		Sand. 10YR7/6 (vellow) mottled with 10YR8/1	
49.4	49.9	(white), firm, and moist. Sand is fine quartz grains	
		Sand, 10YR8/3 (very pale brown) GRADING DOWN	
49.9	50.3	to 10YR8/6 (yellow), firm, and moist. Sand is very fine	
.,,,,	0010	quartz grains	
		Silt with Sand, 10YR8/1 (white) GRADING DOWN to	
50.3	51.6	10YR7/8 (yellow), soft, nonplastic, and moist. Sand is	
		very fine quartz grains	
51.0	517	Clay, 7.5YR7/4 (pink) GRADING DOWN to 10YR7/3	
51.0	54.7	(very pale brown), soft, plastic, and moist	HU3
		Silty Sand with some Gravel, 10YR7/3 (very pale	1105
		brown), firm, and moist. Sand is 90% fine quartz grains	
54.7	55.0	and 10% coarse, subrounded, chert grains. Gravel is	
		subrounded chert without iron patina, 0.3- to 0.5-inch	
55.0	55.4	Sand, 10Y R8/3 (very pale brown), firm, and moist.	
		Sand is line quartz grains	
		Graveny Sand, 10 Y K8/2 (very pale brown), dense, and	
55.4	57.0	moist. Sand is fine quartz grains. Gravel is rounded to	
		subiounded chert without iron patina, 0.3- to 0.5-inch	
		urameter	I

211-A-035

Plant North -2105.517, Plant East -5240.028

10/2/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
57.0	58.3	Sand, 7.5YR8/6 (reddish yellow), loose, and wet. Sand is very fine quartz grains	
58.3	63.0	Silt, 10YR8/1 (white) with 10YR7/6 (yellow) laminations GRADING DOWN to massive 10YR8/1 (white), soft, plastic, and moist	
63.0	65.3	Sand, 10YR8/3 (very pale brown), lightly consolidated, and very moist. Sand is very fine quartz grains	
65.3	66.3	Silt, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) laminations, soft, plastic, and moist	HU4
66.3	66.5	Sand, 7.5YR7/8 (reddish yellow), firm, and moist. Sand is very fine quartz grains	

Plant North -2051.946, Plant East -5261.363

10/3/2012

Start Depth	End	Lithology	Hydrogoologia Unit
(ft hos)	(ft hos)	Littiology	nyurogeologic Ullit
(11 053)	(11 053)	Cilt 10VD2/1 (your doub anov) soft nonplastic and	
0.0	0.6	silt, 10 Y K5/1 (very dark gray), solt, nonplastic, and	
		Silt 10VR6/3 (pale brown) moderately hard slightly	
0.6	1.8	plastic and moist	
		Silt. 10YR8/2 (very pale brown) with little mottling by	
1.8	4.6	10YR7/6 (vellow), hard, nonplastic, and dry	
		Silt, 10YR7/2 (light gray) with little 10YR7/6 (yellow)	
4.6	14.5	mottling, soft, nonplastic, and moist	
14.5	140	Sand, 10YR7/8 (yellow), firm to dense, and moist. Sand	
14.5	14.8	is very fine quartz grains	TIT 1
14.8	16.5	Silt as 4.6 to 14.5 ft	пот
		Silt with thin Sand interbeds, 10YR8/2 (very pale	
16.5	18 1	brown) GRADING DOWN to 7.5YR6/6 (reddish	
10.5	10.1	yellow). Silt is moderately soft, slightly plastic, and	
		moist. Sand is fine quartz grains, firm, and moist	
18.1	20.1	Silt, 7.5YR7/4 (pink), soft, slightly plastic, and moist	
		Silt with some Sand, 10YR7/3 (very pale brown), hard,	
20.1	20.3	nonplastic, and dry. Sand is very fine quartz grains	
		Conductive Control and some Sile 7 5VD7/2 (night) with	
		sand with Gravel and some Sift, 7.5 f K//5 (plik) with some 7.5 VP2/1 (voru dork grav) steining (mangapasa?)	
20.3	25.5	donse and moist Sand is fine quartz grains. Gravel is	
20.5	25.5	subrounded chert with iron pating 0.3 to 0.4 inch	
		diameter	
		Sand, 10YR8/2 (very pale brown), firm, and moist. Sand	
25.5	25.8	is fine quartz grains	
25.8	26.1	Sand with Gravel and some Silt as 20.3 to 25.5 ft	
26.1	26.7	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand	
26.1	26.7	is fine quartz grains	
		Silty Sand with some Gravel, 10YR7/4 (very pale	
26.7	27.1	brown), firm, and moist. Sand is fine quartz grains.	HUZ
20.7	27.1	Gravel is subrounded chert with iron patina, 4 mm- to	
		0.4-inch diameter	
27.1	30.0	Silt, 10YR7/3 (very pale brown), mottled with 10YR8/1	
		(white), soft, plastic, and moist	
30.0	32.5	Disturbed soil (Sandy Silt with some Gravel)	
		Gravelly Sand, 10YR5/6 (yellowish brown), firm, and	
22.5	25.5	moist. Sand is 80% fine quartz grains and 20% coarse,	
32.5	35.5	subangular to subrounded, chert grains. Gravel is	
		subrounded chert with iron patina(?), 0.3- to 1.0-inch	
		Silt 7 5YR8/1 (white) mottled with 7 5YR6/6 (reddish	
35 5	42.9	vellow) and 7.5YR8/6 (reddish vellow) soft moderately	
55.5	π2.7	plastic, and moist	
		Sandy Silt, 10YR8/2 (very pale brown) with 10YR7/6	
42.9	43.7	(yellow) laminations, soft, nonplastic, and moist. Sand is	
		very fine quartz grains	

Plant North -2051.946, Plant East -5261.363

10/3/2012

G ()		,	
Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
43.7	47.4	Clayey Silt, 10YR8/2 (very pale brown) with 7.5YR7/4 (pink) laminations, moderately hard, plastic, and moist	
47.4	49.9	Silt, 10YR8/2 (very pale brown) mottled with 7.5YR6/4 (light brown) and with slight 2.5YR7/6 (light red) staining, soft, plastic, and moist	
49.9	52.1	Sand, 10YR8/1 (very pale brown) with 10YR7/6 (yellow) laminations, firm, and moist. Sand is very fine quartz grains	HU3
52.1	53.2	Silt, 10YR7/3 (very pale brown), soft to moderately soft, plastic, and moist	
53.2	55.0	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
55.0	56.0	Sand with Gravel, 10YR7/8 (yellow), firm, and moist. Sand is 80% fine quartz grains and 20% coarse-to-very- coarse, subrounded, chert grains. Gravel is subrounded chert without iron patina, 4 mm- to 0.4-inch diameter	
56.0	60.9	Interbedded Silt, 10YR8/1 (white), soft, moderately plastic, and moist AND very fine quartz Sand, 10YR8/1 (white) with few 10YR7/6 (yellow) laminations, lightly consolidated, and moist-to-wet	
60.9	62.3	Sand, 10YR8/1 (white), tinged with 10YR7/6 (yellow) at base, firm, and moist. Sand is very fine quartz grains	
62.3	62.5	Sand with Gravel, 10YR7/6 (yellow), loose, and wet. Sand is fine to medium, rounded, quartz grains. Gravel is subrounded chert with iron patina, 0.4- to 0.8-inch diameter	HU4

Plant North -2607.698, Plant East -5240.899

10/9/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	4.0	Gravelly Sand, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.7-inch diameter	FILL
4.0	5.0	Silt, 10YR7/2 (light gray), soft, nonplastic, and moist	HU1
5.0	8.0	Permeameter sample - no description	NO DESCRIPTION
8.0	10.3	Silt as 4.0 to 5.0 ft	
10.3	13.7	Silt with Sand, hard, nonplastic, and moist. Sand is very fine quartz grains	HU1
13.7	15.0	Silt with little Clay and Gravel, 10YR7/2 (light gray) stained with 5YR5/4 (reddish brown), moderately hard, slightly plastic, and moist	
15.0	18.0	Permeameter sample - no description	NO DESCRIPTION
18.0	19.0	Gravelly Sand, 10YR7/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert without(?) iron patina, 0.3- to 0.7-inch diameter	
19.0	20.0	Gravelly Sand with Silt, 10YR7/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert without(?) iron patina, 0.3- to 0.7-inch diameter	
20.0	23.1	Silt with some Sand and Gravel, 10YR6/4 (light yellowish brown), moderately hard, nonplastic, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 1.0-inch diameter	
23.1	25.1	Gravelly Sand, 10YR6/4 (light yellowish brown), dense and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert	HU2
25.1	28.4	Silt, 10YR8/3 (very pale brown) mottled with 10YR8/1 (white), soft, nonplastic to slightly plastic, and moist	
28.4	33.0	Gravelly Sand, 10YR7/3 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with and without iron patina, 0.3- to 0.9-inch diameter	
33.0	33.4	Sand with little Gravel, firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without(?) iron patina, 0.3- to 0.5-inch diameter	
33.4	35.0	Gravelly Sand, 10YR7/6 (yellow), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with and without iron patina, 0.3- to 0.9-inch diameter	
35.0	38.0	Permeameter sample - no description	NO DESCRIPTION
38.0	39.0	Silt, 10YR7/1 (light gray), soft, nonplastic, and moist	

211-B-001

Plant North -2607.698, Plant East -5240.899

10/9/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
39.0	40.0	Silt with Sand, 10YR7/4 (very pale brown), moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
40.0	47.0	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR7/4 (very pale brown), moderately soft, moderately plastic, and moist	11112
47.0	52.4	Silt with little Sand, soft, nonplastic to slightly plastic, and moist. Sand is very fine quartz grains	поз
52.4	56.5	Silt with little Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), moderately hard, slightly plastic, and moist	
56.5	59.4	Silt with Sand, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
59.4	61.6	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
61.6	62.3	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains	HU4
62.3	62.5	Sand, 7.5YR6/8 (reddish yellow), firm, and moist. Sand is fine quartz grains	

Plant North -2608.457, Plant East -5201.467

Start	End Domth	Lith all a set	Huduo coolo cio Unit
Depth (ft bgs)	Depth (ft bgs)	Lithology	Hydrogeologic Unit
(IL Dgs)	(IL Dgs)	Crowally Cond. 2 5VD5/((red)) damage of the state Cond.	
		Graveny Sand, 2.5 r K5/6 (red), dense, and moist. Sand	
0.0	25	is 85% fine quartz grains and 15% coarse, subrounded	
0.0	3.5	to subangular, chert grains. Gravel is subrounded to	FILL
		subangular chert with iron patina, 4-mm to 0.6-inch	
		diameter Silt 10VP7/1 (light gray) with 10VP7/4 (yery pale	
3.5	13.4	brown) mottling, soft, nonplastic, and moist	
		Sand 10YR7/3 (very nale brown) firm and moist Sand	
13.4	14.1	is fine quartz grains	
		Silt with little Clay, 10YR7/3 (very pale brown) with	
14.1	15.9	little 10YR7/6 (vellow) mottling, moderately hard.	
		slightly plastic, and moist	
		Silt with little Clay and Gravel, 10YR7/3 (very pale	HU1
		brown) GRADING DOWN to 7.5YR6/6 (reddish	
15.9	17.0	yellow), moderately hard, slightly plastic, and moist.	
		Gravel is rounded to subrounded chert without iron	
		patina, 0.4- to 0.6-inch diameter	
17.0	175	Silt with some Clay, 10YR7/2 (light gray), soft,	
17.0	17.5	moderately plastic, and moist	
		Gravelly Sand, 7.5YR7/4 (pink), dense, and moist. Sand	
		is 70% fine quartz grains and 30% coarse to very	
17.5	19.1	coarse, subrounded, chert grains. Gravel is subangular	
		to subrounded chert with iron patina, 4-mm to 0.5-inch	
		diameter	
19.1	19 5	Sand, 10YR7/6 (yellow), dense, and moist. Sand is fine	
17.1	17.5	quartz grains	
19.5	20.3	Gravelly Sand as 17.5 to 19.1 ft	
20.3	21.2	Silt with little Clay and Gravel as 15.9 to 17.0 ft	
		Sand with some Gravel, 7.5YR6/4 (light brown), dense,	
		and moist. Sand is 70% fine quartz grains and 30%	
21.2	23.0	coarse to very coarse, subrounded, chert grains. Gravel	
		is subrounded chert with iron patina, 0.3- to 0.5-inch	
		diameter	HU2
23.0	27 3	Silt with some Clay, 10YR7/1 (light gray) mottled with	
23.0	27.3	10YR7/8 (yellow), soft, plastic, and moist	
27.3	28.4	Sand, 10YR7/8 (yellow), firm, and moist. Sand is fine	
	20.1	quartz grains	
		Silty Sand with Gravel, 7.5YR7/3 (pink), dense, and	
28.4	31.3	moist. Sand is fine to medium quartz grains. Gravel is	
		subangular to subrounded chert with and without iron	
		patina, 0.4- to 1.0-inch diameter	
		Sand with some Gravel, 10Y K //4 (very pale brown)	
21.2	22.2	GRADING DOWN to 10Y K8/1 (white), firm, and	
31.3	33.3	moist. Sand is fine to medium quartz grains. Gravel is	
		subrounded chert without iron patina, 0.3- to 0.6-inch	
		alameter	
22.2	20 5	Silt with Sand, 10YR8/3 (very pale brown), very soft,	
55.5	30.3	nonplastic, and moist. Sand is very fine quartz grains	
			1

Plant North -2608.457, Plant East -5201.467

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
38.5	40.0	Silt with Sand, 10YR7/6 (yellow) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is fine quartz grains	
40.0	42.4	Silt with little Clay, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, moderately plastic, and moist	
42.4	44.8	Silt, 10YR8/1 (white) mottled with 10YR7/8 (yellow), soft, nonplastic, and moist	
44.8	47.4	Silt with little Clay, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, moderately hard, moderately plastic, and moist	HU3
47.4	50.4	Silt with Clay, 10YR7/4 (very pale brown) mottled with 10YR8/2 (very pale brown), moderately hard, moderately plastic, and moist	
50.4	51.0	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
51.0	52.5	Silt, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, moderately plastic, and moist	
52.5	56.0	Silt with little Clay, 7.5YR7/4 (pink) with little 7.5YR8/1 (white) mottling, moderately hard, slightly plastic, and moist	
56.0	59.0	Silt with some Clay, 7.5YR8/1 (white) mottled with 7.5YR7/3 (pink), soft, moderately plastic, and moist	
59.0	60.5	Sand, 10YR8/2 (very pale brown) with 10YR7/8 (yellow) laminations, lightly consolidated, and moist. Sand is very fine quartz grains	
60.5	63.0	Sand, 10YR8/2 (very pale brown) with some 2.5YR7/4 (light reddish brown) and 7.5YR7/8 (reddish yellow) laminations, firm, and moist. Sand is fine quartz grains	
63.0	64.5	Sand with little Gravel, 10YR8/2 (very pale brown), loose, and wet. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.3- to 0.4-inch diameter	HU4
64.5	65.0	Sand, 10YR8/1 (white) with 7.5YR7/8 (reddish yellow) staining, loose, and wet. Sand is fine quartz grains	

Plant North -2607.365, Plant East -5181.15

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
		Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist.	
0.0	2.0	Sand is fine quartz grains. Gravel is subrounded to	5.11
0.0	3.0	subangular chert with iron patina, 0.3- to 0.8-inch	Fill
		diameter	
2.0	12.6	Silt, 10YR7/1 (light gray) with 10YR7/6 (yellow)	
3.0	13.0	mottling, soft, nonplastic, and moist	
		Silt with little Clay and little Gravel, 10YR7/2 (light	11111
12 6	15.0	gray), moderately hard, slightly plastic, and moist.	HUI
13.0	15.9	Gravel is subrounded chert without iron patina, 0.4- to	
		0.5-inch diameter	
		Sandy Gravel with little Silt, 7.5YR7/2 (pinkish gray),	
15.0	16.0	dense, and moist. Gravel is subangular to rounded chert	
13.9	10.9	with and without iron patina, 4 mm- to 0.7-inch	
		diameter. Sand is fine quartz grains	
		Sand with little Gravel, 10YR7/3 (very pale brown),	
16.0	17.8	firm, and moist. Sand is fine quartz grains. Gravel is	
10.9	17.0	subangular to subrounded chert without(?) iron patina,	
		0.4- to 0.6-inch diameter	
		Sandy Silt with little Gravel and little Clay, 10YR7/2	
		(light gray), moderately hard, nonplastic, and moist.	
17.8	20.1	Sand is fine quartz grains. Gravel is subangular to	
		angular chert without iron patina, 0.4- to 0.8-inch	
		diameter	
		Gravelly Sand with little Silt, 7.5YR6/4 (light brown),	
20.1	22.3	dense, and moist. Sand is fine quartz grains. Gravel is	
		subrounded chert without(?) iron patina, 0.3- to 0.6-inch	
22.3	22.9	Sand, 10 Y R //8 (yellow), firm, and moist. Sand is fine	
		quartz grains	
22.0	27.0	10VP8/1 (white) soft nonplastic and moist Sand is	HU2
22.9	27.0	101 K8/1 (white), soft, nonplastic, and moist. Sand is	
		Sand 10VR7/6 (vellow) firm and moist Sand is fine	
27.0	27.4	quartz grains	
		Sand with little Gravel 10YR7/4 (very pale brown)	
		GRADING DOWN to 10YR8/1 (white), firm, and	
27.4	28.9	moist. Sand is fine quartz grains. Gravel is subrounded	
	-00	to rounded chert with and without iron patina. 0.3- to	
		0 8-inch diameter	
		Sand with Gravel, 10YR7/3 (very pale brown), dense,	
		and moist. Sand is 75% fine quartz grains and 25%	
28.9	30.4	coarse, subrounded, chert grains. Gravel is subrounded	
		to subangular chert without(?) iron patina, 0.3- to 0.4-	
		inch diameter	
20.4	21.4	Sand, 10YR7/6 (yellow), firm to dense, and moist. Sand	
50.4	51.4	is fine quartz grains	

Plant North -2607.365, Plant East -5181.15

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
31.4	33.0	Sand with Gravel, 7.5YR6/4 (light brown), dense, and moist. Sand is fine to medium quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.4-inch diameter	
33.0	35.9	Silt, 7.5YR7/3 (pink) GRADING DOWN to 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist	
35.9	36.7	Silt with Sand, 7.5YR7/4 (pink), soft, nonplastic, and moist. Sand is very fine quartz grains	
36.7	38.8	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
38.8	40.1	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
40.1	42.5	Silt with little Clay, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, moderately soft, moderately plastic, and moist	
42.5	47.0	Silt with some Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist	HU3
47.0	51.0	Silt with Sand, 10YR7/4 (very pale brown) with some 7.5YR8/1 (white) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
51.0	54.0	Silt with little Clay, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft to moderately soft, moderately plastic, and moist	
54.0	56.3	Silt, 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately hard, nonplastic, and moist	
56.3	58.5	Silt with Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
58.5	60.0	Sand, 10YR8/2 (very pale brown) GRADING DOWN to 7.5YR8/4 (pink), firm, and moist. Sand is very fine quartz grains	HU4

Plant North -2607.187, Plant East -5143.33

10/11/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	3.6	Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	Fill
3.6	7.5	Silt, 10YR7/1 (light gray) with some 10YR7/6 (yellow) mottling, soft, nonplastic, and moist	
7.5	10.0	Permeameter Sample - No Description	
10.0	12.5	Silt as 3.6 to 7.5 ft	
12.5	13.3	Sand, 10YR8/4 (very pale brown), dense, and moist. Sand is very fine quartz grains	
13.3	14.7	Silt, 10YR7/4 (very pale brown), soft, slightly plastic, and moist	
14.7	15.0	Silt with little Gravel and little Clay, 10YR7/2 (light gray) mottled with 7.5YR6/6 (reddish yellow), moderately hard, slightly to moderately plastic, and moist. Gravel is subangular chert without iron patina, 0.3-inch diameter	HU1
15.0	15.5	Slough: Silt, 10YR7/2 (light gay), very soft, nonplastic, and moist	
15.5	17.2	Silt with little Clay and little Gravel, 7.5YR7/2 (pinkish gray) with 7.5YR7/6 (reddish yellow) staining, moderately hard, moderately plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 1.0-inch diameter	
17.2	17.5	Sand with Gravel, 7.5YR7/4 (pink), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with(?) iron pating 0.4- to 0.6-inch diameter	
17.5	20.0	Permeameter Sample - No Description - Appeared similar to Sand with Gravel of 17.2 to 17.5 ft	
20.0	21.1	Silt with little Clay and little Gravel as 15.5 to 17.2 ft	
21.1	23.8	Sand with Gravel, 7.5YR7/4 (pink), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert without(?) iron patina, 0.3- to 0.5-inch diameter	
23.8	24.2	Sand, 7.5YR7/4 (pink), firm, and moist. Sand is fine to medium quartz grains	
24.2	24.6	Silt with some Gravel, 10YR7/1 (light gray) with 7.5YR7/6 (reddish yellow) staining, soft, plastic, and moist. Gravel is subrounded chert without(?) iron patina, 1.0-inch diameter	
24.6	26.0	Sand, 10YR8/2 (very pale brown) GRADING DOWN to 10YR8/4 (very pale brown), dense, and moist. Sand is fine quartz grains	HU2
26.0	26.5	Gravelly Sand with Silt, 10YR7/6 (yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.6-inch diameter	

Plant North -2607.187, Plant East -5143.33

10/11/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
26.5	28.5	Silt with Sand, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is fine quartz grains	
28.5	30.0	Sand with Gravel, 10YR8/3 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 4 mm- to 0.6-inch diameter	
30.0	31.9	Sand with Gravel and some Silt, 7.5YR6/6 (reddish yellow). Sand is 80% fine to medium quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert without(?) iron patina, 4 mm- to 0.5-inch diameter	
31.9	32.7	Silt with Clay, 7.5YR6/6 (reddish yellow), moderately soft plastic and moist	
32.7	42.4	Silt, 7.5YR6/6 (reddish yellow) GRADING DOWN to 10YR7/6 (yellow) and then to 10YR8/3 (very pale brown), soft, slightly plastic, and moist	
42.4	50.0	Silt with little Clay, 7.5YR8/4 (pink) with some 7.5YR7/6 (reddish yellow) mottling, moderately soft, plastic, and moist	
50.0	52.1	Silt with Sand, 10YR8/1 (white) with 10YR8/6 (yellow) laminations, soft, nonplastic, and moist. Sand is fine quartz grains	
52.1	54.6	Silt with Sand, 5YR8/2 (pinkish white), soft, nonplastic, and moist. Sand is very fine quartz grains	HU3
54.6	55.4	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is very fine to fine quartz grains	
55.4	56.8	Silt with Sand, 10YR7/6 (yellow) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is fine quartz grains	
56.8	57.5	Silt with some Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), moderately hard, slightly plastic, and moist	
57.5	61.0	Silt with Sand, 7.5YR8/1 (white) mottled with 5YR6/6 (reddish yellow), soft, nonplastic, and moist. Sand is fine quartz grains	
61.0	64.6	Sand, 10YR8/3 (very pale brown), loose, and wet. Sand is fine quartz grains	HU4
64.6	65.0	Sand with Gravel, 10YR8/2 (very pale brown), firm and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 1.0-inch diameter	HU5

Plant North -2606.307, Plant East -5129.596

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	1.2	Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.4- to 0.7-inch diameter	Fill
1.2	2.5	Silt with Gravel, 5YR7/3 (pink), soft, plastic, and moist. Gravel is rounded to subrounded chert with iron patina, 0.3- to 0.8-inch diameter	
2.5	13.1	Silt, 10YR7/1 (light gray) GRADING DOWN to 10YR7/4 (very pale brown) mottled with 10YR7/1 (light gray), soft, nonplastic, and moist	HU1
13.1	13.7	Sand, 10YR8/2 (very pale brown), dense, and moist. Sand is very fine quartz grains	
13.7	14.4	Silt with little Clay, 10YR6/4 (light yellowish brown), GRADING DOWN to 10YR7/1 (light gray), moderately hard, moderately plastic, and moist	
14.4	17.3	Sand with Gravel and little Silt, 10YR8/1 (white) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 1.0-inch diameter	
17.3	18.2	Sand with Gravel, 10YR7/4 (very pale brown), dense, and moist. Sand is 70% fine quartz grains and 30% coarse to very coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.4-inch diameter	
18.2	19.7	Silt, 10YR7/6 (yellow) mottled with 10YR8/1 (white), moderately soft, slightly plastic, and moist	
19.7	23.3	Sand with Gravel, 10YR6/6 (brownish yellow), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.8-inch diameter	HU2
23.3	24.1	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
24.1	26.7	Silt, 10YR8/4 (very pale brown) GRADING DOWN to 10YR8/4 (very pale brown) mottled with 10YR8/1 (white), soft, plastic, and moist	
26.7	29.2	Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
29.2	30.6	Sand with some Gravel, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert without(?) iron patina, 0.3- to 0.5-inch diameter	

Plant North -2606.307, Plant East -5129.596

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
30.6	31.7	Gravelly Sand with little Silt, 10YR7/4 (very pale brown), dense, and moist. Sand is 60% fine to medium quartz grains and 40% coarse to very coarse, subrounded, chert grains. Gravel is subrounded chert with(?) iron patina, 0.3- to 0.5-inch diameter	
31.7	35.5	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic, and moist	
35.5	39.2	Silt with Sand, 10YR8/6 (yellow) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
39.2	43.1	Silt with little Clay, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, plastic, and moist	
43.1	46.6	Silt with little Clay as above but moderately hard and slightly plastic	
46.6	48.6	Sand, 10YR8/1 (white) with some 10YR7/4 (very pale brown) mottling, firm, and moist. Sand is fine quartz grains	
48.6	49.6	Silt with Sand, 10YR8/2 (very pale brown) GRADING DOWN to 10YR7/6 (yellow), soft to moderately soft, moderately plastic, and moist. Sand is very fine quartz grains	HU3
49.6	52.3	Sand with little Silt, 10YR6/6 (brownish yellow), firm, and moist. Sand is very fine to fine sand	
52.3	53.1	Silt, 10YR8/3 (very pale brown), soft, nonplastic, and moist	
53.1	54.5	Sand, 10YR8/2 (very pale brown) with 10YR6/6 (brownish yellow) laminations, firm, and moist. Sand is very fine quartz grains	
54.5	57.5	Silt with little Clay, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), moderately hard, slightly plastic, and moist	
57.5	59.4	Interbedded Sand and Silt, 7.5YR7/3 (pink). Sand is fine quartz grains, firm and moist. Silt is soft, plastic, and moist	
59.4	62.3	Sand, 7.5YR7/4 (pink), firm to loose, and very moist to wet. Sand is fine quartz grains	
62.3	62.5	Silt, 10YR8/3 (pink), soft, moderately plastic, and moist	HU4
62.5	64.6	Sand with little Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is rounded to subrounded chert without iron patina, 0.7- to 1.0-inch diameter	
64.6	65.0	Sand, 10YR8/1 (white), firm, and very moist. Sand is very fine quartz grains	

Plant North -2611.28, Plant East -5085.431

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	3.2	Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.4- to 0.6-inch diameter	Fill
3.2	12.4	Silt, 10YR7/1 (light gray) with some 10YR7/4 (very pale brown) mottling GRADING DOWN to 10YR7/4 (very pale brown) with 10YR7/1 (light gray) mottling, soft, nonplastic, and moist	HU1
12.4	16.4	Sand with little Gravel, 10YR8/2 (very pale brown) mottled with 10YR6/4 (light yellowing brown), firm to dense, and moist. Sand is very fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.4-inch diameter	
16.4	18.8	Silt with little Clay and little Gravel, 10YR7/1 (light gray) with 10YR7/4 (very pale brown) mottling, moderately hard, slightly to moderately plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.7-inch diameter	
18.8	20.3	Sand with Gravel, 10YR7/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert (and trace of feldspar)without iron patina , 0.3- to 0.4-inch diameter.	
20.3	20.9	Silt with Sand and little Gravel, 10YR7/2 (light gray), moderately hard, nonplastic, and moist. Sand is fine quartz grains	HU2
20.9	21.7	Sand with Gravel as 18.8 to 20.3 ft	
21.7	24.5	Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately soft, moderately plastic, and moist	
24.5	27.2	Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
27.2	34.0	Gravelly Sand (85% fine quartz grains and 15% coarse, subrounded, chert grains) with 0.3- to 0.4-ft interbeds of fine Sand, 10YR7/4 (very pale brown); dense, and moist. Gravel is subrounded to rounded chert with and without iron patina, 0.3- to 0.7-inch diameter	
34.0	35.2	Silt with Clay, 7.5YR7/4 (pink), moderately hard, slightly plastic, and moist	
35.2	36.2	Silt, 10YR8/2 (very pale brown), soft, nonplastic, and moist	
36.2	37.7	Silty Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains	
37.7	38.2	Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	

211-B-006

Plant North -2611.28, Plant East -5085.431

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
38.2	40.0	Silt, 10YR8/3 (very pale brown) with 5YR7/8 (light red) laminations, soft to moderately soft, nonplastic, and moist	
40.0	44.9	Silt, 7.5YR6/2 (pinkish gray) mottled with 7.5YR7/6 (reddish yellow) GRADING DOWN to 7.5YR7/2 (pinkish gray) with 7.5YR7/4 (pink) mottling, moderately hard, moderately plastic, and moist	HU3
44.9	48.0	Silty Sand GRADING DOWN to Sand, 10YR7/3 (very pale brown) with 10YR7/4 (very pale brown) laminations/mottling, firm, and moist. Sand is very fine quartz grains	
48.0	49.4	Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
49.4	55.5	Silt with little Clay, 7.5YR8/2 (pinkish white) mottled with 7.5YR7/6 (reddish yellow), moderately soft, plastic to moderately plastic, and moist	
55.5	58.0	Silt with little Clay, 7.5YR7/4 (pink) with little 7.5YR8/1 (white) mottling, moderately hard, slightly plastic, and moist	
58.0	58.5	Silt with little Clay as 55.5 to 58.0 ft but colored 7.5YR8/2 (pinkish white)	
58.5	61.7	Sand with some Silt blebs, 10YR7/6 (yellow) and dense, GRADING DOWN to 10YR8/2 (very pale brown) and lightly consolidated; and moist. Sand is very fine quartz grains	
61.7	62.3	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	HU4
62.3	62.5	Sand with Gravel, 10YR7/3 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	

Plant North -2611.717, Plant East -5056.859

10/16/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.6	Gravelly Sand, 2.5YR6/6 (red), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.5-inch diameter	Fill
2.6	3.2	Silty Sand with Gravel, 5YR7/4 (pink), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 1.0-inch diameter	
3.2	14.4	Silt, 10YR8/2 (very pale brown) with little 10YR7/6 (yellow) mottling GRADING DOWN to 10YR7/4 (very pale brown), soft, nonplastic, and moist	
14.4	15.0	Silt GRADING DOWN to Sand, 10YR8/1 (white) GRADING DOWN to 10YR8/4 (very pale brown), moderately soft/firm, nonplastic, and moist. Sand is very fine quartz grains	
15.0	19.6	Silt with Clay and some Gravel, 10YR7/1 (light gray) with little 10YR7/4 (very pale brown) mottling, moderately soft/stiff, slightly to moderately plastic, and moist. Gravel is rounded to subrounded chert without iron patina, 0.3- to 0.4-inch diameter	HU1
19.6	20.0	Silt with Sand, 10YR7/6 (yellow), moderately soft, nonplastic, and moist. Sand is fine quartz grains	
20.0	20.3	Silt with Clay and some Gravel as 15.0 to 19.6 ft	
20.3	23.0	Sand with Gravel, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.5-inch diameter	
23.0	24.9	Silty Sand, 10YR8/6 (yellow) mottled with 10YR8/1 (white), firm, and moist. Sand is very fine quartz grains	
24.9	25.1	Sand, 7.5YR7/8 (reddish yellow), firm, and moist. Sand is fine quartz grains	
25.1	26.4	Silty Sand as 23.0 to 24.9 ft	HU2
26.4	32.0	Gravelly Sand, 7.5YR7/4 (pink), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.5-inch diameter	1102
32.0	34.6	Gravelly Sand with little Silt, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
34.6	35.5	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is very fine to fine quartz grains	
35.5	45.0	Silt, 7.5YR8/4 (pink) with 7.5YR7/6 (reddish yellow) laminations GRADING DOWN to 7.5YR8/2 (pinkish white) with 7.5YR7/6 (reddish yellow) laminations, very soft, nonplastic, and moist	

211-B-007

Plant North -2611.717, Plant East -5056.859

10/16/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
45.0	46.4	Silty Sand, GRADING DOWN to Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations/mottling, firm, and moist. Sand is very fine quartz grains	
46.4	48.2	Sand, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling and staining, firm, and moist. Sand is fine quartz grains	
48.2	49.6	Gravelly Sand, 10YR7/3 (very pale brown), dense, and moist. Sand is 85% fine quartz grains and 15% coarse, subrounded, chert grains. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.6-inch diameter	HU3
49.6	50.0	Silt with little Clay, 7.5YR7/6 (reddish yellow), moderately hard, slightly plastic, and moist	
50.0	51.4	Silt, 7.5YR8/4 (pink) with 7.5YR8/1 (white) mottling, soft, plastic, and moist	
51.4	54.5	Silt with Sand, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), soft, nonplastic, and moist. Sand is very fine quartz grains	
54.5	58.6	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic to plastic, and moist	
58.6	61.0	Silty Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) and 5YR7/6 (reddish yellow) laminations, firm, and moist. Sand is very fine quartz grains	
61.0	64.7	Sand with few Silt blebs, 10YR8/1 (white) GRADING DOWN to 10YR8/4 (very pale brown), firm to loose, and moist to wet. Sand is fine quartz grains	HU4
64.7	65.0	Sand, 7.5YR7/6 (reddish yellow), lightly consolidated, and wet. Sand is fine quartz grains	

211-B-008

Plant North -2642.029, Plant East -5211.033

10/9/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.7	Sand with Gravel/Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	 Fill
2.7	13.1	Silt, 10YR7/1 (light gray) with some 10YR7/6 (yellow) mottling, soft, nonplastic, and moist	
13.1	14.8	Interbedded fine Sand, 7.5YR6/6 (reddish yellow) and very fine Sand (7.5YR8/1 (white), firm, and moist. Sand is quartz grains	
14.8	17.0	Gravelly Sand, 7.5YR5/6 (strong brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 0.6-inch diameter	
17.0	17.7	Sand, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains	HU1
17.7	21.3	Gravelly Sand as 14.8 to 17.0 ft	
21.3	21.7	Sand with Gravel, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.6-inch diameter	
21.7	22.3	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
22.3	26.0	Silt, 10YR8/4 (Very pale brown) mottled with 10YR8/1 (white), soft, plastic to moderately plastic, and moist	
26.0	27.1	Sand with little Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
27.1	28.0	Gravelly Sand, 10YR8/1 (white) mottled with 10YR8/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with iron patina, 4 mm- to 0.4-inch diameter	HU2
28.0	28.8	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
28.8	30.0	Sandy Gravel, 10YR8/2 (very pale brown), dense, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter	
30.0	30.8	Sandy Gravel as 28.8 to 30.0 ft but with Silt	
30.8	32.4	Sandy Gravel as 28.8 to 30.0 ft	
32.4	37.0	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 7.5YR8/2 (pinkish white), soft, plastic to moderately plastic, and moist	
37.0	40.8	Silt with Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), soft, plastic, and moist	

Plant North -2642.029, Plant East -5211.033

10/9/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
40.8	41.7	Silt with Clay as 37.0 to 40.8 ft but very soft	
41.7	43.0	Silt with Clay, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR8/2 (very pale brown), moderately hard, moderately plastic, and moist	
43.0	47.4	Silt with Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately soft with blebs of both moderately hard and soft, slightly to moderately plastic, and moist	HU3
47.4	49.5	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains. Note: 49.2 to 49.5 ft contains some chert gravel with iron patina, subrounded, 0.3-inch diameter	
49.5	55.1	Silt with Clay, 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately hard, slightly plastic, and moist	
55.1	58.0	Silt with Sand, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) GRADING DOWN to 10YR8/3 (very pale brown), soft, slightly plastic, and moist. Sand is fine quartz grains	
58.0	58.5	Sand, 10YR8/6 (yellow), firm, and moist. Sand is very fine quartz grains	
58.5	60.2	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
60.2	60.5	Sand with Silt and Gravel, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is rounded chert without iron patina, 0.3-inch diameter	HU4
60.5	62.0	Sand with a few Silt interbeds, 10YR8/2 (very pale brown), lightly consolidated to firm, and moist. Sand is fine quartz grains	
62.0	62.1	Sandy Gravel, 10YR7/4 (very pale brown), loose, and moist. Gravel is subrounded chert with iron patina, 0.3- inch diameter. Sand is fine quartz grains	
62.1	62.5	Sand with a few Silt interbeds as 60.5 to 62.0 ft	

Plant North -2642.058, Plant East -5180.914

10/8/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
(It bgs)	(It bgs)	$C_{12} = 11 - C_{12} + 1 + 1 + 1 + 0 + 0 - 5 \times D 5 / C_{12} + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + $	
0.0	2.4	and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.8-inch diameter	FILL
2.4	14.2	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist	HU2
14.2	15.2	Clayey Silt, 10YR7/2 (light gray), moderately hard, moderately plastic, and moist	
15.2	16.7	Silty Sand, 10YR7/1 (light gray), firm, and moist. Sand is very fine quartz grains	
16.7	20.1	Gravelly Sand with little Silt, 10YR6/4 (light yellowish brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with and without iron patina, 0.3 - to 0.6-inch diameter	
20.1	21.2	Silty Sand with Gravel, 10YR7/1 (light gray), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded chert without iron patina, 0.5- to 0.8-inch diameter	
21.2	23.5	Gravelly Sand with little Silt, 10YR6/6 (brownish yellow), dense, and moist. Sand is 90% fine quartz grains and 10% subrounded, coarse, chert grains. Gravel is subrounded chert with and without iron patina, 0.3- to 0.5-inch diameter	
23.5	26.7	Sand, 10YR8/1 (white) with 10YR7/6 (yellow) mottling, firm, and moist. Sand is very fine quartz grains	HU2
26.7	29.5	Gravelly Sand, 10YR8/2 (very pale brown) GRADING DOWN to 10YR7/6 (yellow), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subrounded chert with and without iron patina, 4-mm to 0.6-inch diameter	
29.5	30.2	Gravelly Sand with Silt, 7.5YR7/1 (light gray), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subrounded chert with and without iron patina, 4-mm to 0.6-inch diameter	
30.2	31.0	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
31.0	34.0	Gravelly Sand as 26.7 to 29.5 ft	
34.0	35.0	Silty Clay, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, soft, plastic, and moist	
35.0	37.6	Silt with Sand, 10YR7/2 (light gray) with little 10YR7/6 (yellow) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
37.6	39.1	Silt with little Clay, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), soft, plastic, and moist	

211-B-009

Plant North -2642.058, Plant East -5180.914

10/8/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
39.1	42.7	Silt with little Clay as 37.6 to 39.1 ft interbedded with Clay with Silt, 10YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white) and 7.5YR7/4 (pink), soft, plastic, and moist	
42.7	45.5	Silt, 7.5YR7/6 (reddish yellow), moderately soft, nonplastic, and moist	
45.5	46.7	Silt with some Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) and 7.5YR6/1 (gray), soft to moderately soft, plastic, and moist	HU3
46.7	52.3	Silt with Sand, 10YR7/6 (yellow) mottled with 10YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
52.3	54.5	Silt with little Clay, 7.5YR6/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, moderately soft, slightly plastic, and moist	
54.5	55.0	Silt with little Clay, 7.5YR6/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, soft, plastic, and moist	
55.0	59.1	Silt with Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow)-GRADING-DOWN-to-7.5YR7/4 (pink) laminations, soft, nonplastic, and moist. Sand is fine quartz grains	
59.1	60.3	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
60.3	62.5	Sand, 10YR8/2 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	
62.5	63.1	Sand with some Gravel, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert without iron patina, 0.3- to 0.4-inch diameter	HU4
63.1	64.0	Sand, 7.5YR7/8 (reddish yellow), firm, and moist. Sand is fine quartz grains	
64.0	65.0	Sand with Gravel, 10YR8/2 (very pale brown), loose, and wet. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.8-inch diameter	
Plant North -2642.383, Plant East -5151.421

10/5/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.5	Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	Fill
2.5	14.7	Silt, 10YR7/1 (light gray) with some 10YR7/4 (very pale brown) mottling, soft, nonplastic, and moist	
14.7	16.0	Clayey Silt with little Gravel, 10YR7/1 (light gray) with 10YR6/1 (gray) mottling, moderately hard, moderately plastic, and moist. Gravel is subrounded chert without iron patina, 0.3-inch diameter	HU1
16.0	16.5	Clayey Silt, 10YR7/1 (light gray) with 10YR6/1 (gray) mottling, moderately hard, moderately plastic, and moist0.3-inch diameter	
16.5	17.9	Sand with little Gravel, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains. Gravel is rounded to subrounded chert with iron patina, 0.4- to 0.6-inch diameter	
17.9	19.0	Clayey Silt with little Gravel, 10YR7/1 (light gray) with 10YR6/1 (gray) mottling, moderately hard, moderately plastic, and moist. Gravel is subrounded chert without iron patina, 0.3- to 0.4-inch diameter	
19.0	20.0	Crushed sample sleeve: 19.0 to $19.6 =$ Clayey Silt with little Gravel as above and 19.6 to 20.0 ft = Sand with Gravel and little Silt as below	
20.0	20.6	Sand with Gravel and little Silt, 7.5YR6/6 (reddish yellow), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to rounded chert with iron patina, 4 mm-to 0.3-inch diameter	HU2
20.6	21.2	Silt with Sand, 10YR8/2 (very pale brown), soft, nonplastic, and moist. Sand is fine quartz grains	
21.2	26.0	Silt with Sand as above but with little Gravel. Gravel is subrounded to rounded chert without(?) iron patina, 0.3-to 0.4-inch diameter	
26.0	31.5	Gravelly Sand with little Silt, 10YR7/6 (yellow) GRADING DOWN to 7.5YR7/4 (pink), dense, and very moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subangular to subrounded chert with iron patina, 4 mm- to 0.8-inch diameter	
31.5	37.0	Silt with Sand, 7.5YR8/4 (pink) mottled with 7.5YR8/1 (white), very soft, nonplastic to slightly plastic, and moist. Sand is very fine quartz grains	

Plant North -2642.383, Plant East -5151.421

10/5/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
37.0	45.0	Silt, 7.5YR7/6 (reddish yellow) with 7.5YR8/1 (white) mottling GRADING DOWN to 7.5YR8/1 (white) with 7.5YR7/4 (pink) mottling, soft, slightly plastic, and moist	
45.0	47.2	Silty Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is very fine quartz grains	
47.2	49.9	Silt with little Clay and some Gravel, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white), moderately soft, plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.4- to 0.8-inch diameter	HU3
49.9	50.2	Sand with some Gravel, 10YR6/6 (brownish yellow), firm, and moist. Sand is fine quartz grains	
50.2	54.0	Silt, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white) GRADING DOWN to 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, moderately plastic, and moist	
54.0	55.0	Clay, 7.5YR7/4 (pink) with some 7.5YR8/1 (white) mottling, moderately hard, plastic, and moist	
55.0	56.1	Clay as above	
56.1	59.5	Silt with Sand, 7.5YR7/4 (pink) GRADING DOWN to 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
59.5	60.0	Sand, 10YR8/3 (very pale brown), lightly consolidated, and moist. Sand is very fine quartz grains	
60.0	60.9	Sand as above but colored 7.5YR7/4 (pink)	
60.9	62.5	Sand as 59.5 to 60.0 ft but colored 7.5YR8/2 (pinkish white) GRADING DOWN to 7.5YR8/1 (white)	
62.5	64.2	Sand with some Gravel, 10YR8/1 (white) GRADING DOWN to 10YR8/3 (very pale brown), firm, and wet. Sand is 90% very fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subangular to subrounded chert without iron patina, 4 mm- to 0.4-inch diameter	HU4
64.2	65.0	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is very fine quartz grains	

Plant North -2642.307, Plant East -5120.984

10/8/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.1	Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	Fill
2.1	13.7	Silt, 10YR7/1 (light gray) with 10YR7/4 (very pale brown) mottling, soft, nonplastic, and moist	
13.7	15.4	Silt with some Gravel and little Clay, 10YR7/2 (light gray), moderately soft, moderately plastic, and moist. Gravel is subrounded chert with iron patina, 0.3- to 0.5-inch diameter	
15.4	16.4	Sandy Gravel, 10YR6/3 (pale brown), dense, and moist. Gravel is subrounded chert with iron patina, 0.3- to 0.5- inch diameter. Sand is fine quartz grains	HU1
16.4	18.2	Silt with some Gravel and little Clay, 10YR7/2 (light gray), moderately soft, moderately plastic, and moist. Gravel is subangular chert without iron patina, 0.4- to 0.5-inch diameter	
18.2	21.9	Gravelly Sand with little Silt, 7.5YR7/4 (pink), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to rounded chert with and without iron patina, 0.3- to 0.6-inch diameter	
21.9	22.4	Sand, 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	
22.4	24.6	Silt, 10YR8/6 (yellow) mottled with 10YR8/1 (white), soft, slightly plastic, and moist	
24.6	29.2	Sandy Silt with little Gravel, 10YR7/3 (very pale brown), moderately soft, nonplastic, and moist. Gravel is subrounded chert without iron patina, 0.6- to 1.0-inch diameter	HU2
29.2	31.6	Sandy Gravel with little Silt, 7.5YR7/4 (pink) with some 7.5YR5/1 (gray) staining (manganese?), dense, and moist. Gravel is subangular to subrounded chert without(?) iron patina, 0.3- to 1.0-inch diameter. Sand is 75% fine quartz grains and 25% coarse to very coarse, subrounded to rounded, chert grains	
31.6	32.2	Sand, 7.5YR7/8 (reddish yellow), firm, and moist. Sand is fine quartz grains	
32.2	34.3	Silt with little Clay, 7.5YR7/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, soft, nonplastic, and moist	
34.3	40.0	Silt, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white), very soft, nonplastic, and moist	
40.0	40.8	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic, and moist	
40.8	42.0	Silt as 34.3 to 40.0 ft	

Plant North -2642.307, Plant East -5120.984

10/8/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
42.0	42.4	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white) and 2.5YR6/8 (light red), moderately soft, slightly plastic, and moist	
42.4	45.9	Silt, 7.5YR7/4 (pink) GRADING DOWN to 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, nonplastic, to slightly plastic, and moist	
45.9	50.1	Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, nonplastic to slightly plastic, and moist. Sand is very fine quartz grains	HU3
50.1	51.6	Sand, 10YR8/1 (white) GRADING DOWN to 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	
51.6	52.8	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
52.8	54.4	Sandy Silt, 7.5YR7/3 (pink), soft, nonplastic, and moist	
54.4	58.0	Silt with Clay, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, moderately hard, moderately plastic, and moist	
58.0	60.3	Silt with Sand, 10YR8/2 (very pale brown) GRADING DOWN to 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
60.3	62.5	Sand, 10YR8/1 (white), lightly consolidated, and moist. Sand is very fine quartz grains	
62.5	62.7	Gravel with Sand and Silt, 10YR7/8 (yellow), firm, and moist. Gravel is subrounded chert with(?) iron patina, 0.6- to 1.0-inch diameter. Sand is very fine quartz sand	
62.7	63.1	Sand, 10YR8/1 (white), loosely consolidated, and moist. Sand is fine quartz grains	HU4
63.1	63.3	Silty Clay, 10YR7/3 (very pale brown), soft, plastic, and moist	
63.3	67.5	Sand, 10YR8/2 (very pale brown) with 7.5YR7/8 (reddish yellow) laminations, firm, and moist. Sand is fine quartz grains	

Plant North -2642.287, Plant East -5091.257

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
		Fill: Gravelly Sand, 2.5YR5/6 (red), dense, and moist.	
0.0	31	Sand is fine quartz grains. Gravel is subrounded to	Fill
0.0	5.1	subangular chert with iron patina, 4 mm- to 0.5-inch	1 111
		diameter	
		Silt, 10YR7/2 (light gray) mottled with 10YR7/4 (very	
3.1	15.2	pale brown), soft, nonplastic to slightly plastic, and	
		moist	
		Silt with little Clay and little Gravel, $10YR//2$ (light	HU1
15.0	10.0	gray) with some $10YR/3$ (very pale brown) mottling,	
15.2	18.6	moderately hard, moderately plastic, and moist. Gravel	
		is rounded to subangular chert without iron patina, 0.3-	
		Inch diameter Gravelly Send with little Silt 10VP5/4 (vellowich	
		brown) firm and slightly major. Sand is fine quarty	
18.6	18.9	brown), fifth, and slightly moist. Sand is fine quartz	
		grains. Gravel is subangular to subrounded chert	
		Silty Sand with some Gravel 10XP7/2 (light grav)	
		firm and moist Sand is very fine quartz grains Gravel	
18.9	19.9	is subrounded to subangular short without iron pating	
		is subfounded to subangular cheft without from patha, 0.2 to 0.4 inch diameter	
		Silty Sand with little Gravel 7 5YR7/2 (ninkish gray)	
	21.4	firm and moist Sand consists of 70% fine quartz grains	
19.9		and 30% very coarse subrounded chert grains Gravel	
17.7	21.7	is subrounded chert without(?) iron pating 4 mm- to 0.3-	
		inch diameter	
		Sand, 7.5YR7/6 (reddish vellow) GRADING DOWN to	
21.4	22.6	10YR7/6 (vellow) mottled with 10YR8/1 (white), firm.	
		and moist. Sand is very fine quartz grains	
		Gravelly Sand with Silt, 10YR6/6 (brownish yellow),	
22.6	22.6	dense, and moist. Sand is fine quartz grains. Gravel is	
22.6	23.6	subrounded to subangular chert without iron patina, 0.4-	
		to 0.8-inch diameter	HU2
22.0	05 1	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand	
23.0	25.1	is fine quartz grains	
		Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with	
25.1	25.9	7.5YR8/1 (white), soft, slightly plastic, and moist. Sand	
		is fine quartz grains	
		Sand with Gravel, 7.5YR6/8 (reddish yellow) with some	
		7.5YR8/1 (white) mottling, firm to dense, and moist.	
25.9	28.1	Sand is fine quartz grains. Gravel is subrounded to	
		subangular chert without iron patina, 4 mm- to 0.8-inch	
		diameter	
28.1	29.1	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand	
20.1	27.1	is fine quartz grains	
29.1	30.0	Sand with Gravel as 25.9 to 28.1 ft	

Plant North -2642.287, Plant East -5091.257

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
30.0	32.1	Sand with Gravel, 10YR6/4 (light yellowish brown), firm to dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded chert with(?) iron patina, 0.3- to 0.9-inch diameter	
32.1	35.6	Silt, 7.5YR7/4 (pink), soft, moderately plastic, and moist	
35.6	37.5	Silt with Sand, 10YR8/3 (very pale brown), soft, nonplastic, and moist. Sand is very fine quartz grains	
37.5	44.9	Silt GRADING DOWN to Silt with a little Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic to plastic, and moist	
44.9	48.1	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), very soft, moderately plastic, and moist	
48.1	48.6	Silty Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains	
48.6	50.1	Silt as 44.9 to 48.1 ft	HU3
50.1	50.8	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
50.8	51.2	Clay, 7.5YR6/4 (light brown) mottled with 7.5YR8/1 (white), moderately hard, plastic, and moist	
51.2	54.6	Silt with Clay, 7.5YR8/1 (white) with 7.5YR7/6 (reddish yellow) mottling, moderately soft, moderately plastic, and moist	
54.6	55.6	Clay as 50.8 to 51.2 ft	
55.6	57.4	Silt with some Sand, 10YR8/3 (very pale brown), soft, slightly plastic, and moist. Sand is fine quartz grains	
57.4	62.7	Sand, 10YR8/3 (very pale brown), firm, and wet. Sand is fine quartz grains	
62.7	65.0	Sand with Gravel, 10YR8/3 (very pale brown), firm, and wet. Sand is 80% fine quartz grains and 20% coarse, rounded, chert grains. Gravel is rounded to subrounded chert without iron patina, 4 mm- to 0.5-inch diameter	HU4

Plant North -2642.137, Plant East -5057.047

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	2.5	Gravely Sand with some Silt, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 0.3- to 1.0-inch diameter (common fill material at PGDP)	Fill
2.5	13.5	Silt, 10YR7/1 (light gray) with some 10YR6/6 (brownish yellow) mottling, soft, nonplastic to slightly plastic, and moist	
13.5	16.5	Silt with little Clay and with little Gravel, 10YR7/2 (light gray), hard, slightly plastic, and slightly moist. Gravel is subrounded chert without iron patina, 0.3-inch diameter	HU1
16.5	17.5	Sandy Gravel with Silt, 7.5YR7/2 (light gray), dens, and moist. Gravel is subrounded chert without iron patina, 0.3- to 0.4-inch diameter. Sand is fine grained	HU2
17.5	20.0	No recovery	No Recovery
20.0	21.3	Sand with some Gravel, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with (?) iron patina, 4- mm to 1.0-inch diameter	
21.3	21.7	Silt, 7.5YR8/4 (pink), moderately hard, moderately plastic, and moist	
21.7	21.8	Sand, 7.5YR8/4 (pink), firm, and moist. Sand is very fine quartz grains.	
21.8	23.7	Silt with little Clay, 7.5YR7/6 (reddish yellow) with 7.5YR7/1 (light gray) mottling, soft, moderately plastic, and moist	
23.7	25.0	Silt, 7.5YR8/3 (pink) with 7.5YR8/1 (white) mottling, soft, plastic, and moist	
25.0	25.9	Silty Sand, 10YR7/4 (very pale brown) with little 10YR8/1 (white) mottling, firm, and moist. Sand is very fine quartz grains	
25.9	26.7	Sand with some Gravel, 10YR7/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without (?) iron patina, 4-mm to 0.3-inch diameter	HU2
26.7	27.6	Silty Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), soft, nonplastic, and moist. Sand is very fine quartz grains	
27.6	27.9	Gravelly Medium Sand, 7.5YR6/6 (reddish yellow), loose, and moist. Gravel is subrounded chert without iron patina, 0.3-inch diameter	
27.9	28.5	Silt, 10YR7/3 (very pale brown), moderately hard, moderately plastic, and moist	
28.5	29.7	Silty Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	

Plant North -2642.137, Plant East -5057.047

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology		Hydrogeologic Unit
		Gravel with Silt, 10YR8/2 (very pale brown), dense, and		
29.7	32.1	moist. Gravel is subrounded to subangular chert without		
		iron patina, 0.3- to 1.0-inch diameter		
32.1	33.1	Sand with blebs of Silt, 10YR7/3 (very pale brown),		
		firm, and moist. Sand is very fine quartz grains		
		and moist Sand is fine quartz grains Gravel is rounded		
33.1	33.8	to subrounded chert without iron pating 4-mm to 0.4-		
		inch diameter		
22.0	245	Sand, 10YR8/2 (very pale brown), lightly consolidate,		
33.8	34.5	and moist. Sand is fine quartz grains		
34.5	34.0	Gravelly Sand as 27.6 to 27.9 ft but colored 7.5YR7/4		
54.5	54.7	(pink)		
34.9	35.4	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand		
		is very fine quartz grains		
35.4	36.0	Sand with Gravel as 33.1 to 33.8 ft		
		Sandy Silt with some Gravel, 10YR7/3 (very pale		
2.0		brown) with little 2.5YR7/8 (light red) staining, soft,		
36.0	36.8	nonplastic, and moist. Sand is fine grained. Gravel is		
		rounded to subrounded chert without iron patina, 0.5- to		
36.8	37 /	Sond with Gravel as 22.1 to 22.8 ft		
50.8	57.4	Saild with Graver as 55.1 ± 55.6 ft Silt 10 VP8/2 (very pale brown) with some 2 5VP7/8		
37 /	12.1	(light red) staining soft nonplastic to slightly plastic		HU3
57.4	72.7	and moist		
		Silt with little Clay, 7.5YR7/3 (pink) mottled with		
42.4	43.8	7.5YR7/1 (light gray), soft, moderately plastic, and		
		moist		
		Silt, 10YR8/2 (very pale brown) with laminations of		
43.8	47.6	10YR7/6 (yellow) and 7.5YR7/6 (reddish yellow),		
		moderately soft, moderately plastic, and moist		
	10.0	Sand, 10YR8/2 (very pale brown) GRADING DOWN		
47.6	48.2	to $5YR7/6$ (reddish yellow), firm, and moist. Sand is		
		Very fine quartz grains		
18.2	50.0	7 5VP7/1 (light gray) soft moderately plastic and		
40.2	50.0	moist		
		Sand. 10YR8/2 (very pale brown) with 7.5YR7/6		
50.0	52.4	(reddish yellow) staining, firm, and moist. Sand is very		
		fine quartz grains		
		Slightly Clayey Silt, 7.5YR8/4 (pink) with 7.5YR8/1		
52.4	59.5	(white) mottling, soft, moderately plastic, and moist		
		Sand 5VD7/6 (raddish vallow) lightly appealidated		
59.5	62.9	and very moist. Sand is very fine quartz grains		
		and very moist, sand is very time qualtz grams		

Plant North -2642.137, Plant East -5057.047

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
62.9	65.0	Sandy Gravel, 7.5YR7/6 (reddish yellow), loose, and wet. Gravel is subrounded to subangular chert with iron patina, 0.3- to 1.0-inch diameter. Sand consists of 80% fine grains and 20% of coarse to very coarse, rounded, chert grains	HU4

Plant North -2607.931, Plant East -5163.515

10/16/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	3.7	Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.4- to 1.0-inch diameter	Fill
3.7	13.7	Silt, 10YR7/1 (light gray) with little 10YR7/6 (yellow) mottling, GRADING DOWN to 10YR7/6 (yellow) with 10YR7/1 (light gray) mottling and streaks of 10YR3/1 (very dark gray) (manganese?), soft, nonplastic, and moist	ни
13.7	17.0	Silt with Clay and little Gravel, 10YR7/1 (light gray), moderately soft to moderately hard, slightly plastic, and moist. Gravel is subrounded to rounded chert without iron patina, 0.4- to 0.5-inch diameter	
17.0	17.4	Sand with Gravel, 7.5YR7/3 (pink), dense, and moist. Sand is 80% fine quartz grains and 20% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.4-inch diameter	
17.4	17.7	Sand, 10YR7/3 (very pale brown), firm, and moist. Sand is fine quartz grains	
17.7	18.0	Sand with Gravel as 17.0 to 17.4 ft	1
18.0	18.3	Silt with Clay and little Gravel as 13.7 to 17.0 ft	1
18.3	21.5	Sand with Gravel and little Silt, 10YR6/4 (light yellowish brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with and without iron patina, 0.3- to 0.8-inch diameter	
21.5	22.4	Sand, 10YR7/6 (yellow) GRADING DOWN to 10YR8/1 (white), dense GRADING DOWN to firm, and moist. Sand is fine quartz grains	HU2
22.4	23.9	Sand with Gravel and little Silt as 18.3 to 21.5 ft	
23.9	24.5	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	
24.5	29.5	Silty Sand, 10YR8/1 (white) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	
29.5	31.8	Sand with Gravel, 10YR6/6 (brownish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with(?) iron patina, 0.3- to 0.6-inch diameter	
31.8	32.6	Sand with Gravel and little Silt, , 10YR6/6 (brownish yellow), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with(?) iron patina, 0.3- to 0.6-inch diameter	
32.6	33.8	Silt with little Clay, 7.5YR7/4 (pink), very soft, moderately plastic, and moist	

Plant North -2607.931, Plant East -5163.515

10/16/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
33.8	35.7	Silt with little Clay, 7.5YR7/4 (pink) with some 7.5YR8/1 (white) mottling, soft, plastic, and moist	
35.7	39.0	Silt with Sand, 7.5YR7/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, moderately soft, nonplastic, and moist. Sand is very fine quartz grains	
39.0	41.0	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately hard to moderately soft, moderately plastic, and moist	
41.0	42.5	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), moderately hard to moderately soft, moderately plastic, and moist	
42.5	45.0	Silt, 7.5YR6/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, hard, nonplastic, and moist	
45.0	50.0	Silt with Sand, 10YR7/4 (very pale brown) with some 10YR8/1 (white) mottling, moderately hard, nonplastic, and moist. Sand is very fine quartz grains	HU3
50.0	52.0	Silt, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), moderately soft, slightly plastic, and moist	
52.0	52.5	Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling, firm, and moist. Sand is very fine quartz grains	
52.5	57.7	Silt, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately hard GRADING DOWN to hard, nonplastic, and moist	
57.7	59.8	Silt with Sand, 7.5YR7/3 (pink) mottled with 7.5YR8/1 (white), soft, moderately plastic, and moist. Sand is very fine quartz grains	
59.8	62.1	Interbedded Very Fine Sand [10YR8/1 (white), firm, and moist] AND Silt with Very Fine Sand [7.5YR7/4 (pink), soft, moderately plastic, and moist]	
62.1	62.5	Sand, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains	HU4

Plant North -2624.624, Plant East -5148.039

Start Depth (ft.bgs)	End Depth (ft.bgs)	Lithology	Hydrogeologic Unit
0.0	2.5	Gravelly Sand, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is chert with iron patina, 0.3- to 1.0-inch diameter	Fill
2.5	12.9	Silt, 10YR7/2 (light gray) with little 10YR7/4 (very pale brown) mottling GRADING DOWN to 10YR6/3 (pale brown), soft, nonplastic, and moist	
12.9	13.6	Sand, 10YR8/3 (very pale brown), dense, and moist. Sand is very fine quartz grains	
13.6	15.2	Silt with Clay and some Gravel, 10YR7/4 (very pale brown) GRADING DOWN to 10YR7/2 (light gray), moderately hard/stiff, slightly plastic, and moist	HT11
15.2	16.0	Gravelly Sand, 10YR6/4 (light yellowish brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 4 mm- to 0.4-inch diameter	nor
16.0	18.8	Silt with little Clay and little Gravel, 10YR7/1 (light gray), moderately soft, slightly plastic, and moist. Gravel is subrounded chert without iron patina, 0.3- to 0.7-inch diameter	
18.8	20.2	Gravelly Sand with Silt, 10YR7/3 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.7- to 1.2-inch diameter AND subangular to subrounded chert with iron patina, 0.3- to 0.7-inch diameter	
20.2	21.5	Sand with Gravel, 7.5YR7/4 (pink), dense, and moist. Sand is 70% fine quartz grains and 30% coarse-to-very- coarse, subrounded chert grains. Gravel is subangular to subrounded chert with(?) iron patina, 0.3-inch diameter	
21.5	22.6	Sand, 10YR8/2 (very pale brown) with 10YR7/6 (yellow) mottling, firm, and moist. Sand is fine quartz grains	
22.6	23.4	Sand with Gravel, 10YR7/4 (very pale brown), dense and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with and without iron patina, 0.3-inch diameter	HI 12
23.4	23.8	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains	1102
23.8	24.1	Sandy Gravel, 10YR8/2 (very pale brown), dense, and moist. Gravel is subrounded chert with and without iron patina, 0.4-inch diameter. Sand is fine quartz grains	
24.1	29.0	Silt with Sand (very fine quartz grains), GRADING DOWN to Sand (very fine quartz grains), 10YR8/2 (very pale brown) with 10YR7/6 (yellow) and 7.5YR7/6 (reddish yellow) laminations, soft to moderately firm, nonplastic, and moist	

Plant North -2624.624, Plant East -5148.039

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
29.0	31.4	Sandy Gravel GRADING DOWN to Sandy Gravel with little Silt, 7.5YR6/4 (light brown), dense, and moist. Gravel is subrounded to subangular chert with iron patina, 0.3- to 1.0-inch diameter. Sand is 80% fine quartz grains and 20% coarse-to-very-coarse, subrounded chert grains	
31.4	36.3	Silt, 7.5YR7/4 (pink) with some 7.5YR8/1 (white) mottling GRADING DOWN to 10YR7/4 (very pale brown) with some 10YR8/1 (white) mottling, very soft to soft, nonplastic to moderately plastic, and moist	
36.3	39.3	Silt, 10YR7/4 (very pale brown) with 10YR8/1 (white) mottling GRADING DOWN to 10YR8/2 (very pale brown) with 7.5YR7/4 (pink) mottling, moderately soft, nonplastic, and moist	
39.3	40.6	Silty Sand, 10YR7/3 (very pale brown) GRADING DOWN to 10YR7/6 (yellow) with 10YR8/1 (white) mottling, firm, and moist. Sand is very fine quartz grains	
40.6	41.0	Sand, 7.5YR7/6 (reddish yellow), firm and moist. Sand is fine quartz grains	
41.0	45.6	Clayey Silt, 7.5YR7/4 (pink) with 7.5YR8/1 (white) mottling, moderately hard, plastic, and moist	
45.6	47.4	Silt with Sand, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains. Contains trace rounded chert gravel (without iron patina), 0.6- to 1.2-inch diameter	HU3
47.4	48.0	Sand, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is fine quartz grains	
48.0	51.5	Silt with little Clay, 7.5YR8/1 (white) with 7.5YR7/4 (pink) mottling, moderately soft, moderately plastic, and moist	
51.5	53.4	Silt with Sand, 7.5YR8/1 (white) mottled with 7.5YR7/4 (pink), soft, slightly plastic, and moist. Sand is very fine quartz grains	
53.4	58.5	Silt with little Clay, 7.5YR7/6 (reddish yellow) with 7.5YR8/1 (white) mottling, moderately hard, slightly plastic, and moist	
58.5	62.3	Silt with Sand (very fine quartz grains) interbedded with Silty Sand (very fine quartz grains), 7.5YR8/1 (white) with 7.5YR7/7 (reddish yellow) laminations and mottling, soft/firm, nonplastic to slightly plastic, and moist	
62.3	63.9	Sand, 10YR8/1 (white), firm, moist to loose, and wet. Sand is fine quartz grains	

Plant North -2624.624, Plant East -5148.039

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
63.9	64.2	Sandy Gravel, 10YR8/2 (very pale brown), loose, and wet. Gravel is subrounded to subangular chert with and without iron patina, 4 mm- to 0.5-inch diameter. Sand is fine quartz grains	HU4
64.2	65.0	Sand with some Gravel and blebs of Silt, 10YR8/1 (white) with an interbed of 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.5-inch diameter	

Plant North -2607.459, Plant East -5258.754

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
0.0	1.8	Gravely Sand, 5YR6/6 (reddish yellow), dense, and moist. Sand is fine grained quartz. Gravel is subangular to subrounded chert with iron patina, 0.3- to 0.7-inch diameter	
1.8	2.2	Sandy Gravel, 10YR7/1 (light gray), dense, and moist. Gravel is subrounded limestone, 4mm- to 0.5-inch diameter (dense gravel aggregate/DGA). Sand is coarse, subangular limestone	Fill
2.2	4.1	Gravelly Sand as 0.0 to 1.8 ft	
4.1	10.3	Silt, 10YR7/2 (light gray) with little 10YR7/4 (very pale brown) mottling, soft, nonplastic, and moist	
10.3	11.5	Sand, 10YR6/6 (brownish yellow), dense, and moist. Sand is very fine quartz grains	
11.5	12.7	Gravelly Sand, 7.5YR6/4 (light brown), dense, and moist. Sand is 90% fine quartz grains and 10% coarse, subrounded, chert grains. Gravel is subrounded chert without (?) iron patina, 0.3- to 1.0-inch diameter	HIII
12.7	15.2	Silt with little Clay and little Gravel, 10YR7/3 (very pale brown), moderately hard, nonplastic, and moist. Gravel is subrounded chert without iron patina	
15.2	17.6	Silt with Gravel and little Clay, 10YR7/3 (very pale brown) GRADING DOWN to 10YR7/1 (light gray), moderately hard, nonplastic, and moist. Gravel is subrounded chert without iron patina, 0.3- to 1.0-inch diameter	
17.6	18.1	Sand, 10YR7/4 (very pale brown), firm and moist. Sand is fine to medium, subrounded, quartz grains	
18.1	18.6	Sand, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
18.6	19.1	Sand with some Gravel, 10YR7/4 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without (?) iron patina, 0.3- to 0.4- inch diameter	
19.1	21.8	Sand with some Gravel, 10YR8/2 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without (?) iron patina, 4 mm- to 0.4- inch diameter	
21.8	22.5	Sand with some Gravel, 7.5YR6/4 (light brown), dense, and moist. Sand is 70% fine quartz grains and 30% coarse-to-very-coarse, subrounded chert grains. Gravel is subrounded to rounded chert without (?) iron patina, 0.3- to 0.4-inch diameter	
22.5	24.9	Sand with little Gravel, 10YR7/1 (light gray) mottled with 10YR7/3 (very pale brown), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert, with and without iron patina, 4 mm- to 0.6-inch diameter	HU2

Plant North -2607.459, Plant East -5258.754

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
24.9	25.8	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains	
25.8	27.0	Silt, 10YR8/2 (very pale brown) with 7.5YR7/6 (reddish yellow) laminations, moderately soft, nonplastic, and moist	
27.0	28.1	Sand, 10YR8/2 (very pale brown), lightly consolidated, and moist. Sand is 90% fine quartz grains and 10% coarse, rounded, chert grains	
28.1	28.8	Silt as 25.8 to 27.0 ft	
28.8	29.5	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains	
29.5	31.0	Gravelly Sand, 10YR7/3 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.3- to 0.6-inch diameter	
31.0	31.5	Silt, 10YR8/2 (very pale brown), soft, plastic, and moist	
31.5	36.4	Gravelly Sand as 29.5 to 31.0 ft	
36.4	39.0	Silty Sand, 10YR8/2 (very pale brown) with some 7.5YR7/6 (reddish yellow) laminations, firm, and moist. Sand is very fine quartz grains	
39.0	40.2	Silt with little Clay, 10YR7/2 (light gray) mottled with 10YR7/4 (very pale brown), moderately soft, moderately plastic, and moist	
40.2	47.0	Silt with some Clay, 7.5YR7/4 (pink) with some 7.5YR8/1 (white) mottling, moderately hard, slightly plastic, and moist	
47.0	53.9	Silt, 7.5YR8/1 (white) mottled with 7.5YR7/6 (reddish yellow), moderately hard, slightly plastic, and moist	HU3
53.9	56.7	Silt, 7.5YR6/8 (reddish yellow), hard, nonplastic, and moist	
56.7	58.2	Silt, 7.5YR8/1 (white), moderately hard, nonplastic, and moist	
58.2	59.0	Silt with Sand, 10YR8/3 (very pale brown) with 7.5YR7/6 (reddish yellow) mottling, soft, nonplastic, and moist. Sand is fine quartz grains	
59.0	62.5	Sand with a few blebs of Silt, 10YR8/2 (very pale brown) with some 7.5YR7/6 (reddish yellow) staining and mottling, firm and moist. Sand is fine quartz grains. Silt blebs are 10YR8/2 (very pale brown), soft, plastic, and moist.	HU4

Plant North -2630.55, Plant East -5241.133

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydr	ogeologic Unit
0.0	1.4	Gravelly Sand with little Silt, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 4-mm to 0.4-inch diameter		
1.4	2.0	Gravel, 10YR7/1 (light gray), dense, and moist. Gravel is subangular limestone, 4-mm to 0.3-inch diameter: dense gravel aggregate/DGA		FILL
2.0	2.6	Gravelly Sand, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded chert with iron patina, 4-mm to 0.4-inch diameter		
2.6	12.1	Silt, 10YR7/1 (light gray) with little 10YR7/4 (very pale brown) mottling GRADING DOWN to 7.5YR7/6 (reddish yellow), soft, nonplastic, and moist		
12.1	12.7	Sand, 10YR8/2 (very pale brown), dense, and moist. Sand is very fine quartz grains		
12.7	14.0	Sand, 10YR7/6 (yellow), firm, and moist WITH thin Silt interbeds, 10YR8/2 (very pale brown), soft, plastic, and moist. Sand is fine quartz grains		
14.0	14.4	Sandy Silt with some Gravel, 7.5YR6/6 (reddish yellow), soft, nonplastic, and moist		HU1
14.4	17.5	Silt with little Clay and Gravel, 10YR7/3 (very pale brown), moderately soft, plastic, and moist. Gravel is subrounded chert without iron patina, 0.4-inch diameter		
17.5	18.6	Silt with Sand and Gravel, 10YR7/1 (light gray), soft, nonplastic, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with and without iron patina, 0.3- to 0.6-inch diameter		
18.6	23.9	Sand with Gravel and little Silt, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is 70% fine quartz grains and 30% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert with iron patina, 0.3-to 0.8-iinch diameter		
23.9	25.8	Sand, 10YR8/4 (very pale brown), firm-to-lightly- consolidated, and moist. Sand is fine quartz grains		
25.8	26.8	Silt with little Sand, 10YR7/6 (yellow) mottled with 10YR8/1 (white), soft, moderately plastic, and moist. Sand is fine quartz grains		
26.8	27.4	Gravelly Sand, 10YR8/2 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subangular to subrounded chert with(?) iron patina, 0.5- to 0.6-inch diameter		HU2
27.4	27.6	Sand, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains		
27.6	30.3	Gravelly Sand as 26.8 to 27.4 ft		

Plant North -2630.55, Plant East -5241.133

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
30.3	31.5	Sand, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains	
31.5	32.4	Sand with Gravel, 10YR8/1 (white), firm, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert without iron patina, 0.3- to 0.5-inch diameter	
32.4	39.0	Silt with some Sand, 10YR8/1 (white), soft, nonplastic to moderately plastic, and moist. Sand is very fine quartz grains	
39.0	43.2	Silt with some Clay, 10YR8/1 (white) mottled with 10YR7/6 (yellow), soft, plastic, and moist	
43.2	51.6	Silt with some Clay, 7.5YR7/4 (pink) mottled with 7.5YR8/1 (white), moderately soft, moderately plastic, and moist	
51.6	52.5	Silt with Sand (soft, moderately plastic, and moist) GRADING DOWN to Sand (firm and moist), 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white). Sand is very fine quartz grains	HU3
52.5	55.5	Silt with little Clay, 7.5YR6/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, moderately hard/stiff, nonplastic to slightly plastic, and moist	
55.5	58.7	Silty Sand, 10YR8/2 (very pale brown) with 10YR7/76 (yellow) laminations, firm, and moist. Sand is very fine quartz grains	
58.7	62.5	Sand, 10YR8/4 (very pale brown), firm and moist to loose and wet. Sand is fine quartz grains but for interval of coarse, rounded, quartz grains at 62.0 to 62.1 ft	HU4

Plant North -2603.36, Plant East -5105.973

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(It bgs)	(tt bgs)		
0.0	2.2	Gravelly Sand with little Silt, 2.5YR5/6 (red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 4 mm- to 0.5-inch diameter	
2.2	15.2	Silt, 10YR7/1 (light gray) with little 10YR7/4 (very pale brown) GRADING DOWN to 10YR7/3 (very pale brown), soft, nonplastic, and moist	HU1
15.2	18.3	Silt with little Clay and little Gravel, 10YR7/1 (light gray) mottled with 10YR7/4 (very pale brown), moderately hard, slightly plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.9-inch diameter	
18.3	19.1	Sand with Gravel, 10YR7/4 (very pale brown), dense, and moist. Sand is 70% fine quartz grains and 30% coarse, subrounded, chert grains. Gravel is subrounded chert without iron patina, 0.3- to 0.5-inch diameter	
19.1	20.0	Sand with trace of Gravel, 7.5YR7/6 (reddish yellow), dense, and moist. Sand is 85% fine quartz grains and 15% coarse, subrounded, chert grains. Gravel is chert, 0.3- to 0.5-inch diameter	
20.0	20.9	Sand with Gravel as 18.3 to 19.1 ft	
20.9	21.3	Silt with Sand, 10YR7/1 (light gray), moderately hard, nonplastic, and moist. Sand is very fine quartz grains	HU2
21.3	22.5	Sand with Gravel as 18.3 to 19.1 ft	
22.5	27.5	Silty Sand, firm, and moist; interbedded with Silt with little Clay, moderately hard, slightly plastic, and moist; 10YR7/1 (light gray) mottled with 7.5YR7/6 (reddish yellow). Sand is very fine quartz grains	
27.5	28.2	Silty Sand with Gravel, 10YR7/1 (light gray) mottled with 7.5YR7/6 (reddish yellow), firm, and moist. Sand is very fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.8-inch diameter	
28.2	28.5	Silt with Sand, 10YR7/1 (light gray), moderately soft, moderately plastic, and moist. Sand is very fine quartz grains	
28.5	32.0	Sand with Gravel and with little Silt, 7.5YR7/4 (pink), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter (and trace 1.0-inch diameter)	
32.0	42.3	Silt, 10YR7/3 (very pale brown) GRADING DOWN to 10YR8/2 (very pale brown) with 10YR7/6 (yellow) laminations, soft to moderately soft, nonplastic to slightly plastic, and moist	

Plant North -2603.36, Plant East -5105.973

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
42.3	45.5	Silt with little Clay, 7.5YR7/4 (pink) mottled with 7.5YR7/1 (white), moderately hard, slightly to moderately plastic, and moist	
45.5	46.5	Silty Sand, 7.5YR6/6 (reddish yellow) with some 7.5YR8/1 (white) mottling, firm, and moist. Sand is very fine quartz grains	
46.5	48.5	Sand with trace of Gravel, 7.5YR6/6 (reddish yellow) mottled with 7.5YR8/1 (white), firm, and moist. Sand is fine quartz grains. Gravel is subrounded chert without iron patina, 0.3- to 0.7-inch diameter	HU3
48.5	50.3	Silt, 10YR7/4 (very pale brown) mottled with 10YR8/1 (white), moderately hard, nonplastic, and moist	
50.3	52.2	Silt, 10YR7/3 (very pale brown) mottled with 7.5YR7/6 (reddish yellow), soft, moderately plastic, and moist	
52.2	53.6	Silty Sand, 10YR8/2 (very pale brown) mottled with 10YR7/6 (yellow), firm, and moist. Sand is very fine quartz grains	
53.6	57.7	Silt, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), moderately soft, moderately plastic, and moist	
57.7	59.0	Silty Sand, 10YR8/4 (very pale brown) mottled with 10YR8/1 (white), firm, and moist. Sand is very fine quartz grains	
59.0	59.6	Silt with Sand, 10YR7/6 (yellow), soft, nonplastic, and moist. Sand is very fine quartz grains	
59.6	67.5	Sand, 10YR8/4 (very pale brown), lightly consolidated and moist TO loose and wet WITH a few blebs of Clay, 10YR8/2 (very pale brown), soft, plastic, and moist. Sand is fine quartz grains	HU4

Plant North -2627.587, Plant East -5106.145

10/19/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
0.0	1.3	Fill: Sand with Gravel and little Silt, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.3-inch diameter	
1.3	1.5	Fill: Gravel, 10YR7/2 (light gray), loose, and moist. Gravel is subangular to subrounded limestone, 4 mm- to 0.5-inch diameter (dense gravel aggregate/DGA)	Fill
1.5	2.6	Fill: Sand with Gravel, 2.5YR6/6 (light red), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to rounded chert with iron patina, 0.3-inch diameter	
2.6	14.5	Silt, 10YR7/1 (light gray) mottled with 10YR7/6 (yellow) GRADING DOWN at 13.1 ft to 10YR7/6 (yellow) mottled with 10YR5/4 (yellowish brown) and 10YR7/1 (light gray), soft, nonplastic, and moist	
14.5	16.7	Silt with little Clay and little Gravel, 10YR7/1 (light gray), moderately soft, moderately plastic, and moist. Gravel is subrounded to subangular chert without iron patina, 4 mm- to 0.3-inch diameter	
16.7	18.3	Silt with Gravel and little Clay, 10YR7/1 (light gray) mottled with 7.5YR7/4 (pink), moderately soft, moderately plastic, and moist. Gravel is subrounded chert without iron patina, 0.5- to 1.1 inch diameter	
18.3	20.0	Clayey Silt with little Gravel, 10YR7/1 (light gray), moderately hard, plastic, and moist. Gravel is subangular to subrounded chert without iron patina, 0.3- to 0.5-inch diameter	HU2
20.0	20.2	Gravelly Sand, 7.5YR6/4 (light brown), dense, and moist. Sand is 65% fine quartz grains and 35% coarse, subrounded, chert grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.5-inch diameter	
20.2	22.0	Silt with Sand, 10YR8/2 (very pale brown) with some 10YR7/6 (yellow) mottling, soft, nonplastic, and moist. Sand is very fine quartz grains	
22.0	22.4	Silt with Gravel and little Clay as at 16.7 to 18.3 ft but colored 7.5YR6/2 (pinkish gray)	
22.4	23.0	Gravelly Sand as 20.0 to 20.2 ft	
23.0	24.2	Silt, 10YR8/1 (white) mottled with 10YR8/3 (very pale brown), soft, nonplastic, and moist	
24.2	25.3	Sand, 10YR8/1 (white) with 10YR7/4 (very pale brown) mottling, firm, and moist. Sand is fine quartz grains	

Plant North -2627.587, Plant East -5106.145

10/19/2012

Start Depth	End Depth	Lithology	Hydrogeologic Unit
(ft bgs)	(ft bgs)		
25.3	30.0	Sand with some Gravel, 10YR8/2 (very pale brown) GRADING DOWN to 10YR6/6 (brownish yellow), dense, and moist. Sand is 85% fine quartz grains and 15% coarse to very coarse, subrounded, chert grains. Gravel is subrounded to subangular chert without iron patina, 0.3- to 0.4-inch diameter	HU3
30.0	30.5	Sand, 10YR8/3 (very pale brown), firm, and moist. Sand is fine quartz grains	1105
30.5	31.9	Gravelly Sand, 10YR7/4 (very pale brown), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with and without iron patina, 4 mm- to 0.8-inch diameter (poorly sorted)	
31.9	32.2	Sand, 7.5YR7/6 (reddish yellow), firm, and moist. Sand is fine quartz grains	
32.2	37.5	Silt with Sand, 7.5YR8/6 (reddish yellow), soft, nonplastic, and moist. Sand is fine quartz grains	
37.5	42.2	Silt, 10YR7/4 (pink) with some 10YR8/1 (white) mottling, soft, nonplastic to moderately plastic, and moist	
42.2	44.2	Silt with little Clay, 7.5YR7/4 (pink) with some 7.5YR6/6 (reddish yellow) mottling, moderately soft GRADING DOWN to soft, moderately plastic, and moist	
44.2	45.9	Silt, 7.5YR7/6 (reddish yellow) with little 7.5YR8/1 (white) mottling, soft, plastic, and moist	
45.9	47.9	Silt with Sand, 7.5YR7/6 (reddish yellow) mottled with 7.5YR8/1 (white), soft, nonplastic, and moist. Sand is very fine quartz grains	
47.9	50.6	Sand, 10YR8/2 (very pale brown), firm, and moist. Sand is very fine quartz grains	HU3
50.6	51.4	Silt with Sand, 10YR8/2 (very pale brown), soft, slightly plastic, and moist. Sand is very fine quartz grains	
51.4	52.3	Silt with Clay, 7.5YR8/2 (pinkish white) mottled with 7.5YR7/4 (pink), soft, plastic, and moist	
52.3	52.9	Silt with Sand, 10YR8/2 (very pale brown), soft, slightly plastic, and moist. Sand is very fine quartz grains	
52.9	53.6	Sand, 10YR8/4 (very pale brown), firm, and moist. Sand is fine quartz grains	
53.6	57.6	Silt, 7.5YR8/2 (pinkish white) with 7.5YR7/4 (pink) mottling, soft, plastic, and moist	
57.6	59.7	Sand (fine quartz grains), 10YR8/6 (yellow), firm, and moist interbedded with Silt, 10YR8/3 (very pale brown), soft, nonplastic, and moist	
59.7	62.4	Sand, 10YR7/6 (yellow), firm, and moist. Sand is fine quartz grains	

Plant North -2627.587, Plant East -5106.145

10/19/2012

Start Depth (ft bgs)	End Depth (ft bgs)	Lithology	Hydrogeologic Unit
62.4	62.7	Gravelly Sand, 10YR8/1 (white), dense, and moist. Sand is fine quartz grains. Gravel is subrounded to subangular chert with iron patina, 0.4- to 0.5-inch diameter	HU4
62.7	65.0	Sand, 10YR8/2 (very pale brown), firm and moist to loose and wet. Sand is fine quartz grains	

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APPENDIX E

SUMMARY OF SOILS VOC DATA FOR SWMU 211-A

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SWMU 211-A VOC Analyes

Station	Date Collected	Sample Depth [ft bls]	TCE [µg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		<i>trans-</i> 1,2- DCE [μg/kg]		VC [µg/kg]	
			75		137		619		5290		570	
		0.5	0.44	U	1.8	U	0.67	U	1.1	U	0.48	U
		7.5	0.42	U	1.7	U	0.65	U	1	U	0.46	U
		10.1	0.39	U	1.6	U	0.61	U	0.95	U	0.43	U
		(10.1)DUP	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U
		19.9	9.7		1.4	U	0.54	U	0.84	U	0.39	U
		24.9	4	J	1.5	U	0.55	U	0.86	U	0.39	U
211-A-	8/29/2012	25.5	14		1.2	U	0.46	U	0.72	U	0.33	U
001		34.5	3.1	J	1.4	U	0.52	U	0.81	U	0.37	U
		35.5	0.45	J	1.3	U	0.5	U	0.78	U	0.36	U
		44.5	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U
		46.5	0.36	U	1.5	U	0.55	U	0.86	U	0.39	U
		50.1	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
		59	11		1.7	U	0.63	U	0.99	U	0.45	U
		Average	3.4		***		***		***		***	
		4.5	2.1	J	1.8	U	0.69	J	1	U	0.47	U
		6	23		1.6	U	9.4	J	0.93	U	0.43	U
		11	12		1.6	U	3.2	J	0.92	U	0.42	U
		16	0.34	U	1.4	U	0.52	U	0.82	U	0.37	U
		21	9.5		1.5	U	2	J	0.88	U	0.4	U
		25.5	0.47	J	1.5	U	0.55	U	0.85	U	0.39	U
	8/30/2012	32.5	10		1.6	U	0.92	J	0.93	U	0.42	U
211-A- 002		(32.5)DUP	2.4	J	1.4	U	0.53	U	0.83	U	0.38	U
002		36.5	1,100		27	U	11	U	8.9	U	30	U
		40.5	880		22	U	9.6	U	7.5	U	26	U
		45.5	140		1.5	U	0.58	U	0.9	U	0.41	U
		50.1	2.5	J	1.6	U	0.6	U	0.93	U	0.43	U
		59.9	65		2	J	0.61	U	0.96	U	0.44	U
	8/31/2012	62.5	8.7	J	1.6	U	0.58	U	0.91	U	0.42	U
		Average	161		2.5		2.0		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		TCE 1,1-DCE cis-1,2- trans-1,2- [μg/kg] [μg/kg] DCE DCE DCE Image: page 1 Image: page 2 Image: 2 Image: page 2 Image: 2 Image: 2 Image:		TCE [µg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		trans-1,2- DCE [μg/kg]		g]
			75		137		619		5290		570					
		4	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U				
		9	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U				
		14	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U				
		19	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U				
		(21.5)DUP	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U				
		21.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U				
211-A-003	0/12/2012	28.5	0.31	U	1.3	U	0.48	U	0.75	U	0.34	U				
	9/12/2012	34.9	8.7	J	1.6	U	0.6	U	0.95	U	0.43	U				
		39.5	110		17		1.8	J	0.83	U	0.38	U				
		40.1	80		19		0.85	J	0.94	U	0.43	U				
		48	52		12		1.2	J	0.89	U	0.41	U				
		54	4.4	J	1.5	U	0.56	U	0.87	U	0.4	U				
		59	0.39	U	1.6	U	0.59	U	0.93	U	0.43	U				
		64	0.36	U	1.9	J	0.56	U	0.87	U	0.4	U				
		Average	18		4.1		0.5		***		***					
		4	0.39	U	1.6	U	0.59	U	0.93	U	0.42	U				
		9	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U				
		14	0.36	U	1.6	J	0.56	U	0.87	U	0.4	U				
		16.5	0.33	U	18		0.5	U	0.79	U	0.36	U				
	8/31/2012	24.9	1,700		1,600		9.6	U	7.5	U	26	U				
		27	960		970		9.4	J	7.3	U	25	U				
211 A 004		30.1	620		900		20	J	6.2	U	21	U				
211-A-004		35.1	1,200		1,400		20	J	8.1	U	28	U				
		40.1	2,400		4,400		29	J	8.3	U	28	U				
		48.5	17	U	480		9.9	U	7.7	U	26	U				
	0/4/2012	53.5	33	J	110	J	10	U	8.2	U	28	U				
	9/4/2012	59.9	97		12		10	J	1.1	U	0.51	U				
		61	160		23		14		1.1	U	0.49	U				
	Average		552		763		9.1		***		***					

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		1,1-DCE [µg/kg]		2- ; ;]	trans-1 DCE [µg/kg	,2- ;]	VC [µg/kg]	
			75		137		619		5290		570	
		4	19	U	26	U	11	U	8.8	U	30	U
		6	1,700		24	U	15	J	8.2	U	28	U
		14	88		1.5	U	11		0.88	U	7.6	J
		15.1	35		1.6	U	4.7	J	0.92	U	1.5	J
		(15.1)DUP	42		1.5	U	6.4	J	0.9	U	2	J
		23.5	17		9.3		2	J	0.81	U	0.37	U
	0/4/2012	26	13		1.3	U	2.2	J	0.75	U	0.35	U
211-A-005	9/4/2012	34.9	54		130		1.4	J	0.88	U	0.4	U
		35.5	190	J	840		11	U	8.4	U	29	U
		43.5	96	J	690		10	U	7.9	U	27	U
		45.5	71	J	550		10	U	7.8	U	27	U
		53	11		8.8	J	0.6	J	0.86	U	0.4	U
		55.5	6.5	J	3.2	J	0.84	J	0.95	U	0.43	U
		60.5	120		24		7.1	J	0.9	U	0.41	U
		Average	175		163		5.2		***		5.9	
		4	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		(4)DUP	1.8	J	1.7	U	0.65	J	0.98	U	0.45	U
		9	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		14	0.38	U	1.6	U	0.59	U	0.93	U	0.42	U
		18.5	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U
		23.5	0.32	U	1.3	U	0.49	U	0.77	U	0.35	U
	9/26/2012	29	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U
211-A-006	<i>J</i> /20/2012	32	1.1	J	1.3	U	0.49	U	0.77	U	0.35	U
		39	13		32		0.83	J	0.97	U	0.44	U
		40.5	8	J	22		0.59	U	0.92	U	0.42	U
		49	8.7		17		0.51	U	0.8	U	0.37	U
		51	7.1	J	9.5	J	0.6	U	0.94	U	0.43	U
		59.5	24		7.2	J	1	J	1	U	0.48	U
		61	52		9.4	J	2.9	J	1.1	U	0.51	U
·		Average	8.3		7.4		0.6		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		,2- ;]	VC [µg/kg]	
			75		137		619		5290		570	
		4	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		(9)DUP	0.54	U	2.2	U	0.83	U	1.3	U	0.6	U
		9	0.49	U	2	U	0.75	U	1.2	U	0.54	U
		13.5	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		19	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U
		24.9	0.45	U	1.9	U	0.69	U	1.1	U	0.5	U
211-A-008	0/20/2012	29	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U
	9/20/2012	33.5	0.37	U	1.5	U	0.56	U	0.88	U	0.4	U
		39	0.36	U	1.5	U	0.56	U	0.87	U	0.4	U
		41	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U
		49.9	0.37	U	1.5	U	0.56	U	0.88	U	0.4	U
		53.5	5.3	J	1.5	U	0.58	U	0.9	U	0.41	U
		59	34		6.5	J	0.67	U	1	U	0.48	U
		61.5	130		78		4.2	J	1.1	U	0.52	U
		Average	12		6.8		0.6		***		***	
		4	0.43	U	1.8	U	0.66	U	1	U	0.48	U
		9	0.44	U	1.8	U	0.68	U	1.1	U	0.49	U
		14	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		19	8.7	J	1.7	U	0.62	U	0.98	U	0.45	U
		22.5	1.7	J	1.7	U	0.64	U	1	U	0.46	U
		(29)DUP	13		1.5	U	0.55	U	0.87	U	0.4	U
	9/20/2012	29	11		1.6	U	0.6	U	0.94	U	0.43	U
211-A-009)/20/2012	34	2.4	J	2.5	J	0.57	U	0.89	U	0.41	U
		39.5	160	J	25	U	11	U	8.5	U	29	U
		40.1	110		1.5	U	0.54	U	0.85	U	0.39	U
		49	1.8	J	1.8	U	0.68	U	1.1	U	0.48	U
		54	32		3.6	J	0.56	U	0.88	U	0.4	U
		59.9	190		38		1.9	J	0.92	U	0.42	U
		60.1	33		3.3	J	0.64	J	0.93	U	0.43	U
		Average	40		4.8		0.8		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		TCE [µg/kg]		1,1-DCE [µg/kg]		1,1-DCE cis-1,2- trans-1,2- [μg/kg] DCE DCE [μg/kg] [μg/kg] [μg/kg]		1,1-DCE cis-1,2- trans-1,2- [μg/kg] DCE DCE [μg/kg] [μg/kg] [μg/kg]		1,1-DCE [µg/kg]		<i>cis-</i> 1,2- DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		trans-1,2- DCE [μg/kg]		g]
			75		137		619		5290		570											
		4	0.39	U	1.6	U	0.6	U	0.95	U	0.43	U										
	8/16/2012	9.5	0.46	J	1.6	U	0.6	U	0.94	U	0.43	U										
	8/10/2012	14.5	0.42	U	1.7	U	0.64	U	1	U	0.46	U										
		19.9	14		1.4	U	11		0.8	U	0.37	U										
		24	2.7	J	1.4	U	0.51	U	0.81	U	0.37	U										
211-A-010		26	25		1.5	U	0.91	J	0.89	U	0.41	U										
		33	790		22	U	9.5	U	7.4	U	25	U										
	9/13/2012	38.5	500		26	U	11	U	8.6	U	29	U										
		40.1	280		22	U	9.6	U	7.5	U	25	U										
		48	1.4	J	1.5	U	0.57	U	0.9	U	0.41	U										
		52	0.32	U	1.3	U	0.49	U	0.76	U	0.35	U										
	0/17/2012	59	15		1.6	U	0.61	U	0.96	U	0.44	U										
	9/17/2012	60.5	120		2.2	J	1.3	J	1.1	U	0.52	U										
		Average	135		3.4		2.3		***		***											
		4	0.39	U	1.6	U	0.6	U	0.93	U	0.43	U										
		9	0.42	U	1.7	U	0.64	U	1	U	0.46	U										
		(11)DUP	0.39	U	1.6	U	0.6	U	0.95	U	0.43	U										
		11	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U										
		19.5	0.39	U	1.6	U	0.59	U	0.93	U	0.43	U										
		20.1	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U										
	8/17/2012	27.5	0.34	U	1.4	U	0.52	U	0.82	U	0.37	U										
211-A-011	0/17/2012	30.5	0.35	U	1.5	U	0.54	U	0.85	U	0.39	U										
		36.5	60		17		0.86	J	1.2	U	0.55	U										
		40.1	76		20		0.64	U	1	U	0.46	U										
		49.5	11		2.9	J	0.67	U	1	U	0.48	U										
		51.5	3.2	J	1.5	U	0.55	U	0.86	U	0.39	U										
		59.9	8.3	J	19		0.68	U	1.1	U	0.49	U										
		62.5	8.6	J	28		0.6	U	0.94	U	0.43	U										
		Average	12		6.7		0.3		***		***											

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		ΓCE 1,1-DCE cis-1,2- trans-1,2- g/kg] [μg/kg] [μg/kg] [μg/kg] [μg/kg]		TCE [µg/kg]		1,1-DCE [µg/kg]		1,1-DCE cis-1,2- trans-1,2- [μg/kg] DCE DCE [μg/kg] [μg/kg] [μg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		VC [µg/k	g]
			75		137		619		5290		570								
		4	0.46	U	1.9	U	0.7	U	1.1	U	0.5	U							
		9	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U							
		14	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U							
		(19)DUP	0.39	U	1.6	U	0.59	U	0.93	U	0.43	U							
		19	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U							
		20.5	0.36	U	1.5	U	0.55	U	0.86	U	0.39	U							
211-A-012	0/17/2012	26.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U							
	9/17/2012	31	0.44	U	1.8	U	0.67	U	1.1	U	0.48	U							
		36.5	0.35	U	1.4	U	0.53	U	0.84	U	0.38	U							
		40.1	20		23		0.88	J	0.97	U	0.45	U							
		49	16		11		1.5	J	0.86	U	0.39	U							
		54	5.1	J	1.6	J	0.55	U	0.86	U	0.39	U							
		59	12		50		1.2	J	1	U	0.46	U							
		64.5	14		55		1.3	J	0.94	U	0.43	U							
		Average	4.9		11		0.6		***		***								
		4.9	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U							
		6.5	5.7	J	1.6	U	12		0.96	U	0.44	U							
		14	42		1.6	U	22		0.93	U	3	J							
		18.5	0.37	U	1.5	U	0.57	U	0.9	U	0.41	U							
	9/4/2012	20.5	9.3		1.4	U	2.1	J	0.84	U	0.38	U							
		26.5	3.3	J	1.4	U	0.92	J	0.81	U	0.37	U							
211 A 013		30.1	22		7.8	J	2.9	J	0.81	U	0.39	J							
211-A-015		35.5	29		5.1	J	1.3	J	0.87	U	0.4	U							
		44.5	170	J	350		9.4	U	7.4	U	25	U							
		47.5	78	J	180	J	9.7	U	7.6	U	26	U							
	0/5/2012	53.5	13		11		0.7	J	0.99	U	0.45	U							
	9/3/2012	55.1	13		12		0.76	J	0.91	U	0.42	U							
		64	56		13		4.8	J	0.99	U	0.45	U							
		Average	34		45		4.4		***		2.4								

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		TCE 1,1-DCE cis-1,2- trans-1,2- ug/kg] [μg/kg] DCE DCE [μg/kg] [μg/kg] [μg/kg] [μg/kg]		TCE [µg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		trans-1,2- DCE [μg/kg]		g]
			75		137		619		5290		570					
		4	0.39	U	1.6	U	0.6	U	0.93	U	0.43	U				
		9	0.4	U	24		0.61	U	0.96	U	0.44	U				
		14	0.41	U	6.1	J	0.63	U	0.98	U	0.45	U				
		19	0.33	U	1.4	U	0.51	U	0.8	U	0.36	U				
		24.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U				
		29.5	0.31	U	1.7	J	0.48	U	0.75	U	0.35	U				
211-A-014	0/5/2012	34.5	18		22		1.1	J	0.88	U	0.4	U				
	9/3/2012	(36.5)DUP	28		43		1.6	J	0.81	U	0.37	U				
		36.5	0.35	U	1.5	U	0.54	U	0.85	U	0.39	U				
		42	59		140		3.5	J	0.84	U	0.38	U				
		45.1	24		57		0.93	J	0.78	U	0.36	U				
		50.5	26		34		0.6	J	0.87	U	0.4	U				
		56	2.4	J	1.4	U	0.53	U	0.83	U	0.38	U				
		63.5	16		7.6	J	1.7	J	0.95	U	0.44	U				
		Average	12		24		0.8		***		***					
		4.5	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U				
		6	0.41	U	1.7	U	0.64	U	1	U	0.46	U				
		14	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U				
		19	0.37	U	1.5	U	0.56	U	0.88	U	0.4	U				
		24	0.31	U	1.3	U	0.48	U	0.75	U	0.34	U				
		25.5	0.35	U	1.4	U	0.53	U	0.84	U	0.38	U				
211 A 015	9/6/2012	34	20		30		1	J	0.83	U	0.38	U				
211-A-015		39	51		83		1.4	J	0.86	U	0.39	U				
		44.9	47		22		0.54	U	0.85	U	0.39	U				
		46.5	120		24		0.71	J	0.84	U	0.39	U				
		50.1	130		5.9	J	0.56	U	0.88	U	0.4	U				
		59.9	57		47		1.9	J	0.91	U	0.42	U				
		63	36		25		3.3	J	1	U	0.46	U				
		Average	36		19		0.8		***		***					

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		1,1-DCE [µg/kg]		2- g]	trans-1 DCE [µg/kg	,2- g]	VC [µg/kg]	
			75		137		619		5290		570	
		0.1	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		6	1.7	J	1.7	U	1.1	J	0.97	U	0.45	U
		14	0.48	U	2	U	0.74	U	1.2	U	0.53	U
		16.5	2.1	J	1.7	U	0.63	U	0.99	U	0.45	U
		23.5	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U
		(29.9)DUP	34		3.7	J	0.52	U	0.82	U	0.37	U
211-A-016	0/27/2012	29.9	33		4.4	J	0.48	U	0.75	U	0.34	U
	9/21/2012	30.5	86		18		0.56	U	0.88	U	0.4	U
		35.1	6.4	J	4.8	J	0.64	U	1	U	0.46	U
		43	26	J	26	U	11	U	8.7	U	29	U
		46.5	300		22	U	9.5	U	7.4	U	25	U
		54	150		8.6		0.54	J	0.81	U	0.37	U
		55.1	<mark>89</mark>	J	25	U	11	U	8.3	U	28	U
		62.5	90		110		4.1	J	1.3	U	0.58	U
		Average	58		14		1.7		***		***	
		1	0.48	U	2	U	0.74	U	1.2	U	0.53	U
		9	2.4	J	1.9	U	6.4	J	1.1	U	0.5	U
		14	2.2	J	1.6	U	21		0.94	U	0.59	J
		18	79		1.4	U	9.5		0.83	U	0.38	U
		(22.5)DUP	31		1.8	U	7.7	J	1.1	U	0.49	U
		22.5	29		1.4	U	7.2	J	0.84	U	0.38	U
	9/21/2012	29.5	1,500		26	U	11	U	8.8	U	30	U
211-A-017	<i>)</i> /21/2012	30.1	1,600		22	U	9.6	U	7.5	U	25	U
		39	190		1.8	U	3	J	1.1	U	0.48	U
		41.5	64		1.5	U	0.86	J	0.87	U	0.4	U
		49	9	J	1.5	U	0.57	U	0.89	U	0.41	U
		52.5	23		1.5	U	0.71	J	0.85	U	0.39	U
		59	180	J	29	U	12	U	9.7	U	33	U
		61.5	150	J	23	U	10	U	7.9	U	27	U
		Average	276		***		5.6		***		4.3	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		TCE 1,1-DCE cis-1,2- trans-1, [μg/kg] [μg/kg] DCE DCE DCE μg/kg		<i>cis</i> -1,2- DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		trans-1,2- DCE [μg/kg]		VC [µg/k	g]
			75		137		619		5290		570				
		0.5	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U			
		6.5	0.42	U	1.7	U	0.64	U	1	U	0.46	U			
		(11)DUP	0.4	U	1.7	U	0.62	U	0.97	U	0.45	U			
		11	0.36	U	1.5	U	0.55	U	0.87	U	0.4	U			
		19.9	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U			
		21	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U			
	9/11/2012	28.5	0.32	U	1.3	U	0.5	U	0.78	U	0.36	U			
211-A-018		33	0.35	U	1.5	U	0.54	U	0.85	U	0.39	U			
		36	1.1	J	1.6	U	0.59	U	0.93	U	0.42	U			
		44.9	7.7	J	4.6	J	0.52	U	0.81	U	0.37	U			
		48	49		15		0.57	U	0.89	U	0.41	U			
		53.5	81		23		0.61	U	0.96	U	0.44	U			
		56.5	66		20		0.62	U	0.97	U	0.44	U			
	9/12/2012	62	440		24	U	10	U	8.1	U	28	U			
		Average	46		5.8		***		***		***				
		0.5	0.36	U	1.5	U	0.55	U	0.86	U	0.39	U			
		9	0.37	U	1.5	U	0.57	U	0.9	U	0.41	U			
		14	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U			
		19	0.32	U	1.3	U	0.49	U	0.77	U	0.35	U			
		23	0.34	U	1.4	U	0.52	U	0.82	U	0.37	U			
		29.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U			
211 A 010	9/12/2012	33.5	0.36	U	1.5	U	0.55	U	0.86	U	0.39	U			
211-A-019		39	0.36	U	4.4	J	0.55	U	0.86	U	0.39	U			
		44	0.35	U	2.4	J	0.54	U	0.85	U	0.39	U			
		47	0.35	U	4.5	J	0.54	U	0.84	U	0.38	U			
		54	2	J	26		0.56	U	0.88	U	0.4	U			
		59	2.4	J	35		0.57	U	0.89	U	0.41	U			
		64	11		59		3	J	0.93	U	0.42	U			
·		Average	1.3		10		0.5		***		***				

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		1,1-DCE [µg/kg]		<i>cis</i> -1,2- DCE [µg/kg]		trans-1,2- DCE [μg/kg]		g]
			75		137		619		5290		570	
		4.5	0.43	U	1.8	U	0.67	U	1	U	0.48	U
		9	9.9	J	1.7	U	1.8	J	1	U	0.46	U
		(9)DUP	6.7	J	1.6	U	1.3	J	0.95	U	0.43	U
		11	3.9	J	1.8	U	0.7	J	1	U	0.47	U
		19	23		1.5	U	5.4	J	0.88	U	0.4	U
		20.1	12		1.9	U	3.3	J	1.1	U	0.51	U
		25.9	710		24	U	10	U	8	U	27	U
211 A 020	9/24/2012	32	210		1.9	U	4.3	J	1.1	U	0.49	U
		35.5	470		25	U	11	U	8.3	U	28	U
		40.1	770		23	U	9.8	U	7.7	U	26	U
		48	800		23	U	9.8	U	7.6	U	26	U
		53.5	300		22	U	9.4	U	7.3	U	25	U
		57	800		25	U	11	U	8.5	U	29	U
		62	180		6.7	J	3.1	J	0.95	U	0.44	U
		65.1	160		17		4.3	J	1.1	U	0.5	U
	Average		297		6.7		3.7		***		***	
		0.1	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U
		6.5	0.4	U	1.7	U	0.74	J	0.97	U	0.44	U
		14	0.38	U	1.6	U	1.2	J	0.92	U	0.42	U
		18.5	0.34	U	1.4	U	0.54	J	0.81	U	0.37	U
		24	0.33	U	1.4	U	0.51	U	0.79	U	0.36	U
		29.5	15		22		1.6	J	0.91	U	0.42	U
	9/6/2012	30.5	7.7	J	7.5	J	0.73	J	0.78	U	0.36	U
211-A-021	9/0/2012	39	46		84		3.6	J	0.89	U	0.41	U
		(44)DUP	59		110		3.8	J	0.87	U	0.47	J
		44	50		95		3.5	J	0.9	U	0.41	U
		49	46		82		3.1	J	0.81	U	0.37	U
		54	30		29		3.3	J	0.86	U	0.39	U
		55.1	7.5	J	6.2	J	1.2	J	0.93	U	0.43	U
		64	6.2	J	3.4	J	0.82	J	0.99	U	0.45	U
		Average	19		32		1.8		***		0.2	
Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	5 g]	1,1-DCE [µg/kg]		cis-1,2 DCE [µg/kş	2- ; g]	trans-1 DCE [µg/kg	, 2- ;]	VC [µg/k	g]
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			75		137		619		5290		570	
		0.5	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		6	2.7	J	1.7	U	0.7	J	0.97	U	0.44	U
		14	3.2	J	1.6	U	0.69	J	0.94	U	0.43	U
		18.5	1.6	J	1.5	U	0.54	U	0.85	U	0.39	U
		24.9	0.37	U	1.5	U	0.56	U	0.88	U	0.4	U
		27.5	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U
211 A 022	9/27/2012	33.5	0.36	U	1.5	U	0.55	U	0.87	U	0.4	U
211-A-022		35.1	8.5	J	6.7	J	0.85	J	0.83	U	0.38	U
		44	10		12		1	J	0.86	U	0.39	U
		49.5	6.7	J	5	J	0.68	U	1.1	U	0.49	U
		54.5	13		17		0.79	J	1.1	U	0.52	U
		56	88		1.8	J	1	J	0.89	U	0.41	U
		62	27		5.3	J	1.2	J	1	U	0.46	U
		Average	12		4.1		0.6		***		***	
		1	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		7	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
		14.9	0.36	U	1.5	U	0.56	U	0.88	U	0.4	U
		18	0.36	U	1.5	U	0.55	U	0.87	U	0.4	U
		20.1	0.33	U	1.6	J	0.51	U	0.81	U	0.37	U
		(20.1)DUP	0.36	U	7.2	J	0.56	U	0.88	U	0.4	U
	0/11/2012	25.5	0.33	U	3.9	J	0.5	U	0.78	U	0.36	U
211-A-023	9/11/2012	34.9	0.37	U	1.5	U	0.57	U	0.89	U	0.4	U
		36.5	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		43	0.39	U	7.9	J	0.6	U	0.94	U	0.43	U
		49	1.4	J	9.9		0.55	U	0.86	U	0.39	U
		53	66		8.6	J	0.87	J	0.97	U	0.45	U
		55.1	130		6.9	J	1.5	J	0.94	U	0.43	U
		62	73		11		1	J	1	U	0.46	U
		Average	19		4.4		0.5		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCE 1,1-DCE c [μg/kg] [μg/kg] [μ		cis-1,2 DCE [µg/kş	2- ; g]	trans-1, DCE [µg/kg	2- ;]	VC [µg/k	g]		
			75		137		619		5290		570	
		1	0.37	U	1.5	U	0.56	U	0.88	U	0.4	U
		9	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		14	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U
		19	2.2	J	1.6	U	0.61	U	0.95	U	0.43	U
		24	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
		26	1.8	J	1.2	U	0.46	U	0.71	U	0.33	U
211 A 024	9/10/2012	33	0.36	U	1.5	U	0.55	U	0.87	U	0.4	U
211-A-024		39	0.86	J	1.8	U	0.68	U	1.1	U	0.49	U
		44	1.3	J	1.5	U	0.57	U	0.9	U	0.41	U
		49	3.4	J	1.5	U	0.56	U	0.88	U	0.4	U
		52.5	76		1.5	U	0.73	J	0.86	U	0.39	U
		56	9.2	J	1.5	U	0.56	U	0.87	U	0.4	U
		64.5	25		1.8	U	0.91	J	1.1	U	0.49	U
		Average	9		***		0.4		***		***	
		3	71		1.7	U	13		0.97	U	0.45	U
		6.5	92		2.1	U	28		1.2	U	0.55	U
		11	80		1.6	U	23		0.94	U	0.43	U
		(15.5)DUP	33		1.7	U	9	J	0.97	U	0.44	U
		15.5	80		1.8	U	20		1.1	U	0.48	U
		22.5	54		1.5	U	14		0.88	U	0.4	U
	0/10/2012	25.5	45		1.4	U	1.2	J	0.82	U	0.38	U
211-A-025	9/10/2012	32.5	63		1.6	U	1.4	J	0.95	U	0.44	U
		39.5	420		23	U	10	U	7.9	U	27	U
		44.5	1,400		23	U	44	J	7.7	U	26	U
		49.9	540		27	U	24	J	9.1	U	31	U
		50.1	27		1.5	U	0.9	J	0.88	U	0.4	U
		56.5	7	J	1.9	U	0.72	U	1.1	U	0.52	U
-		64	68		1.7	U	0.65	U	1	U	0.47	U
		Average	213		***		13		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		E []	cis-1,2 DCE [µg/kş	2- g]	trans-1 DCE [µg/kg	,2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		4	0.43	U	1.8	U	0.66	U	1	U	0.47	U
		9	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		14	0.41	U	1.7	U	0.62	U	0.98	U	0.45	U
		18.5	0.34	U	1.4	U	0.52	U	0.82	U	0.37	U
		24.9	0.35	U	1.5	U	0.55	U	0.85	U	0.39	U
		29	0.36	U	1.5	U	0.55	U	0.86	U	0.4	U
211 A 026	9/7/2012	30.5	0.41	J	1.4	U	0.51	U	0.8	U	0.37	U
211-A-020		36	12		15		2.3	J	0.99	U	0.45	U
		44	12		14		4.1	J	0.88	U	0.84	J
		47	14		20		3.9	J	0.88	U	1	J
		51	7.2	J	6.6	J	2.2	J	0.96	U	0.44	U
		55.5	14		1.6	U	0.65	J	0.92	U	0.42	U
		61.5	1.2	J	1.6	U	0.59	U	0.92	U	0.42	U
		Average	4.8		4.8		1.2		***		0.3	
	0/11/2012	2	0.43	U	1.8	U	0.66	U	1	U	0.47	U
	9/11/2012	8.5	0.53	U	2.2	U	0.81	U	1.3	U	0.58	U
		14	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		(14)DUP	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		16.5	0.35	U	1.5	U	0.55	U	0.85	U	0.39	U
		21	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		28	0.35	U	1.4	U	0.54	U	0.84	U	0.39	U
211-A-027	0/18/2012	31.5	0.46	J	1.7	J	0.51	U	0.8	U	0.36	U
	9/18/2012	36.5	3.4	J	1.6	U	0.59	U	0.92	U	0.42	U
		44.5	47		1.4	U	0.53	U	0.83	U	0.38	U
		45.5	620		20	U	8.7	U	6.8	U	23	U
		51	51		1.7	U	0.63	U	0.99	U	0.45	U
-		59	29		1.7	U	0.67	J	1	U	0.46	U
		66.5	17		1.9	J	0.86	J	1.1	U	0.48	U
		Average	55		1.6		0.7		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCE [µg/kg]		1,1-DC [µg/kg	E []	cis-1,2 DCE [µg/kg	2- 5]	trans-1 DCE [µg/kg	, 2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		4	0.38	U	1.6	U	0.58	U	0.91	U	0.42	U
		9	0.43	U	1.8	U	0.66	U	1	U	0.48	U
		14	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U
		19	0.76	J	55		0.57	U	0.89	U	0.41	U
		22.5	0.44	U	1.8	J	0.67	U	1.1	U	0.48	U
		26	210		290		0.92	U	1.4	U	0.66	U
211 A 028	9/24/2012	34	220	J	55	J	11	U	8.9	U	30	U
211-A-028		38.5	3,700		4,200		33	J	9.1	U	31	U
		42.5	2,800		3,800		28	J	7.8	U	27	U
		48	1,600		1,800		33	J	8.1	U	27	U
		50.5	1,700		1,400		38	J	8.3	U	28	U
		55.1	42		79		4.2	J	0.95	U	0.43	U
		61	180		66		16		1.3	U	0.58	U
		Average	804		904		12		***		***	
		4	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		9	0.51	U	2.1	U	0.79	U	1.2	U	0.56	U
		14	0.4	U	1.7	U	0.62	U	0.98	U	0.45	U
		18	0.31	U	1.3	U	0.48	U	0.74	U	0.34	U
		24.9	23		18		0.54	U	0.85	U	0.39	U
		28.5	440		240		9	U	7	U	24	U
	0/25/2012	(32)DUP	110		77		2.5	J	1.4	U	0.65	U
211-A-029	9/23/2012	32	480		360		12	U	9.4	U	32	U
		38	2,600		2,900		62	J	9.2	U	31	U
		40.5	870		880		11	U	8.2	U	28	U
		48.5	270		350		11	U	8.6	U	29	U
		50.5	22		27		0.61	U	0.96	U	0.44	U
		55.1	4	J	4.4	J	0.86	J	1	U	0.46	U
		64	100		15		9.2	J	1.1	U	0.49	U
		Average	351		348		7.0		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCE [µg/kg]		1,1-DC [µg/kg	E []	cis-1,2 DCE [µg/kş	2- g]	trans-1, DCE [µg/kg	,2- ;]	VC [µg/kậ	g]
			75		137		619		5290		570	
		9	0.39	U	1.6	U	0.61	U	0.95	U	0.43	U
		14	0.36	U	1.5	U	0.56	U	0.87	U	0.4	U
		19	0.36	U	30		0.56	U	0.87	U	0.4	U
		23.5	21	U	29	U	13	U	9.9	U	34	U
		29.9	0.51	U	2.1	U	0.78	U	1.2	U	0.56	U
	0/25/2012	32.5	97	J	61	J	11	U	8.9	U	30	U
211-A-030	9/23/2012	39	0.38	U	3.5	J	0.58	U	0.91	U	0.42	U
		40.1	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U
		49	0.39	U	8.9	J	0.61	U	0.95	U	0.44	U
		54.5	4.8	J	2	J	0.76	J	0.91	U	0.41	U
		58	20		25		1.9	J	1	U	0.47	U
		61	12		15		1.5	J	0.93	U	0.42	U
		Average	12		14		1.5		***		***	
		0.1	0.46	U	1.9	U	0.71	U	1.1	U	0.51	U
		9	0.41	U	1.7	U	0.64	U	1	U	0.46	U
		(14)DUP	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		14	0.35	U	1.4	U	0.53	U	0.83	U	0.38	U
		19	2.9	J	1.5	U	0.9	J	0.85	U	0.39	U
		23	1	J	1.6	U	0.61	U	0.95	U	0.44	U
	9/26/2012	28	7.8	J	1.5	U	0.57	U	0.9	U	0.41	U
211-A-031	9/20/2012	34.5	35		1.9	U	0.7	U	1.1	U	0.5	U
		35.5	310		22	U	9.5	U	7.4	U	25	U
		40.5	18	U	24	U	10	U	8.1	U	28	U
		49.5	42		1.6	U	0.64	J	0.93	U	0.43	U
		50.5	29		1.8	U	0.69	U	1.1	U	0.49	U
		56.5	5.8	J	1.6	U	0.62	J	0.96	U	0.44	U
-		61.5	3.5	J	1.8	U	0.67	U	1	U	0.48	U
		Average	32		***		1.1		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCF [µg/k	[g]	1,1-DC [µg/kg	E []	cis-1,2 DCE [µg/kg	2- g]	trans-1, DCE [µg/kg	2- []	VC [µg/k	g]
			75		137		619		5290		570	
		1.3	0.38	U	1.6	U	0.59	U	0.93	U	0.42	U
		9	0.41	U	1.7	U	0.64	U	1	U	0.46	U
		14	0.37	U	1.5	U	0.58	U	0.9	U	0.41	U
		19	1.1	J	1.5	U	0.57	U	0.89	U	0.41	U
		24.9	4.7	J	1.8	U	2	J	1.1	U	0.49	U
	0/28/2012	26	6.6	J	1.5	U	1.7	J	0.9	U	0.41	U
211-A-032	9/20/2012	33	0.47	J	1.5	U	0.54	U	0.85	U	0.39	U
		38	33		1.8	U	0.68	U	1.1	U	0.48	U
		42.5	29		1.5	U	0.58	U	0.9	U	0.41	U
		49	3.3	J	1.5	U	0.57	U	0.9	U	0.41	U
		54.9	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		58.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
		Average	6.6		***		0.6		***		***	
		4	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		9	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U
		14	0.37	U	1.5	U	0.58	U	0.9	U	0.41	U
		19	0.35	U	1.5	U	0.55	U	0.85	U	0.39	U
		21.5	0.33	U	1.4	U	0.51	U	0.8	U	0.37	U
		29.9	3.6	J	2.4	J	0.64	U	1	U	0.46	U
	10/1/2012	(34)DUP	12		1.9	J	0.84	J	0.8	U	0.36	U
211-A-033	10/1/2012	34	60		16		2.1	J	0.84	U	0.38	U
		36	1,100		1,100		46	J	8	U	27	U
		44.5	700		540		29	J	7.4	U	25	U
		49.5	300		240		9.3	U	7.3	U	25	U
		50.5	130	J	58	J	12	U	9.7	U	33	U
		56.5	0.48	J	1.7	U	0.64	U	1	U	0.46	U
-		62	14		3.6	J	8.4	J	0.89	U	0.41	U
		Average	166		140		7.1		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		E []	cis-1,2 DCE [µg/kg	2- g]	trans-1 DCE [µg/kg	, 2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		1.9	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		8.6	0.39	U	1.6	U	0.61	U	0.95	U	0.44	U
		13.4	0.38	U	2.5	J	3.6	J	0.9	U	0.41	U
		18.5	1.6	J	33		12		0.87	U	0.4	U
		24	7.6	J	30		6.9	J	0.89	U	0.41	U
		27	2.1	J	1.7	J	0.53	U	0.84	U	0.38	U
	10/2/2012	30.5	35		27		0.57	U	0.89	U	0.4	U
211-A-035	37	580		590		11	U	8.3	U	28	U	
		(41.5)DUP	420		350		11	U	8.2	U	28	U
		41.5	400		400		10	U	8	U	27	U
		49	210	J	26	J	11	U	8.4	U	29	U
		51.5	680		360		10	U	8.2	U	28	U
		55.5	17		1.7	U	2	J	1	U	0.46	U
		66.5	25		9.3	J	4	J	0.98	U	0.45	U
		Average	170		131		4		***		***	
		0.1	0.41	U	1.7	U	0.64	U	1	U	0.46	U
		9	0.47	U	1.9	U	0.73	U	1.1	U	0.52	U
		14.7	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		19	0.67	J	2.1	J	0.57	U	0.89	U	0.41	U
		22	280	J	31	U	13	U	10	U	35	U
		26.5	810		340		9.9	U	7.8	U	26	U
211 A 026	10/3/2012	31.5	1,400		1,600		8.6	U	6.7	U	23	U
211-A-030		35.5	2,800		3,700		51	J	8.2	U	28	U
		44.5	3,800		3,900		110	J	7.6	U	28	J
		47.5	<mark>4,800</mark>		3,300		77	J	8	U	27	U
		50.1	1,300		<mark>690</mark>		12	U	9.1	U	31	U
		55.5	3	J	1.5	U	0.57	U	0.89	U	0.41	U
		61	33		12		4.1	J	0.99	U	0.45	U
		Average	1,171		1,043		20		***		9	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		5E []	cis-1,2 DCE [µg/kş	2- ; g]	trans-1 DCE [µg/kg	, 2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		4	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U
		9	0.39	U	1.6	U	0.61	U	0.95	U	0.43	U
		14	0.42	U	1.7	U	0.65	U	1	U	0.47	U
		16	0.38	U	1.6	U	0.58	U	0.91	U	0.41	U
		24	0.47	U	1.9	U	0.72	U	1.1	U	0.51	U
		(24)Dup	0.53	U	2.2	U	0.81	U	1.3	U	0.58	U
	2/25/2012	25.5	0.36	U	1.5	U	0.55	U	0.87	U	0.4	U
211-A-037	2/23/2015	34	0.51	U	2.1	U	0.78	U	1.2	U	0.56	U
		35.5	0.54	U	2.2	U	0.84	U	1.3	U	0.6	U
		44	0.37	U	2.3	J	0.57	U	0.89	U	0.41	U
		49.5	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
		54.5	2.2	J	1.7	U	0.65	U	1	U	0.47	U
		56.5	1.4	J	2.5	U	0.93	U	1.5	U	0.67	U
		62	1.2	J	1.8	U	0.67	U	1	U	0.48	U
		Average	0.5		***		***		***		***	
		3	0.37	U	1.5	U	0.58	U	0.9	U	0.41	U
		7.5	20	U	27	U	12	U	9.2	U	31	U
		12	23	U	32	U	14	U	11	U	36	U
		15.5	0.41	U	1.7	U	0.64	U	1	U	0.46	U
		20.5	26		1.6	U	6.8	J	0.96	U	2.2	J
		28.5	0.36	U	1.5	U	0.55	U	0.86	U	0.39	U
211 A 029	2/25/2013	32.5	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
211-A-036		39	30		1.6	U	7.5	J	0.92	U	0.42	U
		43	61		2	J	10		0.91	U	0.42	U
		49.9	0.98	J	1.6	U	0.6	U	0.93	U	0.43	U
		54.5	6.6	J	1.5	U	1.2	J	0.89	U	0.4	U
		56	20		3.6	J	6.6	J	0.97	U	0.44	U
-		62	11		1.8	J	4	J	0.89	U	0.41	U
		Average	14		3.3		3.9		***		2.9	

Station	Date Collected	Sample Depth [ft bls]	TCE [µg/kg]		1,1-DC [µg/kg	E]	cis-1,2 DCE [µg/kş	2- ; ;]	<i>trans</i> -1, DCE [µg/kg	,2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		9	0.41	U	1.7	U	0.62	U	0.98	U	0.45	U
		14	0.44	U	1.8	U	0.67	U	1.1	U	0.48	U
		(14)Dup	0.46	U	1.9	U	0.7	U	1.1	U	0.5	U
		19	0.36	U	1.5	U	0.55	U	0.86	U	0.4	U
		23	0.39	U	1.6	U	0.59	U	0.93	U	0.43	U
		27.5	0.44	U	1.8	U	0.68	U	1.1	U	0.49	U
211 A 020	2/26/2013	33	0.34	U	1.4	U	0.55	J	0.83	U	0.38	U
211-A-039		37	0.41	U	3.4	J	1.5	J	1	U	0.46	U
		42	0.38	U	15		1.8	J	0.92	U	0.42	U
		49.5	0.34	U	12		0.53	U	0.83	U	0.38	U
		51.5	0.39	U	57		0.66	J	0.93	U	0.43	U
		56	1	J	1.5	U	0.57	U	0.89	U	0.41	U
		64	4.5	J	2.3	U	0.86	U	1.3	U	0.61	U
		Average	0.6		7.3		0.57		***		***	
		3	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U
		9	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		14	0.38	U	1.6	U	0.59	U	0.92	U	0.42	U
		16.5	0.42	U	1.7	U	0.64	U	1	U	0.46	U
		22	0.53	U	2.2	U	0.82	U	1.3	U	0.59	U
		26	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
	2/26/2012	34.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
211-A-040	2/20/2013	36	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U
		(36)Dup	0.35	U	1.5	U	0.54	U	0.85	U	0.39	U
		41.5	0.4	U	1.7	U	0.62	U	0.97	U	0.44	U
		48.5	0.37	U	2.4	J	0.56	U	0.88	U	0.4	U
		51.5	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
		56	0.36	U	21		0.55	U	0.86	U	0.39	U
		61	0.38	U	3.2	J	0.58	U	0.91	U	0.42	U
		Average	***		2.5		***		***		***	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		5 E 5]	cis-1,2 DCE [µg/kş	2- g]	trans-1, DCE [µg/kg	2- []	VC [µg/k	g]
			75		137		619		5290		570	
		4	0.39	U	1.6	U	0.61	U	0.95	U	0.44	U
		9	0.41	U	1.7	U	0.63	U	0.98	U	0.45	U
		14.5	0.41	U	1.7	U	0.63	U	0.99	U	0.45	U
		18.5	0.37	U	8.8	J	0.57	U	0.89	U	0.41	U
		(18.5)Dup	0.35	U	8.7	J	0.54	U	0.84	U	0.39	U
		24	0.53	U	2.2	U	0.82	U	1.3	U	0.59	U
	2/27/2012	27	0.34	U	1.4	U	0.53	U	0.83	U	0.38	U
211-A-041	211-A-041	34.5	1.7	J	1.6	J	2.2	J	0.86	U	1.1	J
		39	71		120		14		1	U	6.5	J
		41	76		140		11		0.86	U	6.4	J
		49	33		170		8.5	J	0.84	U	0.72	J
		50.5	18		26		4.1	J	0.98	U	0.45	U
		55.1	27		2.2	J	2.8	J	1	U	0.46	U
		63	68		21		15		0.87	U	0.4	U
		Average	21		36		4.3		***		1.2	
		9	0.41	U	1.7	U	2.8	J	0.99	U	0.45	U
		14.5	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		17	0.37	U	1.5	U	0.57	U	0.89	U	0.41	U
		22.5	0.33	U	1.4	U	0.52	U	0.81	U	0.37	U
		27.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
	2/27/2012	31	0.38	U	1.6	U	0.59	U	0.93	U	0.42	U
211-A-042	2/2//2013	39	61		68		9.6	J	0.95	U	2	J
		42	120		94		16		0.98	U	2.4	J
		48	82		40		9	J	0.92	U	0.6	J
		54.9	40		21		5.7	J	0.88	U	0.4	U
		57	0.38	U	1.6	U	0.58	U	0.91	U	0.41	U
		62.5	27		6.4	J	5.2	J	0.98	U	0.45	U
		Average	28		20		4.2		***		0.6	

Station	Date Collected	Sample Depth [ft bls]	TCI [µg/k	TCE [µg/kg]		E]	cis-1,2 DCE [µg/kş	2- ; g]	trans-1 DCE [µg/kg	,2- ;]	VC [µg/k	g]
			75		137		619		5290		570	
		3.5	0.34	U	1.4	U	0.52	U	0.81	U	0.37	U
		9	0.42	U	1.7	U	0.97	J	1	U	0.46	U
		14	0.39	U	1.6	U	0.6	U	0.93	U	0.43	U
		(14)Dup	0.4	U	1.6	U	0.61	U	0.96	U	0.44	U
		17.5	0.35	U	1.4	U	0.54	U	0.84	U	0.38	U
		22.5	0.32	U	1.3	U	1.2	J	0.78	U	0.36	U
	3/4/2013	29	2.7	J	1.7	U	8.3	J	0.98	U	0.45	U
211-A-043	3/4/2013	32.5	1.8	J	1.5	U	5.2	J	0.9	U	0.41	U
		36	9.2		2	J	28		0.86	U	0.39	U
		44.9	24		13		32		0.94	U	0.43	U
		49	39		6.7	J	34		0.81	U	0.37	U
		53.5	30		1.7	U	46		0.97	U	0.44	U
		55.1	42		5.1	J	48		0.84	U	0.39	U
		62	0.39	U	1.6	U	0.6	U	0.94	U	0.43	U
		Average	11		2.5		15		***		***	
		4	5.5	J	1.7	U	100		1	U	78	
		(4)Dup	4.2	J	1.7	U	49		1	U	62	
		6	20	U	28	U	630		9.4	U	32	U
		10.5	18	U	25	U	520		8.5	U	29	U
		18.5	0.46	U	1.9	U	1.2	J	1.1	U	0.5	U
		23	5	J	1.3	U	31		0.76	U	0.96	J
	3/6/2013	26	11		1.9	U	99		1.1	U	9.2	J
211-A-044	5/0/2015	33.5	8.5	J	1.7	U	64		1	U	3.2	J
		36.5	18		1.8	J	98		0.82	U	4.8	J
		44.5	42		2.6	J	130		0.88	U	9.9	
		49	76		9.6		110		0.85	U	0.77	J
		54.5	2.7	J	1.5	U	4.8	J	0.86	U	0.39	U
		55.5	2.5	J	1.9	U	1.7	J	1.1	U	0.52	U
-		62.5	0.47	U	1.9	U	0.72	U	1.1	U	0.51	U
		Average	14		3.4		131		***		14	

Notes:

- 1. Groundwater Protection Remediation Goals from *Remedial Design Work Plan for Solid Waste Management Units 1, 211-A, and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, (DOE 2012a).*
- 2. J—Indicates an estimated value.
- 3. U—Compound analyzed for but not detected at or below the lowest concentration reported.
- 4. DUP-Indicated that a duplicate sample was taken for the interval given in parentheses.
- 5. Sample depth represents the discrete depth at which an EnCore® sample was taken.
- 6. For "U" qualified samples a value of one half the concentration reported was used in calculating the average borehole concentration.
- 7. ***—indicates average concentration not calculated as all boring samples were "U" qualified for specific VOC.
- 8. Yellow shading and bold text indicates an exceedance of Groundwater Protection Remediation Goals.
- 9. Soil boring 211-A-007 was not collected.
- 10. Soil boring 211-A-034 was collected and archived. Boring was not logged or screened for VOC impacts.

APPENDIX F

HYDRAULIC CONDUCTIVITY AND GRAIN SIZE TESTS

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Grain Size Analysis

ASTM D422

Advanced Terra Testing

MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

CLIENT LATA Kent	ucky	JOB NO. 2855-05	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-006 12-15.5' 211A006GRNSZ1 ERI12-SW-SWMU211A SW Plume RDSI Geotechn	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE ical	09/26/12 KD 10/10/12 JS Yes No
MOISTURE DATA		WASH SIEVE ANALYS	SIS
HYGROSCOPIC	Yes	Wt. Total Sample	1120 50
NATURAL	No	Weight of + #10	1120.00
		Before Washing (g) Weight of + #10	0.92
Wt. Wet Soil & Pan (g)	40.14	After Washing (g)	0.87
Wt. Dry Soil & Pan (g)	39.59	Weight of - #10	
Wt. Lost Moisture (g)	0.55	Wet (g)	1119.58
Wt. of Pan Only (g)	3.07	Weight of - #10	
Wt. of Dry Soil (g)	36.52	Dry (g)	1103.02
Moisture Content %	1.5	Wt. Total Sample	
		Dry (g)	1103.89
Wt. Hydrom. Sample W	et (g) 62.50	Calc. Wt. "W" (ɑ)	61.62
Wt. Hydrom. Sample Dr	y (g) 61.57	Calc. Mass + #10	0.05
÷ 1			

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain <i>.</i>	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.71	0.71	0.71	0.1	99.9
#10	0.00	0.16	0.16	0.87	0.1	99.9
#20	2.02	3.06	0.02	0.02	D 1	00.0
#20	3.03	3.00	0.03	0.03	0.1	99.9
#40 #60	3.11	3.19	0.00	0.10	0.2	99.0
#00	3.07	3.42	0.35	0.45	0.8	99.2
#100	3.01	4.84	1.83	2.28	3.8	96.2
#200	3.01	4.94	1.93	4.21	6.9	93.1

Data entered by: DAW Data checked by: <u>AU</u> FileName: LKH0NSZ1

Date: 10/12/2012 Date: 10/12/2012



CLIENT LATA K	entucky	JOB NO. 2855-05	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-006 12-15.5' 211A006GRNSZ1 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/26/12 KD 10/10/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alpha" Deflocculant Defloc. Corr'n Meniscus Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0 0.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	22.5 0.01325 61.622 100.0

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	⊤ Elapsed Tìme (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.0						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.5						
2.048.2543.2570.270.28.380.02715.039.0034.0055.255.29.890.018615.028.0023.0037.337.311.700.011730.023.0018.0029.229.212.520.008660.019.0014.0022.722.713.170.0062120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	1.0	54.75	49.75	80.7	80.7	7.31	0.0358
5.039.0034.0055.255.29.890.018615.028.0023.0037.337.311.700.011730.023.0018.0029.229.212.520.008660.019.0014.0022.722.713.170.0062120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	2.0	48.25	43.25	70.2	70.2	8.38	0.0271
15.028.0023.0037.337.311.700.011730.023.0018.0029.229.212.520.008660.019.0014.0022.722.713.170.0062120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	5.0	39.00	34.00	55.2	55.2	9.89	0.0186
30.023.0018.0029.229.212.520.008660.019.0014.0022.722.713.170.0062120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	15.0	28.00	23.00	37.3	37.3	11.70	0.0117
60.019.0014.0022.722.713.170.0062120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	30.0	23.00	18.00	29.2	29.2	12.52	0.0086
120.017.7512.7520.720.713.380.0044250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	60.0	19.00	14.00	22.7	22.7	13.17	0.0062
250.016.7511.7519.119.113.540.00311440.015.2510.2516.616.613.790.0013	120.0	17.75	12.75	20.7	20.7	13.38	0.0044
1440.0 15.25 10.25 16.6 16.6 13.79 0.0013	250.0	16.75	11.75	19.1	19.1	13.54	0.0031
	1440.0	15.25	10.25	16.6	16.6	13.79	0.0013

Grain Diameter = $K^{(SQRT(L/T))}$

Data entered by: DAW Data checked by: DAW FileName: LKH0NSZ1

Date: 10/12/2012 Date: 10/12/12





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F-6

6

MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

CLIENT	LATA Kenti	JCKY		JOB NO.	2855-05	
BORING NO DEPTH SAMPLE NO SOIL DESC LOCATION	D. D. :R.	211-A-006 211A006GRNSZ ERI12-SW-SWM SW Plume RDSI	2 U211A Geotechnical	SAMPLED DATE TES ⁻ WASH SIEV DRY SIEVE	TED VE	09/26/12 KD 10/10/12 JS Yes No
MOISTURE	DATA			WASH SIE	/E ANALYSI	s
HYGROSCO	OPIC	Yes		Wt. Total Sa	ample	
NATURAL		No		Weight of +	g) #10	929.90
				Weight of +	ning (g) #10	494.76
Wt. Wet Soil Wt. Dry Soil	l & Pan (g) & Pan (g)		34.10 33.65	After Washi Weight of -	ng (g) #10	470.13
Wt. Lost Mo	isture (g)		0.45	Wet (g) #10	435.14
Wt. of Dry S	ioil (g)		31.23	Dry (g)	453.24
woisture co	intent %].4	Dry (ampie J)	923.37
Wt. Hydrom	. Sample We	ət (g)	86.50	Calc. Wt. "V	V" (g)	173.72
Wt. Hydrom	. Sample Dr	y (g)	85.27	Calc. Mass	+ #10	88.45

Sieve	Pan	Indiv.	Indiv.	Cum.	Cum.	%
Number	Weight	Wt. + Pan	Wt.	Wt.	%	Finer
(Size)	(g)	(g)	Retain.	Retain.	Retain.	By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	42.14	42.14	42.14	4.6	95.4
3/8"	0.00	102.72	102.72	144.86	15.7	84.3
#4	0.00	174.75	174.75	319.61	34.6	65.4
#10	0.00	150.52	150.52	470.13	50.9	49,1
#20	3.05	18.15	15.10	15.10	59.6	40.4
#40	3.06	17.47	14.41	29.51	67.9	32.1
#60	3.05	15.15	12.10	41.62	74.9	25.1
#100	2.98	9.72	6.74	48.36	78.7	21.3
#200	3.08	6.90	3.82	52,17	80.9	19.1

Data entered by: DAW Data checked by: DAW FileName: LKH0NSZ2

Date: 10/12/2012 Date: 10/12/12-



CLIENT LAT	A Kentucky	JOB NO. 2855-05	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-006 211A006GRNSZ2 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/26/12 KD 10/10/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alpha" Deflocculant Defloc. Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	22.5 0.01325 173.718 100.0

T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0						
0.5						
1.0	36.75	31.75	18.3	18.3	10.26	0.0424
2.0	36.00	31.00	17.8	17.8	10.39	0.0302
5.0	33.00	28.00	16.1	16.1	10.88	0.0195
15.0	30.25	25.25	14.5	14.5	11.33	0.0115
30.0	29.00	24.00	13.8	13.8	11.53	0.0082
60.0	28.00	23.00	13.2	13.2	11.70	0.0058
120.0	27.25	22.25	12.8	12.8	11.82	0.0042
250.0	27.00	22.00	12.7	12.7	11.86	0.0029
1440.0	26.00	21.00	12.1	12.1	12.03	0.0012

0.0

Grain Diameter = $K^*(SQRT(L/T))$

Meniscus Corr'n

Data entered by: DAW Data checked by: <u>SM</u> FileName: LKH0NSZ2

Date: 10/12/2012 Date: 10/12/2





MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

D-05
09/26/12 KD 10/10/12 JS Yes No
NALYSIS
1241.01
(g) 19.21
g) 18.33
1222.70
1210.15 e
1228.48
62.93
0.94

Sieve Number	Pan Weight	Indiv. Wt. + Pan	Indiv. Wt.	Cum. Wt.	Cum. %	% Finer
(Size)	(g)	(g)	Retain.	Retain.	Retain.	By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	8.17	8.17	8.17	0.7	99.3
3/8"	0.00	4.84	4.84	13.01	1.1	98.9
#4	0.00	3.19	3.19	16.20	1.3	98.7
#10	0.00	2.13	2.13	18.33	1.5	98.5
#20	3.07	3.28	0.21	0.21	1.8	98.2
#40	3.32	4.38	1.06	1.26	3.5	96.5
#60	3.03	8.93	5.90	7.16	12.9	87.1
#100	3.08	13.97	10.89	18.06	30.2	69.8
#200	2.99	12.62	9.62	27.68	45.5	54.5

Data entered by: DAW Data checked by: DAW FileName: LKH0NSZ3

Date: 10/12/2012 Date: 10/12/12



CLIENT LATA K	entucky	JOB NO. 2855-05	
BORING NO. DEPTH	211-A-006	SAMPLED DATE TESTED	09/26/12 KD 10/10/12 JS
SAMPLE NO.	211A006GRNSZ3	WASH SIEVE	Yes
SOIL DESCR.	ERI12-SW-SWMU211A	DRY SIEVE	No
LOCATION	SW Plume RDSI Geotechnical		
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.6
Sp. Gr. of Soil	2.65	Temp. Coef. K	0.01323
Value of "alpha"	1.00	Wt. Dry Sample "W"	62.927
Deflocculant	Sodium Hexametaphosphate	% of ⊺otal Sample	100.0

T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0					. 	
0.5						
1.0	34.75	29.75	47.3	47.3	10.59	0.0431
2.0	33.00	28.00	44.5	44.5	10.88	0.0309
5.0	31.75	26.75	42.5	42.5	11.08	0.0197
15.0	28.25	23.25	36.9	36.9	1 1.66	0.0117
30.0	26.25	21.25	33.8	33.8	11.99	0.0084
60.0	24.50	19.50	31.0	31.0	12.27	0.0060
120.0	23.00	18.00	28.6	28.6	12.52	0.0043
250.0	21.50	16.50	26.2	26.2	12.76	0.0030
1440.0	20.00	15.00	23.8	23.8	13.01	0.0013

5.0

0.0

Grain Diameter = K*(SQRT(L/T))

Defloc. Corr'n

Meniscus Corr'n

Data entered by: Data checked by: FileName: LKH0NSZ3 DAW Date: 10/12/2012 Date: 10/12/12





MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

CLIENT	LATA Kente	ucky		JOB NO.	2855-2	
BORING NO DEPTH SAMPLE NO SOIL DESCR LOCATION).). R.	211-A-002 9-13' 211A002GRNSZ ERI12-SW-SWM SW Plume RDSI	1 U211A Geotechnical	SAMPLED DATE TES WASH SIE DRY SIEVE	TED VE	8/30/12 KD 9/13/12 JS Yes No
MOISTURE	DATA			WASH SIE	VE ANALYSI	S
HYGROSCO	PIC	Yes		Wt. Total Sa Wet (ample	1213 18
NATURAI		No		Weight of +	.9) ·#10	1213.10
				Before Was Weight of +	shing (g) #10	4.38
Wt. Wet Soil Wt. Dry Soil	& Pan (g) & Pan (g)		38.74 37.31	After Washi Weight of -	ing (g) #10	3.66
Wt. Lost Moi Wt. of Pan O	sture (g) mlv (a)		1.43 3.04	Wet (Weight of -	(g) #10	1208.80
Wt. of Dry So Moisture Cor	oil (g) ntent %		34.27 4.2	Dry (g Wt. Total S	g) amole	1161.07
				Dry (g)	1164.73
Wt. Hydrom.	Sample W	et (g)	77.11	Calc. Wt. "V	∿ ' (g)	74.25
Wt. Hydrom.	Sample Dr	y (g)	74.02	Calc. Mass	+ #10	0.23

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	1.15	1.15	1.15	0.1	99.9
#4	0.00	0.83	0.83	1.98	0.2	99.8
#10	0.00	1.68	1.68	3.66	0.3	99.7
#20	2.99	3.08	0.09	0.09	0.4	99.6
#40	2.99	3.32	0.33	0.42	0.9	99.1
#60	3.03	4.00	0.97	1.39	2.2	97.8
#100	3.12	4.66	1,54	2.93	4.3	95.7
#200	3.04	4.30	1.26	4.19	6.0	94.0

Data entered by: MLM Data checked by: <u>SML</u> FileName: LKHYNS21

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Date: 09/17/2012 Date: **9/17/12**



CLIENT L	ATA Kentucky		JOB NO.	2855-2	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR LOCATION	211-A-00 9-13' 211A002 ERI12-S SW Plun	02 2GRNSZ1 W-SWMU211A ne RDSI Geotechnical	SAMPLED DATE TEST WASH SIEV DRY SIEVE	red /e	8/30/12 KD 9/13/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alph Deflocculant Defloc. Corr'n Meniscus Cor	ASTM 1: 2. a" 1. Sodium r'n (52 H 65 00 Hexametaphosphate 4.5 0.0	Temp., Deg Temp. Coef Wt. Dry San % of Total S	. C . K nple "W" Sample	23.3 0.01312 74.253 100.0

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Elapsed	Hydrometer	Reading		%	Effective	Grain
Time	Original	Corrected		Total	Depth	Diameter
(min)		"R"	100Ra/W	Sample	L	(mm)
0.0)					
0.5				-		
1.0	42.50	38.00	51.2	51.2	9.32	0.0401
2.0	39.50	35.00	47.1	47.1	9.81	0.0291
5.0	34.50	30.00	40.4	40.4	10.63	0.0191
15.0	26.50	22.00	29.6	29.6	11.94	0.0117
30.0	22.00	17.50	23.6	23.6	12,68	0.0085
60.0	19.00	14.50	19.5	19.5	13.17	0.0061
120.0	17.50	13.00	17.5	17.5	13.42	0.0044
250.0	15.25	10.75	14.5	14.5	13.79	0.0031
1440.0	13.00	8.50	11.4	11.4	14.16	0.0013

Grain Diameter = $K^{(SQRT(L/T))}$

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Date: 09/17/2012 Date: <u>9/17/(२</u>





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MECHANICAL ANALYSIS - ŚIEVE TEŚT DATA ASTM D 422

CLIENT L	ATA Kentu	licky		JOB NO.	2855-2	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR LOCATION		211-A-002 23-26' 211A002GRNSZ2 ERI12-SW-SWMU SW Plume RDSI (2 J211A Geotechnical	SAMPLED DATE TES WASH SIE DRY SIEVE	TED /E	8/30/12 KD 9/13/12 JS Yes No
MOISTURE D	DATA			WASH SIE	/E ANALYSI	S
HYGROSCO	PIC	Yes		Wt. Total Sa	ample	1087 63
NATURAL		No		Weight of +	97 #10	1007.00
				Before Was Weight of +	hing (g) #10	562.03
Wt. Wet Soil & Wt. Dry Soil &	& Pan (g) & Pan (g)		38.48 38.00	After Washi Weight of -	ng (g) #10	502.46
Wt. Lost Mois	ture (g)		0.48	Wet (g) #10	525.60
Wt. of Dry Soi	il (g)		34.85	Dry (g) ample	577.22
	LETIL 70		1.4	Dry (g)	1079.68
Wt. Hydrom. 8	Sample We	et (g)	91.49	Caic. Wt. "V	V" (g)	168.81
Wt. Hydrom. 8	Sample Dr	y (g)	90.25	Calc. Mass	+ #10	78.56

Sieve Number	Pan Weight	Indiv. Wt + Pap	Indiv.	Cum.	Cum. %	% Finer
(Size)	(g)	(g)	Retain.	Retain.	Retain.	By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	17.41	17.41	17,41	1.6	98.4
3/8"	0.00	121.64	121.64	139.05	12.9	87 .1
#4	0.00	184.36	184.36	323.41	30.0	70.0
#10	0.00	179.05	179.05	502.46	46.5	53.5
#20	3.02	17.88	14.87	14.87	55.3	44.7
#40	3.11	16.68	13.56	28.43	63.4	36.6
#60	3.06	18.07	15.01	43.43	72.3	27.7
#100	2.99	14.19	11.20	54.64	78.9	21.1
#200	3.09	8.81	5.72	60.36	82.3	17.7

Data entered by: MLM Data checked by: MLM FileName: LKHYNS22

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Date: 09/17/2012 Date: 9/17/20



CLIENT LATA K	entucky	JOB NO. 2855-2	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-002 23-26' 211A002GRNSZ2 ERI12-SW-SWMU211A SW Plume RDSI Geotechnica!	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	8/30/12 KD 9/13/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alpha" Deflocculant Defloc. Corr'n Meniscus Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 4.5 0.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	23.3 0.01312 168.807 100.0

Т						
Elapsed	Hydrometer	Reading		%	Effective	Grain
Time	Original	Corrected		Totai	Depth	Diameter
(min)	•	"R"	100Ra/W	Sample	Ĺ	(mm)
• •				•		
0.0						
0.5						
1.0	32.25	27,75	16.4	16.4	11.00	0.0435
2.0	30.00	25.50	15.1	15.1	11.37	0.0313
5.0	28.00	23.50	13.9	13.9	11.70	0.0201
15.0	25.25	20.75	12.3	12.3	12.15	0.0118
30.0	23.50	19.00	11.3	11.3	12.44	0.0084
60.0	22.00	17.50	10.4	10.4	12.68	0.0060
120.0	21.00	16.50	9.8	9.8	12.85	0.0043
250.0	20.25	15.75	9.3	9.3	12.97	0.0030
1440.0	19.00	14.50	8.6	8.6	13.17	0.0013

Grain Diameter = K*(SQRT(L/T))

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Date: 09/17/2012 Date: 9/17 (2





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MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

CLIENT LATA Kent	ucky		JOB NO.	2855-2	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-002 37.4-39.0' 211A002GRNSZ3 ERI12-SW-SWMU SW Plume RDSI G	I211A Seotechnical	SAMPLED DATE TES WASH SIE DRY SIEVE	TED VE E	8/30/12 KD 9/13/12 JS Yes No
MOISTURE DATA			WASH SIE	VE ANALYS	IS
HYGROSCOPIC	Yes		Wt. Total S Wet (ample (q)	842.64
NATURAL	No		Weight of +	·#10	
			Before Was	shing (g)	1.54
Wt. Wet Soil & Pan (g)	3	37.39	After Washi	ing (g)	1.36
Wt. Dry Soil & Pan (g)	3	36.68	Weight of -	#10`´´	
Wt. Lost Moisture (g)		0.71	Wet	(g)	841.10
Wt. of Pan Only (g)		2.98	Weight of -	#10	
Wt. of Dry Soil (g)	3	33.70	Dry (g)	823.92
Moisture Content %		2.1	Wt. Total S	ample	
			Dry (g)	825.28
Wt. Hydrom. Sample W	et (g) 7	70.65	Calc. Wt. "V	№ " (g)	69.31
Wt. Hydrom. Sample Dr	у(<u>g)</u> е	69.19	Calc. Mass	+ #10	0.11

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.48	0.48	0.48	0.1	99.9
#10	0.00	0.88	0.88	1.36	0.2	99.8
			/			
#20	3.23	3.44	0,21	0.21	0.5	99.5
#40	3.12	4.35	1.22	1.43	2.2	97.8
#60	3.25	7.71	4.46	5.89	8.7	91.3
#10 0	3.05	8.12	5.07	10.96	16.0	84.0
#200	2.98	7.40	4.42	15.38	22.4	77.6

Data entered by: Data checked by: FileName: LKHYNS23

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Date: 09/17/2012 Date: 117/12



CLIENT	LATA Kentu	ucky	JOB NO.	2855-2	
BORING NO DEPTH SAMPLE NO SOIL DESC LOCATION	D. D. R.	211-A-002 37.4-39.0' 211A002GRNSZ3 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TES WASH SIE DRY SIEVI	TED VE E	8/30/12 KD 9/13/12 JS Yes No
Hydrometer Sp. Gr. of Sc	# pil	ASTM 152 H 2.65	Temp., Deg Temp. Coe	д. С f. K	23.4 0.01311

op. on or oon	2.00		0.01011
Value of "alpha"	1.00	Wt. Dry Sample "W"	69.306
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5	·	
Meniscus Corr'n	0.0		

Elapsed	Hydrometer	Reading		%	Effective	Grain
Time	Original	Corrected		Total	Depth	Diameter
(min)	5	"R"	100Ra/W	Sample	Ĺ	(mm)
0.0						
0.5						
1.0	57.00	52.50	75.8	75.8	6.94	0.0345
2,0	53.00	48.50	70.0	70.0	7.60	0.0255
5.0	49.00	44.50	64.2	64.2	8.25	0.0168
15.0	44.00	39.50	57.0	57.0	9.07	0.0102
30.0	40.50	36.00	51.9	51.9	9.65	0.0074
60.0	37.00	32.50	46.9	46.9	10.22	0.0054
120.0	35.00	30.50	44.0	44.0	10.55	0.0039
250.0	32.50	28.00	40.4	40.4	10.96	0.0027
1440.0	27.50	23.00	33.2	33.2	11.78	0.0012

Grain Diameter = K*(SQRT(L/T))

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Data entered by: MLM Data checked by: <u>ML</u> FileName: LKHYNS23

Date: 09/17/2012 Date: <u>9/17 1</u>2



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MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

CLIENT LA	TA Kentucky		JOB NO. 2	855-03
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-01 12-15' 211A012 ERI12-SV SW Plum	2 GRNSZ1 V-SWMU211A e RDSI Geotechnical	SAMPLED DATE TESTE WASH SIEVE DRY SIEVE	09/17/12 KD ED 10/02/12 JS E Yes No
MOISTURE DA	TA		WASH SIEVE	ANALYSIS
HYGROSCOPI	C Yes		Wt. Total San Wet (g)	nple 1107.23
NATURAL	No		Weight of + # Before Washi Weight of + #	10 ing (g) 4.40
Wt. Wet Soil & Wt. Dry Soil & F	Pan (g) Pan (g)	43.29 42.55	After Washing Weight of - #1	g (g) 4.22
Wt. Lost Moistu Wt. of Pan Only	ire (g) / (g)	0.74 3.03	Wet (g) Weight of - #1	1102.83 10
Wt. of Dry Soil Moisture Conte	(g) nt %	39.52 1.9	Dry (g) Wt. Total San	1082.7 4 1ple
			Dry (g)	1086.96
Wt. Hydrom. Sa Wt. Hydrom. Sa	ample Wet (g) ample Dry (g)	66.99 65.76	Calc. Wt. "W" Calc. Mass +	(g) 66.02 #10 0.26

Sieve	Pan	Indiv.	Indiv.	Cum.	Cum.	%
Number	Weight	Wt. + Pan	Wt.	Wt.	%	Finer
(Size)	(g)	(g)	Retain.	Retain.	Retain.	By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.96	2.96	2.96	0.3	99.7
#4	0.00	0.93	0.93	3.89	0.4	99.6
#10	0.00	0.33	0.33	4.22	0.4	99.6
#20	1.78	1.83	0.05	0.05	0.5	99.5
#40	1.79	2,14	0.35	0.40	1.0	99.0
#60	1.77	3.04	1.27	1.67	2.9	97.1
#100	1.80	3.62	1.82	3.49	5.7	94.3
#200	1.77	3.10	1.33	4.82	7.7	92.3

Data entered by: Data checked by: FileName: LKH01215

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Date: 10/04/2012 Date: 10/11/18



CLIENT L	ATA Kentua	cky	JOB NO.	2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR LOCATION		211-A-012 12-15' 211A012GRNSZ1 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TEST WASH SIEV DRY SIEVE	TED /E	09/17/12 KD 10/02/12 JS Yes No
Hydrometer # Sp. Gr. of Soi Value of "alph Deflocculant Defloc. Corr'n Meniscus Col	ל געלים וו יו וויייים געלים	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0 0.0	Temp., Deg Temp. Coel Wt. Dry Sar % of Total S	i. C f. K nple "W" Sample	23.2 0.01314 66.016 100.0

T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0				***		
0.5						
1.0	48.00	43.00	65.1	65.1	8.42	0.0381
2.0	45.00	40.00	60.6	60.6	8.91	0.0277
5.0	38.00	33.00	50.0	50.0	10.06	0.0186
15.0	29.00	24.00	36.4	36.4	11.53	0.0115
30.0	24.00	19.00	28.8	28.8	12.35	0.0084
60.0	21.00	16.00	24.2	24.2	12.85	0.0061
120.0	19.75	14.75	22.3	22.3	13.05	0.0043
250.0	18.25	13.25	20.1	20.1	13.30	0.0030
1440.0	17.00	12.00	18.2	18.2	13.50	0.0013

Grain Diameter = K*(SQRT(L/T))

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Data entered by: DAW Data checked by: CHA FileName: LKH01215

Date: 10/04/2012 Date: 10/14/12




CLIENT	LATA Kent	ucky		JOB NO.	2855-03	
BORING NO DEPTH SAMPLE NO SOIL DESCI LOCATION).). R.	211-A-012 20-23' 211A012 GRNS ERI12-SW-SWM SW Plume RDSI	Z2 IU211A Geotechnical	SAMPLED DATE TES WASH SIE DRY SIEVE	TED VE E	09/17/12 KD 10/02/12 JS Yes No
MOISTURE	DATA			WASH SIE	VE ANALYS	IS
HYGROSCO	OPIC	Yes		Wt. Total S	ample	1002.00
NATURAL		No		Weight of +	.9) #10	1023.00
				Before Was Weight of +	shing (g) #10	122.94
Wt. Wet Soil Wt. Dry Soil	& Pan (g) & Pan (g)		35.67 34.93	After Wash Weight of -	ing (g) #10	85.39
Wt. Lost Moi	sture (g)		0.74	Wet ((g) #10	900.94
Wt. of Dry So	oil (g)		31.85	Dry (g) ample	917.18
woisture coi	intenit 70		2.3	Dry (g)	1002.57
Wt. Hydrom.	Sample W	et (g)	71.84	Calc, Wt. "V	V" (g)	76.75
Wt. Hydrom.	Sample Dr	y (g)	70.21	Calc. Mass	+ #10	6.54

Sieve Number (Size)	Pan Weight (a)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain	% Finer By Wt
(/	(3)	(3/				
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	20.30	20.30	20.30	2.0	98.0
#4	0.00	38.42	38.42	58.72	5.9	94.1
#10	0.00	26.67	26.67	85.39	8.5	91.5
#20	1.78	3.64	1.86	1.86	10.9	89.1
#40	1.75	6.01	4.26	6.12	16.5	83.5
#60	1.76	11.75	9.99	16.11	29.5	70.5
#100	1.78	8.69	6.91	23.02	38.5	61.5
#200	1.78	4.95	3.17	26.19	42.6	57.4

Data entered by: Data checked by: FileName: LKH02023

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Date: 10/04/2012 Date: 10/11/12



CLIENT LATA	Kentucky	JOB NO. 2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-012 20-23' 211A012 GRNSZ2 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/17/12 KD 10/02/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alpha" Deflocculant Defloc. Corr'n Meniscus Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0 0.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	23.2 0.01314 76.747 100.0

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Elapsed	Hydrometer	Reading		%	Effective	Grain
Time	Original	Corrected		Total	Depth	Diameter
(min)		"R"	100Ra/W	Sample	L	(mm)
0.0	I	·				
0.5	i					
1.0	46.00	41.00	53.4	53.4	8.75	0.0389
2.0	43.00	38.00	49.5	49.5	9.24	0.0282
5.0	38.00	33.00	43.0	43.0	10.06	0.0186
15.0	32.75	27.75	36.2	36.2	10.92	0.0112
30.0	30.00	25.00	32.6	32,6	11.37	0.0081
60.0	28.25	23.25	30.3	30.3	11.66	0.0058
120.0	27.00	22.00	28.7	28.7	11.86	0.0041
250.0	26.00	21.00	27.4	27.4	12.03	0.0029
1440.0	24.50	19.50	25.4	25.4	12.27	0.0012

Grain Diameter = K*(SQRT(L/T))

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Data entered by: DAW Data checked by: DAW FileName: LKH02023 Date: 10/04/2012 Date: 10/4/12





CLIENT LAT	A Kentucky		JOB NO. 2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-01: 40-42' 211A0120 ERI12-SV SW Plum	2 GRNSZ3 V-SWMU211A e RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/17/12 KD 10/02/12 JS Yes No
MOISTURE DAT	Ā		WASH SIEVE ANALY	SIS
HYGROSCOPIC	Yes		Wt. Total Sample	1943 67
NATURAL	No		Weight of + #10	1240.01
			Before Washing (g) Weight of + #10	7.17
Wt. Wet Soil & P Wt. Dry Soil & Pa	an (g) an (g)	35.86 35.35	After Washing (g) Weight of - #10	6.35
Wt. Lost Moisture Wt. of Pan Only	⇒ (g) (a)	0.51 3.06	Wet (g) Weight of - #10	1236.50
Wt. of Dry Soil Moisture Content	(g) t %	32.29 1.6	Dry (g) Wt. Total Sample	1218.08
			Dry (g)	1224.43
Wt. Hydrom. San Wt. Hydrom. San	nple Wet (g) nple Dry (g)	71.16 70.06	Calc. Wt. "W" (g) Calc. Mass + #10	70.42 0.37
0:	New India			

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0,00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	1.76	1.76	1.76	0.1	99.9
#10	0.00	4.59	4.59	6.35	0.5	99.5
#20	1.78	2.84	1.06	1.06	2.0	98.0
#40	1.78	5.92	4.14	5.20	7.9	92.1
#60	1.78	9.68	7.90	13.10	19.1	80.9
#100	1.79	11.09	9.30	22.40	32.3	67.7
#200	1.78	10.51	8.73	31.13	44.7	55.3

Data entered by: DAW Data checked by: DAW FileName: LKH04042

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Date: 01/10/04/2012 Date: 01/12



CLIENT	LATA Kenti	ucky	JOB NO.	2855-03	
BORING NO DEPTH SAMPLE NO SOIL DESCI LOCATION).). R.	211-A-012 40-42' 211A012GRNSZ3 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TES [®] WASH SIEV DRY SIEVE	TED /E	09/17/12 KD 10/02/12 JS Yes No
Hydrometer Sp. Gr. of So Value of "alp Deflocculant Defloc. Corr' Meniscus Co	# bil bha" 'n prr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0 0.0	Temp., Deg Temp. Coef Wt. Dry Sar % of Total \$	ı. C f. K nple "W" Sample	23.2 0.01314 70.422 100.0

T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sampie	Effective Depth L	Grain Diameter (mm)
0.0						
0.5		***			H-+	
1.0	39.00	34.00	48.3	48.3	9.89	0.0413
2.0	36.50	31.50	44.7	44.7	10.30	0.0298
5.0	33.75	28.75	40.8	40.8	10.76	0.0193
15.0	29.00	24.00	34.1	34.1	11.53	0.0115
30.0	26.00	21.00	29.8	29.8	12.03	0.0083
60.0	23.00	18.00	25.6	25.6	12.52	0.0060
120.0	21.00	16.00	22.7	22.7	12.85	0.0043
250.0	19.00	14.00	19.9	19.9	13.17	0.0030
1440.0	17.25	12.25	17.4	17.4	13.46	0.0013

Grain Diameter = K*(SQRT(L/T))

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Data entered by: DAW Data checked by: DAW FileName: LKH04042

Date: 10/9/2012 Date: 10/9/10





CLIENT LATA Ken	tucky		JOB NO.	2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-027 3 12-15' 1 211A027GRNSZ1 1 ERI12-SW-SWMU211A 1 SW Plume RDSI Geotechnical 1		SAMPLED 09/18/12 DATE TESTED 10/02/12 WASH SIEVE Yes DRY SIEVE No		09/18/12 KD 10/02/12 JS Yes No
MOISTURE DATA			WASH SIE	VE ANALYS	ilS
HYGROSCOPIC	Yes		Wt. Total S	ample	1074.24
NATURAL	No		Weight of 4	· #10	1997 - 1997
			Before Was Weight of H	shing (g) - #10	0.34
Wt. Wet Soil & Pan (g) Wt. Dry Soil & Pan (g))	32.07 31.27	After Wash Weight of -	ing (g) #10	0.29
Wt. Lost Moisture (g) Wt. of Pan Only (g)		0.80 3.09	Wet Weight of -	(g) #10	1073.90
Wt. of Dry Soil (g)		28.18	Dry (g) ample	1044.30
Moistere Content %		2.0	Dry (g)	1044.59
Wt. Hydrom. Sample W	vet (g)	66.90	Calc. Wt. "	№ " (g)	65.07
Wt. Hydrom. Sample D	ry (g)	65.05	Calc. Mass	+ #10	0.02

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.29	0.29	0.29	0.0	100.0
#20	3.01	3.09	0.08	0.08	0.1	99.9
#40	3.19	3.66	0.47	0.55	0.9	99.1
#60	3.05	5.41	2.36	2.91	4.5	95.5
#100	3.08	7.07	3.99	6.90	10.6	89.4
#200	3.07	5.54	2.47	9.37	14.4	85.6

Data entered by: // DAW Data checked by: <u></u> FileName: LKHU1215

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Date: 10/15/2012 Date: 10/15/1え



CLIENT LATA K	entucky	JOB NO. 2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-027 12-15' 211A027GRNSZ1 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/18/12 KD 10/02/12 JS Yes No
Hydrometer # Sp. Gr. of Soli Value of "alpha" Deflocculant Defloc. Corr'n Meniscus Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0 0.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	23.3 0.01312 65.069 100.0

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Elapsed Time (min)	Hydrometer Original	Reading Corrected	1000-000	% Totai Samala	Effective Depth	Grain Diameter
(crinci)		R.	TUURA/W	Sample	L	(man)
0.0						
0.5						
1.0	53.00	48.00	73.8	73.8	7.60	0.0362
2.0	47.50	42.50	65.3	65.3	8.50	0.0271
5.0	38.25	33.25	51.1	51.1	10.02	0.0186
15.0	29.00	24.00	36.9	36.9	1 1. 5 3	0.0115
30.0	24.25	19.25	29.6	29.6	12.31	0.0084
60.0	22.50	17.50	26.9	26.9	12.60	0.0060
120.0	21.00	16.00	24.6	24.6	12.85	0.0043
2.50.0	19.00	14.00	21.5	21.5	13.17	0.0030
1440.0	18.00	13.00	20.0	20.0	13.34	0.0013

Grain Diameter = K*(SQRT(L/T))

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Data entered by: _____DAW Data checked by: _____ FileName: LKHU1215

Date: 10/05/2012 Date: 10/5/12





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CLIENT LATA Ken	lucky		JOB NO.	2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-027 22-25' 211A027GRNZ2 ERI12-SW-SWM SW Plume RDSI	U211A Geotechnical	SAMPLED DATE TES WASH SIE DRY SIEVE	TED VE	09/18/12 JS 10/02/12 JS Yes No
MOISTURE DATA			WASH SIE	VE ANALYS	IS
HYGROSCOPIC	Yes		Wt. Total S	ample	745 33
NATURAL	No		Weight of +	#10	
			Weight of +	shing (g) #10	208.89
Wt. Wet Soil & Pan (g)		33.43 32.67	After Washi	ing (g) #10	169.94
Wt. Lost Moisture (g)		0.76	Weight bir - Wet ((g)	536.44
Wt. of Pan Only (g)		3.07	Weight of -	#10 >	
VVt. of Dry Soil (g) Moisture Content %		29.60	Wt Total S	g) ample	560.99
		1. W	Dry (g)	730.93
Wt. Hydrom. Sample V	/et (g)	86.92	Calc. Wt. "V	∿" (g)	110.41
Wt. Hydrom. Sample D	ry (g)	84.74	Calc. Mass	+ #10	25.67

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
Z "	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	22.89	22.89	22.89	3.1	96.9
3/8"	0.00	48.61	48.61	71.50	9.8	90.2
#4	0.00	53.80	53.80	125.30	17.1	82.9
#10	0.00	44.64	44.64	169.94	23.2	76.8
#20	3.01	7.83	4.82	4.82	27.6	72.4
#40	3.12	12.75	9.64	14.45	36.3	63.7
#60	3.12	15.51	12.40	26.85	47.6	52.4
#100	3.05	12.36	9.31	36.16	56.0	44.0
#200	3.02	6.57	3.55	39.70	59.2	40.8

Data entered by: DAW Data checked by: CALL FileName: LKHU2225

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Date: 10/05/2012 Date: 10/5//2



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CLIENT LATA K	entucky	JOB NO. 2855-03	
BORING NO. DEPTH SAMPLE NO. SOIL DESCR. LOCATION	211-A-027 22-25' 211A027GRNZ2 ERI12-SW-SWMU211A SW Plume RDSI Geotechnical	SAMPLED DATE TESTED WASH SIEVE DRY SIEVE	09/18/12 JS 10/02/12 JS Yes No
Hydrometer # Sp. Gr. of Soil Value of "alpha" Deflocculant Defloc. Corr'n	ASTM 152 H 2.65 1.00 Sodium Hexametaphosphate 5.0	Temp., Deg. C Temp. Coef. K Wt. Dry Sample "W" % of Total Sample	23.4 0.01311 110.414 100.0
Meniscus Corr'n	0.0		

T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0						
0.5						
1.0	49.00	44.00	39.8	39.8	8.25	0.0377
2.0	44.00	39.00	35.3	35.3	9.07	0.0279
5.0	39.00	34.00	30.8	30.8	9.89	0.0184
15.0	34.50	29.50	26.7	26.7	10.63	0.0110
30.0	31.75	26.75	24.2	24.2	11.08	0.0080
60.0	30.25	25.25	22.9	22.9	11.33	0.0057
120.0	29.25	24.25	22.0	22.0	11.49	0.0041
250.0	28.00	23.00	20.8	20.8	11.70	0.0028
1440.0	27.00	22.00	19.9	19.9	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

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Data entered by: DAW Data checked by: DAW FileName: LKHU2225

10/05/2012 Date: Date: 10 12-





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| CLIENT LATA Kent                                             | ucky                                                                                     | JOB NO. 2855-03                                   |                                         |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-A-027<br>35.5-37'<br>211A027GRNSZ3<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnica | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE | 09/18/12 KD<br>10/02/12 JS<br>Yes<br>No |
| MOISTURE DATA                                                |                                                                                          | WASH SIEVE ANALYS                                 | IS                                      |
| HYGROSCOPIC                                                  | Yes                                                                                      | Wt. Total Sample                                  | 1131 00                                 |
| NATURAL                                                      | No                                                                                       | Weight of + #10                                   | 1121.00                                 |
|                                                              |                                                                                          | Before Washing (g)<br>Weight of + #10             | 491.75                                  |
| Wt. Wet Soil & Pan (g)                                       | 34.83                                                                                    | After Washing (g)                                 | 462.56                                  |
| Wt. Dry Soil & Pan (g)                                       | 34.66                                                                                    | Weight of - #10                                   |                                         |
| Wt. Lost Moisture (g)                                        | 0.17                                                                                     | Wet (g)                                           | 630.13                                  |
| Wt. of Pan Only (g)                                          | 3.06                                                                                     | Weight of - #10                                   |                                         |
| VVt. of Dry Soll (g)                                         | 31.60                                                                                    | Dry (g)                                           | 655.79                                  |
| Moisture Content %                                           | 0.5                                                                                      | Dry (g)                                           | 1118.35                                 |
| Wt. Hydrom, Sample W                                         | 'et (a) 89.44                                                                            | Calc. Wt. "W" (g)                                 | 151.72                                  |
| Wt. Hydrom. Sample Di                                        | γ(g) 88.96                                                                               | Calc. Mass + #10                                  | 62.75                                   |
|                                                              |                                                                                          |                                                   |                                         |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | Wt.     | Wt.     | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 11.05     | 11.05   | 11.05   | 1.0     | 99.0   |
| 3/8"   | 0.00   | 177.82    | 177.82  | 188.87  | 16.9    | 83.1   |
| #4     | 0.00   | 157.69    | 157.69  | 346.56  | 31.0    | 69.0   |
| #10    | 0.00   | 116.00    | 116.00  | 462.56  | 41.4    | 58.6   |
|        |        |           |         |         |         |        |
| #20    | 3.11   | 13.47     | 10.36   | 10.36   | 48.2    | 51.8   |
| #40    | 2.96   | 22.16     | 19.20   | 29.56   | 60.8    | 39.2   |
| #60    | 3.03   | 27.11     | 24.07   | 53.63   | 76.7    | 23.3   |
| #100   | 2.99   | 17.11     | 14.11   | 67.75   | 86.0    | 14.0   |
| #200   | 3.07   | 8.03      | 4.96    | 72.71   | 89.3    | 10.7   |

Data entered by: DAW Data checked by: <u>JU</u> FileName: LKHU3537

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Date: 10/05/2012 Date: 10/6/12



| CLIENT                                                                                       | LATA Kentu                          | ucky                                                                                      | JOB NO.                                                 | 2855-03                            |                                         |
|----------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------|-----------------------------------------|
| BORING NC<br>DEPTH<br>SAMPLE NC<br>SOIL DESCI<br>LOCATION                                    | ).<br>).<br>R.                      | 211-A-027<br>35.5-37'<br>211A027GRNSZ3<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIEV<br>DRY SIEVE           | TED<br>VE                          | 09/18/12 KD<br>10/02/12 JS<br>Yes<br>No |
| Hydrometer<br>Sp. Gr. of Sc<br>Value of "alp<br>Deflocculant<br>Defloc. Corr'<br>Meniscus Cc | #<br>bil<br>bha"<br>c<br>n<br>orr'n | ASTM 152 H<br>2.65<br>1.00<br>Sodium Hexametaphosphate<br>0.0<br>5.0                      | Temp., Deg<br>Temp. Coef<br>Wt. Dry Sar<br>% of Total S | i. C<br>f. K<br>nple "W"<br>Sample | 23.1<br>0.01315<br>151.715<br>100.0     |

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| Elapsed                                 | Hydrometer : | Reading |           | %<br>Totol | Effective | Grain  |
|-----------------------------------------|--------------|---------|-----------|------------|-----------|--------|
| (min)                                   | Onginai      | "R"     | 100Ra/W   | Sample     | Lepin     | (mm)   |
| (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |              |         | 1001(0/17 | oampie     | -         | County |
| 0.0                                     |              |         |           |            |           |        |
| 0.5                                     |              |         |           |            |           |        |
| 1.0                                     | 20.00        | 25.00   | 16.5      | 16.5       | 13.01     | 0.0474 |
| 2.0                                     | 18.00        | 23.00   | 15.2      | 15.2       | 13.34     | 0.0340 |
| 5.0                                     | 17.00        | 22.00   | 14.5      | 14.5       | 13.50     | 0.0216 |
| 15.0                                    | 16.00        | 21.00   | 13.8      | 13.8       | 13.67     | 0.0126 |
| 30.0                                    | 14.50        | 19.50   | 12.9      | 12.9       | 13.91     | 0.0090 |
| 60.0                                    | 14.00        | 19.00   | 12.5      | 12.5       | 13.99     | 0.0064 |
| 120.0                                   | 14.00        | 19.00   | 12.5      | 12.5       | 13.99     | 0.0045 |
| 250.0                                   | 13.50        | 18.50   | 12.2      | 12.2       | 14.08     | 0.0031 |
| 1440.0                                  | 13.50        | 18.50   | 12.2      | 12.2       | 14.08     | 0.0013 |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: DAW Data checked by: DAW FileName: LKHU3537

Date: 16/5/10/05/2012 Date: 16/5/19





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Permeability Tests

# ASTM D5084-10

Advanced Terra Testing

#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT LATA     | Environmental Services-Ky  | JOB NO. 2855-04 |                  |
|-----------------|----------------------------|-----------------|------------------|
| BORING NO.      | 211-A-027                  | SAMPLED         | 9/18/12 KD       |
| DEPTH           | 38-40'                     | TEST STARTED    | 10/12/12 CAL     |
| SAMPLE NO.      | 211A027PERM3               | TEST FINISHED   | 10/23/12 CAL     |
| SOIL DESCR.     | ERI12-SW-SWMU211A          | CELL NUMBER     | 14S              |
| LOCATION        | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRES. PSI | 5046                       | TEST TYPE       | TX/Pbp/Tap Water |

| MOISTURE/DENSITY<br>DATA                          | BEFORE<br>TEST | AFTER<br>TEST  |        |
|---------------------------------------------------|----------------|----------------|--------|
| Wt. Soil + Moisture (g)<br>Wt. Wet Soil & Pan (g) | 213.6<br>220.3 | 209.4<br>216.1 |        |
| Wt. Dry Soil & Pan (g)                            | 186.4          | 186.4          |        |
| Wt of Pan Only (g)                                | 6.7            | 29.7           |        |
| Wt. of Dry Soil (g)                               | 179.8          | 179.8          |        |
| Moisture Content %                                | 18.8           | 16.5           |        |
| Wet Density PCF                                   | 133.0          | 134.9          |        |
| Dry Density PCF                                   | 111.9          | 115.8          |        |
| Init. Diameter (in)                               | 1.611          | (cm)           | 4.092  |
| Init. Area (sq in)                                | 2.038          | (sq cm)        | 13.152 |
| Init. Height (in)                                 | 3.002          | (cm)           | 7.625  |
| Vol. Bef. Consol. (cu ft)                         | 0.00354        | 100 A          |        |
| Vol. After Consol. (cu ft)                        | 0.00342        |                |        |
| Porosity %                                        | 30.60          |                |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 5        |
|-------------------------------|----------|
| Velocity CM/Sec               | 3.29E-05 |
| Q (cc/s)                      | 1.05E-06 |
| Height                        | 2.962    |
| Diameter                      | 1.595    |
| Pressure (psi)                | 1.949    |
| Area after consol. (cm*cm)    | 12.883   |
| Gradient                      | 18.214   |
| Permeability k (cm/s)         | 4.5E-09  |
| Permeability k (m/s)          | 4.5E-11  |
| Back Pressure (psi)           | 98.0     |
| Cell Pressure (psi)           | 133.0    |
| Ave. Effective Stress (psi)   | 34.026   |
| Average temperature degree C: | 22.7     |

| Data entry by:     | MLM Date:        |
|--------------------|------------------|
| Checked by: Ctr.   | Date: 10/24/2012 |
| FileName: LKP00273 | 1 1              |

10/24/2012



#### TRIAXAL COMPRESSION TEST DATA

| CLIENT LATA Envi                                       |                 | ronmental Services-Ky                                                                          | JOB NO. 2855-04                                                                      |                                                                              |
|--------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>SOIL DESC<br>LOCATION | O.<br>O.<br>CR. | 211-A-027<br>38-40'<br>211A027PERM3<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical<br>5046 | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>SETUP NO.<br>SATURATED TEST<br>TEST TYPE | 9/18/12 KD<br>10/12/12 CAL<br>10/23/12 CAL<br>14S<br>Yes<br>TX/Pbp/Tap Water |
|                                                        |                 |                                                                                                |                                                                                      |                                                                              |

#### SATURATION DATA

| Cell  | Back  | Burette |      | Pore     |       |        |   |      |
|-------|-------|---------|------|----------|-------|--------|---|------|
| Pres. | Pres. | Reading |      | Pressure |       |        |   |      |
| (PSI) | (PSI) | (CC)    |      | (PSI)    |       | Change | В |      |
|       |       | Close   | Open | Close    | Open  |        |   |      |
| 40.0  | 38.0  | 1.4     | 6.3  |          |       |        |   |      |
| 50.0  | 48.0  | 7.8     | 8.6  | 38.5     | 47.5  | 9.0    |   | 0.90 |
| 60.0  | 58.0  | 9.3     | 10.0 | 48.4     | 57.3  | 8.9    |   | 0.89 |
| 70.0  | 68.0  | 9.9     | 10.7 | 58.7     | 67.6  | 8.9    |   | 0.89 |
| 80.0  | 78.0  | 11.0    | 11.7 | 69.0     | 77.8  | 8.8    |   | 0.88 |
| 90.0  | 88.0  | 11.9    | 12.6 | 78.9     | 88.3  | 9.4    |   | 0.94 |
| 100.0 | 98.0  | 12.8    |      | 88.8     | 98.1  | 9.3    |   | 0.93 |
| 110.0 |       | 14.0    | 14.1 | 98.4     | 107.9 | 9.5    |   | 0.95 |

#### CONSOLIDATION DATA

| Elapsed<br>Time<br>(Min) | SQRT<br>Time<br>(Min) | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |
|--------------------------|-----------------------|----------------------------|-------------------------|
| 0.00                     | 0.00                  | 0.80                       | 0.00                    |
| 0.25                     | 0.50                  | 3.05                       | -2.25                   |
| 0.5                      | 0.71                  | 3.10                       | -2.30                   |
| 1                        | 1.00                  | 3.15                       | -2.35                   |
| 2                        | 1.41                  | 3.25                       | -2.45                   |
| 4                        | 2.00                  | 3.40                       | -2.60                   |
| 9                        | 3.00                  | 3.70                       | -2.90                   |
| 16                       | 4.00                  | 3.95                       | -3.15                   |
| 30                       | 5.48                  | 4.40                       | -3.60                   |
| 60                       | 7.75                  | 5.00                       | -4.20                   |
| 120                      | 10.95                 | 5.80                       | -5.00                   |
| 240                      | 15.49                 | 6.70                       | -5.90                   |
| 360                      | 18.97                 | 7.40                       | -6.60                   |

| Initial Height  | (in)       |
|-----------------|------------|
| Height Change   | (in)       |
| Ht. After Cons. | (in)       |
| Initial Area (  | sq in)     |
| Area After Con  | s. (sq in) |

| Init. Vol. (CC)  |
|------------------|
| Vol. Change (CC) |
| Cell Exp. (CC)   |
| Net Change (CC)  |
| Cons. Vol. (CC)  |



100.29

| Data entry by:     | MLM         | Date:  |
|--------------------|-------------|--------|
| Checked by: CHL    | Date: 10/29 | 1/2012 |
| FileName: LKP00273 |             | 1      |

10/24/2012

3.002

0.040

2.962

2.038





Client LATA ENV. Services - Ky Job No. 2855-04 Sample No. 2114027 PERM3 ##4###### 38-40' Project SN Plame RDST Gestechnical Sampled 9/18/12 by 100 Prepped 10/12/12 by 2 Tx/Php 03 35 psi LK2855/LKDP0273 10/24/12

#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT   | LATA Env | /ironmental Services-Ky    | JOB NO. 2855-04 |                  |
|----------|----------|----------------------------|-----------------|------------------|
| BORING   | 10.      | 211-A-012                  | SAMPLED         | 9/17/12          |
| DEPTH    |          | 10-12'                     | TEST STARTED    | 10/4/12 CAL      |
| SAMPLE N | 10.      | 211A012PERM1               | TEST FINISHED   | 10/6/12 CAL      |
| SOIL DES | CR.      | ERI12-SW-SWMU211A          | CELL NUMBER     | 13S              |
| LOCATION | 4        | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PR | ES. PSF  | 1423                       | TEST TYPE       | TX/Pbp/Tap Water |
|          |          |                            |                 |                  |

| DATA   TEST   TEST     Wt. Soil + Moisture (g)   202.0   196.9     Wt. Wet Soil & Pan (g)   208.6   203.5     Wt. Dry Soil & Pan (g)   169.4   169.4     Wt. Lost Moisture (g)   39.2   34.1     Wt. of Pan Only (g)   6.6   6.6     Wt. of Dry Soil (g)   162.8   162.8     Moisture Content %   24.1   20.9     Wet Density PCF   126.0   132.3     Dry Density PCF   101.5   109.4     Init. Diameter (in)   1.618   (cm) 4.110     Init. Area (sq in)   2.056   (sq cm) 13.266     Init. Height (in)   2.971   (cm) 7.546     Vol. Bef. Consol. (cu ft)   0.00354   Vol. After Consol. (cu ft) | MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------|---------|--------|
| Wt. Soil + Moisture (g) 202.0 196.9   Wt. Wet Soil & Pan (g) 208.6 203.5   Wt. Dry Soil & Pan (g) 169.4 169.4   Wt. Lost Moisture (g) 39.2 34.1   Wt. of Pan Only (g) 6.6 6.6   Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol. After Consol. (cu ft) 0.00328                                                                                            | DATA                       | TEST    | TEST    |        |
| Wt. Wet Soil & Pan (g) 208.6 203.5   Wt. Dry Soil & Pan (g) 169.4 169.4   Wt. Lost Moisture (g) 39.2 34.1   Wt. of Pan Only (g) 6.6 6.6   Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol.328                                                                                                                                                             | Wt. Soil + Moisture (g)    | 202.0   | 196.9   |        |
| Wt. Dry Soil & Pan (g) 169.4 169.4   Wt. Lost Moisture (g) 39.2 34.1   Wt. of Pan Only (g) 6.6 6.6   Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol.34fer Consol. (cu ft) 0.00328                                                                                                                                                                        | Wt. Wet Soil & Pan (g)     | 208.6   | 203.5   |        |
| Wt. Lost Moisture (g) 39.2 34.1   Wt. of Pan Only (g) 6.6 6.6   Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol.328                                                                                                                                                                                                                                       | Wt. Dry Soil & Pan (g)     | 169.4   | 169.4   |        |
| Wt. of Pan Only (g) 6.6 6.6   Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol.328                                                                                                                                                                                                                                                                         | Wt. Lost Moisture (g)      | 39.2    | 34.1    |        |
| Wt. of Dry Soil (g) 162.8 162.8   Moisture Content % 24.1 20.9   Wet Density PCF 126.0 132.3   Dry Density PCF 101.5 109.4   Init. Diameter (in) 1.618 (cm) 4.110   Init. Area (sq in) 2.056 (sq cm) 13.266   Init. Height (in) 2.971 (cm) 7.546   Vol. Bef. Consol. (cu ft) 0.00354 Vol.328                                                                                                                                                                                                                                                                                                       | Wt. of Pan Only (g)        | 6.6     | 6.6     |        |
| Moisture Content %   24.1   20.9     Wet Density PCF   126.0   132.3     Dry Density PCF   101.5   109.4     Init. Diameter (in)   1.618   (cm)   4.110     Init. Area (sq in)   2.056   (sq cm)   13.266     Init. Height (in)   2.971   (cm)   7.546     Vol. Bef. Consol. (cu ft)   0.00354   Vol.328   0.00328                                                                                                                                                                                                                                                                                 | Wt. of Dry Soil (g)        | 162.8   | 162.8   |        |
| Wet Density PCF   126.0   132.3     Dry Density PCF   101.5   109.4     Init. Diameter (in)   1.618   (cm)   4.110     Init. Area (sq in)   2.056   (sq cm)   13.266     Init. Height (in)   2.971   (cm)   7.546     Vol. Bef. Consol. (cu ft)   0.00354   Vol.328                                                                                                                                                                                                                                                                                                                                | Moisture Content %         | 24.1    | 20.9    |        |
| Dry Density PCF   101.5   109.4     Init. Diameter (in)   1.618 (cm) 4.110     Init. Area (sq in)   2.056 (sq cm) 13.266     Init. Height (in)   2.971 (cm) 7.546     Vol. Bef. Consol. (cu ft)   0.00354     Vol. After Consol. (cu ft)   0.00328                                                                                                                                                                                                                                                                                                                                                 | Wet Density PCF            | 126.0   | 132.3   |        |
| Init. Diameter   (in)   1.618   (cm)   4.110     Init. Area   (sq in)   2.056   (sq cm)   13.266     Init. Height   (in)   2.971   (cm)   7.546     Vol. Bef. Consol. (cu ft)   0.00354   0.00328   0.00328                                                                                                                                                                                                                                                                                                                                                                                        | Dry Density PCF            | 101.5   | 109.4   |        |
| Init. Area   (sq in)   2.056   (sq cm)   13.266     Init. Height   (in)   2.971   (cm)   7.546     Vol. Bef. Consol.   (cu ft)   0.00354   7.546                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Init. Diameter (in)        | 1.618   | (cm)    | 4.110  |
| Init. Height   (in)   2.971   (cm)   7.546     Vol. Bef. Consol. (cu ft)   0.00354   0.00328   0.00328                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Init. Area (sq in)         | 2.056   | (sq cm) | 13.266 |
| Vol. Bef. Consol. (cu ft)   0.00354     Vol. After Consol. (cu ft)   0.00328                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Init. Height (in)          | 2.971   | (cm)    | 7.546  |
| Vol After Consol (cu ff) 0.00328                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Vol. Bef. Consol. (cu ft)  | 0.00354 |         |        |
| 0.00020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Vol. After Consol. (cu ft) | 0.00328 |         |        |
| Porosity % 36.68                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Porosity %                 | 36.68   |         |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 15       |
|-------------------------------|----------|
| Velocity CM/Sec               | 9.85E-05 |
| Q (cc/s)                      | 3.15E-06 |
| Height                        | 2.950    |
| Diameter                      | 1.564    |
| Pressure (psi)                | 2.180    |
| Area after consol. (cm*cm)    | 12.399   |
| Gradient                      | 20.455   |
| Permeability k (cm/s)         | 1.2E-08  |
| Permeability k (m/s)          | 1.2E-10  |
| Back Pressure (psi)           | 38.0     |
| Cell Pressure (psi)           | 47.9     |
| Ave. Effective Stress (psi)   | 8.810    |
| Average temperature degree C: | 21.8     |

| Data entry by:     | MLM       | Date:  | 10 |
|--------------------|-----------|--------|----|
| Checked by: Gtc    | Date: 10/ | 100/1- |    |
| FileName: LKP0A121 |           |        |    |

10/08/2012



#### TRIAXAL COMPRESSION TEST DATA

| CLIENT LATA En                                               | vironmental Services-Ky                                                                | JOB NO. 2855-04                                                         |                                                                         |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-A-012<br>10-12'<br>211A012PERM1<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>SETUP NO.<br>SATURATED TEST | 9/17/12<br>10/4/12 CAL<br>10/6/12 CAL<br>13S<br>Yes<br>TX/Php/Cap Water |

#### SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | (    | Change | В |      |
|------------------------|------------------------|----------------------------|------|---------------------------|------|--------|---|------|
|                        |                        | Close                      | Open | Close                     | Open |        |   |      |
| 40.0                   | 38.0                   | 1.8                        | 7.2  |                           |      |        |   |      |
| 50.0                   |                        | 12.0                       | 12.2 | 39.0                      | 48.5 | 9.5    |   | 0.95 |

### CONSOLIDATION DATA

|                                                     | Elapsed<br>Time<br>(Min)         | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |        |
|-----------------------------------------------------|----------------------------------|-----------------------|------------|----------------------------|-------------------------|--------|
|                                                     | 0.00                             | 0.00                  |            | 12.20                      | 0.00                    |        |
|                                                     | 0.25                             | 0.50                  |            | 12.85                      | -0.65                   |        |
|                                                     | 0.5                              | 0.71                  |            | 12.85                      | -0.65                   |        |
|                                                     | 1                                | 1.00                  |            | 12.90                      | -0.70                   |        |
|                                                     | 2                                | 1.41                  |            | 13.00                      | -0.80                   |        |
|                                                     | 4                                | 2.00                  |            | 13.10                      | -0.90                   |        |
|                                                     | 9                                | 3.00                  |            | 13.20                      | -1.00                   |        |
|                                                     | 16                               | 4.00                  |            | 13.40                      | -1.20                   |        |
|                                                     | 30                               | 5.48                  |            | 13.60                      | -1.40                   |        |
|                                                     | 60                               | 7.75                  |            | 14.00                      | -1.80                   |        |
|                                                     | 120                              | 10.95                 |            | 14.60                      | -2.40                   |        |
|                                                     | 240                              | 15.49                 |            | 15.20                      | -3.00                   |        |
|                                                     | 360                              | 18.97                 |            | 15.55                      | -3.35                   |        |
| Initial Height (in)                                 |                                  | 2.971                 |            | Init Vol. (CC              | .)                      | 100.12 |
| Height Change (in)                                  |                                  | 0.021                 |            | Vol. Change                | (CC)                    | 14 80  |
| Ht After Cons (in)                                  |                                  | 2 950                 |            | Cell Exp. (C               | C)                      | 7 60   |
| Initial Area (sg in)                                |                                  | 2.056                 |            | Net Change                 | (CC)                    | 7.20   |
| Area After Cons. (sq in)                            |                                  | 1.922                 |            | Cons. Vol. (0              | CC)                     | 92.92  |
| Data entry by:<br>Checked by:<br>FileName: LKP0A121 | MLM [<br>Date:_ <u>/o/////</u> > | Date:                 | 10/08/2012 |                            |                         | ATT    |

F-47









#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT LATA E                                                | nvironmental Service-Ky                                                                | JOB NO. 2855-04                                                           |                                                       |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-A-012<br>23-25'<br>211A012PERM2<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>CELL NUMBER<br>SATURATED TEST | 9/17/12<br>10/04/12 CAL<br>10/09/12 CAL<br>15S<br>Yes |
| CONF. PRES. PSF                                              | 3105                                                                                   | TEST TYPE                                                                 | TX/Pbp/Tap Water                                      |

| MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------|---------|---------|--------|
| DATA                       | TEST    | TEST    |        |
| Wt. Soil + Moisture (g)    | 214.8   | 215.8   |        |
| Wt. Wet Soil & Pan (g)     | 223.0   | 223.9   |        |
| Wt. Dry Soil & Pan (g)     | 197.5   | 197.5   |        |
| Wt. Lost Moisture (g)      | 25.4    | 26.4    |        |
| Wt. of Pan Only (g)        | 8.1     | 8.1     |        |
| Wt. of Dry Soil (g)        | 189.4   | 189.4   |        |
| Moisture Content %         | 13.4    | 13.9    |        |
| Wet Density PCF            | 134.5   | 143.3   |        |
| Dry Density PCF            | 118.6   | 125.8   |        |
| Init. Diameter (in)        | 1.613   | (cm)    | 4.097  |
| Init. Area (sq in)         | 2.043   | (sq cm) | 13.184 |
| Init. Height (in)          | 2.977   | (cm)    | 7.562  |
| Vol. Bef. Consol. (cu ft)  | 0.00352 |         |        |
| Vol. After Consol. (cu ft) | 0.00332 |         |        |
| Porosity %                 | 28.07   |         |        |

# FLOW PUMP CALCULATIONS

| Pump Setting                | 5        |
|-----------------------------|----------|
| Velocity CM/Sec             | 3.29E-05 |
| Q (cc/s)                    | 1.05E-06 |
| Height                      | 2.920    |
| Diameter                    | 1.582    |
| Pressure (psi)              | 2.510    |
| Area after consol. (cm*cm)  | 12.674   |
| Gradient                    | 23.794   |
| Permeability k (cm/s)       | 3.5E-09  |
| Permeability k (m/s)        | 3.5E-11  |
| Back Pressure (psi)         | 48.0     |
| Cell Pressure (psi)         | 69.6     |
| Ave. Effective Stress (psi) | 20.345   |

Average temperature degree C: 22.4 Notes: Sample diameter is less than specification for nominal particle size in sample.

| Data entry by:     | MLM         | Date: |
|--------------------|-------------|-------|
| Checked by: CHL    | Date: 10/12 | 12012 |
| FileName: LKP0A122 |             |       |

10/10/2012



# TRIAXAL COMPRESSION TEST DATA

| CLIENT LATA En  | vironmental Service-Ky     | JOB NO. 2855-04 |                  |
|-----------------|----------------------------|-----------------|------------------|
| BORING NO.      | 211-A-012                  | SAMPLED         | 9/17/12          |
| DEPTH           | 23-25'                     | TEST STARTED    | 10/04/12 CAL     |
| SAMPLE NO.      | 211A012PERM2               | TEST FINISHED   | 10/09/12 CAL     |
| SOIL DESCR.     | ERI12-SW-SWMU211A          | SETUP NO.       | 15S              |
| LOCATION        | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRES. PSF | 3105                       | TEST TYPE       | TX/Pbp/Tap Water |

#### SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | C    | Change | В   |    |
|------------------------|------------------------|----------------------------|------|---------------------------|------|--------|-----|----|
|                        |                        | Close                      | Open | Close                     | Open |        |     |    |
| 40.0                   | 38.0                   | 1.8                        | 7.3  |                           |      |        |     |    |
| 50.0                   | 48.0                   | 9.5                        | 10.4 | 39.2                      | 48.5 | 9.3    | 0.9 | 93 |
| 60.0                   |                        | 11.4                       | 11.8 | 49.0                      | 58.7 | 9.7    | 0.9 | 97 |

#### CONSOLIDATION DATA

|                                                     | Elapsed<br>Time<br>(Min) | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |       |
|-----------------------------------------------------|--------------------------|-----------------------|------------|----------------------------|-------------------------|-------|
|                                                     | 0.00                     | 0.00                  |            | 11.80                      | 0.00                    |       |
|                                                     | 0.25                     | 0.50                  |            | 14.25                      | -2.45                   |       |
|                                                     | 0.5                      | 0.71                  |            | 14.40                      | -2.60                   |       |
|                                                     | 1                        | 1.00                  |            | 14.60                      | -2.80                   |       |
|                                                     | 2                        | 1.41                  |            | 14.85                      | -3.05                   |       |
|                                                     | 4                        | 2.00                  |            | 15.10                      | -3.30                   |       |
|                                                     | 9                        | 3.00                  |            | 15.40                      | -3.60                   |       |
|                                                     | 16                       | 4.00                  |            | 15.60                      | -3.80                   |       |
|                                                     | 30                       | 5.48                  |            | 15.80                      | -4.00                   |       |
|                                                     | 60                       | 7.75                  |            | 16.10                      | -4.30                   |       |
|                                                     | 120                      | 10.95                 |            | 16.30                      | -4.50                   |       |
|                                                     | 240                      | 15.49                 |            | 16.50                      | -4.70                   |       |
|                                                     | 360                      | 18.97                 |            | 16.55                      | -4.75                   |       |
| Initial Height (in)                                 |                          | 2 977                 |            | Init Vol. (CC              |                         | 00.70 |
| Height Change (in)                                  |                          | 0.057                 |            | Vol Change                 | (00)                    | 15.20 |
| Ht After Cons (in)                                  |                          | 2 920                 |            | Cell Exp (C                | (00)                    | 9.51  |
| Initial Area (sq in)                                |                          | 2 043                 |            | Net Change                 |                         | 5.69  |
| Area After Cons. (sq in)                            |                          | 1.964                 |            | Cons. Vol. (0              | (CC)                    | 94.02 |
| Data entry by:<br>Checked by:<br>FileName: LKP0A122 | MLM Date: 10/12/24       | )ate:<br>112          | 10/10/2012 |                            |                         | ATT T |





Client LATTA EAN. Services - KY Job No. 2755-09 Sample No. 21/A-09 201012 Adree 23-25' Project Sel Rame Geofechnical Sampled 1/11/12-by Prepped 10/22/ E.by \_\_\_\_\_ prepart # ERID-Sub-Sumu 21/A Tx/Pbp 03 3105 psf LK2855/LKDPA122 10/10/12

#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT    | LATA Envir | onmenetal Services -KY     | JOB NO. 2855-04 |                  |
|-----------|------------|----------------------------|-----------------|------------------|
| BORING N  | Ο.         | 211-A-012                  | SAMPLED         | 09/17/12         |
| DEPTH     |            | 38-40'                     | TEST STARTED    | 10/06/12 CAL     |
| SAMPLE N  | O.         | 211A012PERM3               | TEST FINISHED   | 10/16/12 CAL     |
| SOIL DESC | R.         | ERI12-SW-SWMU211A          | CELL NUMBER     | 13S              |
| LOCATION  |            | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRE | ES. PSF    | 5046                       | TEST TYPE       | TX/Pbp/Tap Water |

| TEST    | TEST                                                                                                                               |                                                                                                                                                                             |
|---------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | 1201                                                                                                                               |                                                                                                                                                                             |
| 197.8   | 194.4                                                                                                                              |                                                                                                                                                                             |
| 206.1   | 202.7                                                                                                                              |                                                                                                                                                                             |
| 164.4   | 164.4                                                                                                                              |                                                                                                                                                                             |
| 41.8    | 38.3                                                                                                                               |                                                                                                                                                                             |
| 8.3     | 8.3                                                                                                                                |                                                                                                                                                                             |
| 156.0   | 156.0                                                                                                                              |                                                                                                                                                                             |
| 26.8    | 24.6                                                                                                                               |                                                                                                                                                                             |
| 123.0   | 124.1                                                                                                                              |                                                                                                                                                                             |
| 97.0    | 99.6                                                                                                                               |                                                                                                                                                                             |
| 1.620   | (cm)                                                                                                                               | 4.115                                                                                                                                                                       |
| 2.061   | (sq cm)                                                                                                                            | 13.299                                                                                                                                                                      |
| 2.972   | (cm)                                                                                                                               | 7.549                                                                                                                                                                       |
| 0.00355 |                                                                                                                                    |                                                                                                                                                                             |
| 0.00345 |                                                                                                                                    |                                                                                                                                                                             |
| 39.21   |                                                                                                                                    |                                                                                                                                                                             |
|         | 197.8<br>206.1<br>164.4<br>41.8<br>8.3<br>156.0<br>26.8<br>123.0<br>97.0<br>1.620<br>2.061<br>2.972<br>0.00355<br>0.00345<br>39.21 | 197.8 194.4   206.1 202.7   164.4 164.4   41.8 38.3   8.3 8.3   156.0 156.0   26.8 24.6   123.0 124.1   97.0 99.6   1.620 (cm)   2.061 (sq cm)   2.972 (cm)   0.00355 39.21 |

#### FLOW PUMP CALCULATIONS

| Pump Setting                | 19       |
|-----------------------------|----------|
| Velocity CM/Sec             | 1.25E-04 |
| Q (cc/s)                    | 3.99E-06 |
| Height                      | 2.868    |
| Diameter                    | 1.627    |
| Pressure (psi)              | 4.100    |
| Area after consol. (cm*cm)  | 13.421   |
| Gradient                    | 39.571   |
| Permeability k (cm/s)       | 7.5E-09  |
| Permeability k (m/s)        | 7.5E-11  |
| Back Pressure (psi)         | 108.0    |
| Cell Pressure (psi)         | 143.0    |
| Ave. Effective Stress (psi) | 32.950   |
|                             |          |

Average temperature degree C:

Data entry by: DAW Date: Checked by: Date: Date:

10/18/2012



# TRIAXAL COMPRESSION TEST DATA

| CLIENT                | LATA Envir | ronmenetal Services -KY           | JOB NO.              | 2855-04 |                          |
|-----------------------|------------|-----------------------------------|----------------------|---------|--------------------------|
| BORING N<br>DEPTH     | 0.         | 211-A-012<br>38-40'               | SAMPLED<br>TEST STAF | RTED    | 09/17/12<br>10/06/12 CAL |
| SAMPLE N<br>SOIL DESC | IO.<br>CR. | 211A012PERM3<br>ERI12-SW-SWMU211A | TEST FINIS           | SHED    | 10/16/12 CAL<br>13S      |
| CONF. PRI             | ES. PSF    | 5046                              | TEST TYPE            | E       | TX/Pbp/Tap Water         |

#### SATURATION DATA

| Cell<br>Pres.<br>(PSI)   | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |             | Pore<br>Pressure<br>(PSI) |                 | Change | В                |                 |
|--------------------------|------------------------|----------------------------|-------------|---------------------------|-----------------|--------|------------------|-----------------|
| 40.0                     | 28.0                   | Close                      | Open        | Close                     | Open            |        |                  |                 |
| 40.0                     | 19.0                   | 7.4                        | 0.5         | 20.0                      | 17.2            | 0.2    | 0.02             |                 |
| 50.0                     | 40.0                   | 2.4                        | 0.2         | 39.0                      | 47.5            | 0.5    | 0.05             |                 |
| 70.0                     | 68.0                   | 0.0                        | 0.7         | 49.0                      | 67.3            | 0.9    | 0.09             |                 |
| 70.0                     | 79.0                   | 0.9                        | 9.0         | 50.9                      | 77.7            | 0.4    | 0.04             |                 |
| 0.00                     | 70.0                   | 9.7                        | 10.4        | 70.0                      | //./            | 0.0    | 0.00             |                 |
| 90.0                     | 00.0                   | 10.7                       | 10.4        | 79.0                      | 00.0            | 9.0    | 0.90             |                 |
| 100.0                    | 100.0                  | 11.5                       | 12.1        | 00.9                      | 90.1            | 9.2    | 0.92             |                 |
| 110.0                    | 106.0                  | 12.5                       | 12.1        | 90.0                      | 100.0           | 9.2    | 0.92             |                 |
| 120.0                    |                        | 13.1                       | IJ.I        | 108.4                     | 117.9           | 9.5    | 0.95             |                 |
|                          |                        | CONSC                      | DLIDATION D | ATA                       |                 |        |                  |                 |
|                          |                        | Elapsed                    | SQRT        |                           | Burette         | Volume |                  |                 |
|                          |                        | Time                       | Time        |                           | Reading         | Defl.  |                  |                 |
|                          |                        | (Min)                      | (Min)       |                           | (CC)            | (cc)   |                  |                 |
|                          |                        | 0.00                       | 0.00        |                           | 0.00            | 0.00   |                  |                 |
|                          |                        | 0.00                       | 0.00        |                           | 0.30            | 0.00   |                  |                 |
|                          |                        | 0.25                       | 0.50        |                           | 2.60            | -2.30  |                  |                 |
|                          |                        | 0.5                        | 0.71        |                           | 2.70            | -2.40  |                  |                 |
|                          |                        | 1                          | 1.00        |                           | 2.80            | -2.50  |                  |                 |
|                          |                        | 2                          | 1.41        |                           | 2.90            | -2.60  |                  |                 |
|                          |                        | 4                          | 2.00        |                           | 3.05            | -2.75  |                  |                 |
|                          |                        | 9                          | 3.00        |                           | 3.30            | -3.00  |                  |                 |
|                          |                        | 16                         | 4.00        |                           | 3.55            | -3.25  |                  |                 |
|                          |                        | 30                         | 5.48        |                           | 3.90            | -3.60  |                  |                 |
|                          |                        | 60                         | 7.75        |                           | 4.50            | -4.20  |                  |                 |
|                          |                        | 120                        | 10.95       |                           | 5.10            | -4.80  |                  |                 |
|                          |                        | 240                        | 15.49       |                           | 5.80            | -5.50  |                  |                 |
|                          |                        | 360                        | 18.97       |                           | 6.20            | -5.90  |                  |                 |
|                          | 1241-201               |                            |             |                           | and said street |        |                  | 1012 (Del 1012) |
| Initial Height (in)      |                        |                            | 2.972       |                           | Init. Vol. (C   | C)     |                  | 100.40          |
| Height Change (in)       |                        |                            | 0.104       |                           | Vol. Change     | e (CC) |                  | 18.80           |
| Ht. After Cons. (in)     |                        |                            | 2.868       |                           | Cell Exp. (     | CC)    |                  | 16.19           |
| Initial Area (sq in)     |                        |                            | 2.061       |                           | Net Change      | (CC)   |                  | 2.61            |
| Area After Cons. (sq in) |                        |                            | 2.080       |                           | Cons. Vol.      | (CC)   |                  | 97.79           |
| Data optor by:           |                        | DAW.                       | Data:       | 10/10/2012                |                 |        | NANCED TERRA TES | TINO. IN        |

| Data entry by:     | DAW   | Date:  |  |
|--------------------|-------|--------|--|
| Checked by: due    | Date: | 118/12 |  |
| FileName: LKP00123 |       | / /    |  |

10/18/2012






| MN.                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client LATTA EAULADAMEATTA SEAMERS- Ky<br>Job No. 2855-04                                                                                                                             |
| Sample No. 2114-012 @ 38-90<br><u>2114 012 FEAM 3</u><br>Project <u>SW Plume RDSI Gestechnical</u><br>Sampled <u>9/17/12 by</u><br>Prepped <u>10/06/12 by CAL</u><br>Tr/Pho Gr 35 psi |
| LK2855/LKDP0123<br>10/18/12                                                                                                                                                           |

# PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT L                                                                  | ATA Environmental S                                                    | ervices - KY                                | JOB NO.                                                              | 2855-04                              |                                                                            |
|---------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR<br>LOCATION<br>CONF. PRES | 211-A-027<br>10-12'<br>211A027P<br>ERI12-SW<br>SW Plume<br>5. PSF 142: | ERM1<br>-SWMU211A<br>RDSI Geotechnical<br>3 | SAMPLED<br>TEST STA<br>TEST FINI<br>CELL NUM<br>SATURATI<br>TEST TYP | RTED<br>SHED<br>IBER<br>ED TEST<br>E | 09/18/12<br>10/04/12 CAL<br>10/11/12 CAL<br>14S<br>Yes<br>TX/Pbp/Tap Water |

| MOISTURE/DENSITY<br>DATA   | BEFORE<br>TEST | AFTER<br>TEST |        |
|----------------------------|----------------|---------------|--------|
| Wt. Soil + Moisture (g)    | 192.6          | 189.8         |        |
| Wt. Wet Soil & Pan (g)     | 200.8          | 198.0         |        |
| Wt. Dry Soil & Pan (g)     | 165.3          | 165.3         |        |
| Wt. Lost Moisture (g)      | 35.5           | 32.7          |        |
| Wt. of Pan Only (g)        | 8.2            | 8.2           |        |
| Wt. of Dry Soil (g)        | 157.1          | 157.1         |        |
| Moisture Content %         | 22.6           | 20.8          |        |
| Wet Density PCF            | 127.7          | 128.1         |        |
| Dry Density PCF            | 104.2          | 106.0         |        |
| Init. Diameter (in)        | 1.564          | (cm)          | 3.973  |
| Init. Area (sq in)         | 1.921          | (sq cm)       | 12.395 |
| Init. Height (in)          | 2.991          | (cm)          | 7.597  |
| Vol. Bef. Consol. (cu ft)  | 0.00333        | ()            |        |
| Vol. After Consol. (cu ft) | 0.00327        |               |        |
| Porosity %                 | 35.31          |               |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 15       |
|-------------------------------|----------|
| Velocity CM/Sec               | 9.85E-05 |
| Q (cc/s)                      | 3.15E-06 |
| Height                        | 2.956    |
| Diameter                      | 1.559    |
| Pressure (psi)                | 1.403    |
| Area after consol. (cm*cm)    | 12.321   |
| Gradient                      | 13.138   |
| Permeability k (cm/s)         | 1.9E-08  |
| Permeability k (m/s)          | 1.9E-10  |
| Back Pressure (psi)           | 68.0     |
| Cell Pressure (psi)           | 77.9     |
| Ave. Effective Stress (psi)   | 9.199    |
| Average temperature degree C: | 22.3     |

 Data entry by:
 DAW
 Date:
 1

 Checked by:
 \_\_\_\_\_\_
 Date:
 1

 FileName:
 LKP00271

10/12/2012



# TRIAXAL COMPRESSION TEST DATA

| CLIENT L               | _ATA Envir | onmental Services - KY             | JOB NO.              | 2855-04      |                          |
|------------------------|------------|------------------------------------|----------------------|--------------|--------------------------|
| BORING NO.<br>DEPTH    |            | 211-A-027<br>10-12'                | SAMPLED<br>TEST STA  | RTED         | 09/18/12<br>10/04/12 CAL |
| SAMPLE NO              | i          | 211A027PERM1                       | TEST FINIS           | SHED         | 10/11/12 CAL             |
| SOIL DESCR             | ۶.         | ERI12-SW-SWMU211A                  | SETUP NC             | ).           | 14S                      |
| LOCATION<br>CONF. PRES | S. PSF     | SW Plume RDSI Geotechnical<br>1423 | SATURATE<br>TEST TYP | ED TEST<br>E | Yes<br>TX/Pbp/Tap Water  |

#### SATURATION DATA

| Cell  | Back  | Burette |      | Pore     |      |       |     |    |
|-------|-------|---------|------|----------|------|-------|-----|----|
| Pres. | Pres. | Reading | 1    | Pressure |      |       |     |    |
| (PSI) | (PSI) | (CC)    |      | (PSI)    | C    | hange | В   |    |
|       |       | Close   | Open | Close    | Open |       |     |    |
| 40.0  | 38.0  | 2.2     | 8.1  |          |      |       |     |    |
| 50.0  | 48.0  | 10.6    | 11.4 | 38.8     | 46.8 | 8.0   | 0.8 | 30 |
| 60.0  | 58.0  | 11.7    | 12.5 | 48.9     | 57.8 | 8.9   | 0.8 | 39 |
| 70.0  | 68.0  | 12.4    | 13.1 | 58.7     | 68.1 | 9.4   | 0.9 | 94 |
| 80.0  |       | 13.5    | 13.8 | 68.6     | 78.1 | 9.5   | 0.9 | 95 |

# CONSOLIDATION DATA

| Elapse               | d SQRT   | Burette         | /olume |  |
|----------------------|----------|-----------------|--------|--|
| Time                 | Time     | Reading         | Defl.  |  |
| (Min)                | (Min)    | (CC)            | (cc)   |  |
| 0.                   | 00.00    | 0.20            | 0.00   |  |
| 0.                   | 25 0.50  | 0.85            | -0.65  |  |
| C                    | 0.5 0.71 | 0.85            | -0.65  |  |
|                      | 1 1.00   | 0.90            | -0.70  |  |
|                      | 2 1.41   | 0.90            | -0.70  |  |
|                      | 4 2.00   | 1.00            | -0.80  |  |
|                      | 9 3.00   | 1.10            | -0.90  |  |
|                      | 16 4.00  | 1.25            | -1.05  |  |
| 8                    | 30 5.48  | 1.45            | -1.25  |  |
|                      | 60 7.75  | 1.75            | -1.55  |  |
| 1                    | 20 10.95 | 2.10            | -1.90  |  |
| 2                    | 40 15.49 | 2.50            | -2.30  |  |
| 3                    | 60 18.97 | 2.60            | -2.40  |  |
| Initial Height (in)  | 2.991    | Init, Vol. (CC) |        |  |
| Height Change (in)   | 0.035    | Vol. Change (C  | C)     |  |
| Ht. After Cons. (in) | 2.956    | Cell Exp. (CC   | )      |  |
| Initial Area (sq in) | 1.921    | Net Change (0   | CC)    |  |

| Vol. Change (CC) | 14.40             |
|------------------|-------------------|
| Cell Exp. (CC)   | 12.75             |
| Net Change (CC)  | 1.65              |
| Cons. Vol. (CC)  | 92.53             |
| 2.1 .170         | CED TERRA TESTING |
| 040              | VAN               |

| Data entry by:     | DAW   | Date:    |
|--------------------|-------|----------|
| Checked by: are    | Date: | 10-12-12 |
| FileName: LKP00271 |       |          |

Area After Cons. (sq in)

10/12/2012

94.18

1.910





Client LATA Environmental Services - Ky Job No. 2855 -04 Sample No. 211-4 -027 211 A 027 PERMI @ 10-12 Project SW Plume RDST Gertechnica Sampled 9 / 18/12 by\_ Prepped 10 / 4 /12 by care TX/Pop 03 9.9 psi LK2855/LKDP1012 10/12/12

# PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT    | LATA Envir | onmental Services - KY     | JOB NO.    | 2855-04 |                  |
|-----------|------------|----------------------------|------------|---------|------------------|
| BORING N  | Ο.         | 211-A-027                  | SAMPLED    |         |                  |
| DEPTH     |            | 22.5-24.5'                 | TEST STAF  | RTED    | 10/10/12 CAL     |
| SAMPLE N  | Ο.         | 211A027PERM2               | TEST FINIS | SHED    | 10/15/12 DPM     |
| SOIL DESC | CR.        | ERI12-SW-SWMU211A          | CELL NUM   | BER     | 15S              |
| LOCATION  |            | SW Plume RDSI Geotechnical | SATURATE   | D TEST  | Yes              |
| CONF. PR  | ES. PSF    | 2911                       | TEST TYPE  | Ξ       | TX/Pbp/Tap Water |

| MOISTURE/DENSITY           | BEFORE  | AFTER      |        |
|----------------------------|---------|------------|--------|
| DATA                       | TEST    | TEST       |        |
| Wt. Soil + Moisture (g)    | 249.3   | 252.1      |        |
| Wt. Wet Soil & Pan (g)     | 255.9   | 258.7      |        |
| Wt. Dry Soil & Pan (g)     | 228.6   | 228.6      |        |
| Wt. Lost Moisture (g)      | 27.3    | 30.1       |        |
| Wt. of Pan Only (g)        | 6.6     | 6.6        |        |
| Wt. of Dry Soil (g)        | 222.0   | 222.0      |        |
| Moisture Content %         | 12.3    | 13.6       |        |
| Wet Density PCF            | 136.1   | 139.8      |        |
| Dry Density PCF            | 121.2   | 123.1      |        |
| Init. Diameter (in)        | 1.663   | (cm)       | 4.224  |
| Init. Area (sq in)         | 2.172   | (sq cm)    | 14.014 |
| Init, Height (in)          | 3.212   | (cm)       | 8.158  |
| Vol. Bef. Consol. (cu ft)  | 0.00404 | 1.4.12.1.4 |        |
| Vol. After Consol. (cu ft) | 0.00397 |            |        |
| Porosity %                 | 26.75   |            |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 5        |
|-------------------------------|----------|
| Velocity CM/Sec               | 3.29E-05 |
| Q (cc/s)                      | 1.05E-06 |
| Height                        | 3.181    |
| Diameter                      | 1.658    |
| Pressure (psi)                | 2.260    |
| Area after consol. (cm*cm)    | 13.929   |
| Gradient                      | 19.666   |
| Permeability k (cm/s)         | 3.8E-09  |
| Permeability k (m/s)          | 3.8E-11  |
| Back Pressure (psi)           | 58.0     |
| Cell Pressure (psi)           | 78.2     |
| Ave. Effective Stress (psi)   | 19.070   |
| Average temperature degree C: | 22.4     |

| Data entry by:     | DAW       | Date: | 10/16/2012 |
|--------------------|-----------|-------|------------|
| Checked by:        | Date: 10/ | 16/12 |            |
| FileName: LKP027P2 | 1         | /     |            |



### TRIAXAL COMPRESSION TEST DATA

| CLIENT                | LATA Envir | ronmental Services - KY            | JOB NO.               | 2855-04 |                         |
|-----------------------|------------|------------------------------------|-----------------------|---------|-------------------------|
| BORING NO             | ).         | 211-A-027<br>22.5-24.5'            | SAMPLED<br>TEST STAF  | RTED    | 10/10/12 CAL            |
| SAMPLE NO             | D.         | 211A027PERM2                       | TEST FINIS            | SHED    | 10/15/12 DPM            |
| SOIL DESCI            | R.         | ERI12-SW-SWMU211A                  | SETUP NO              |         | 15S                     |
| LOCATION<br>CONF. PRE | S. PSF     | SW Plume RDSI Geotechnical<br>2911 | SATURATE<br>TEST TYPE | D TEST  | Yes<br>TX/Pbp/Tap Water |

#### SATURATION DATA

| Cell Back<br>Pres. Pres.<br>(PSI) (PSI) |      | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | C    | Change | В    |
|-----------------------------------------|------|----------------------------|------|---------------------------|------|--------|------|
|                                         |      | Close                      | Open | Close                     | Open |        |      |
| 40.0                                    | 38.0 | 1.7                        | 7.7  |                           |      |        |      |
| 50.0                                    | 48.0 | 7.7                        | 8.7  | 39.1                      | 47.6 | 8.5    | 0.85 |
| 60.0                                    | 58.0 | 8.9                        | 9.7  | 49.2                      | 58.2 | 9.0    | 0.90 |
| 70.0                                    |      | 9.8                        | 10.0 | 59.1                      | 68.6 | 9.5    | 0.95 |

# CONSOLIDATION DATA

|                          | Elapsed<br>Time<br>(Min) | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |                 |
|--------------------------|--------------------------|-----------------------|------------|----------------------------|-------------------------|-----------------|
|                          | 0.00                     | 0.00                  |            | 10.00                      | 0.00                    |                 |
|                          | 0.25                     | 0.50                  |            | 11.45                      | -1.45                   |                 |
|                          | 0.5                      | 0.71                  |            | 11.50                      | -1.50                   |                 |
|                          | 1                        | 1.00                  |            | 11.60                      | -1.60                   |                 |
|                          | 2                        | 1.41                  |            | 11.70                      | -1.70                   |                 |
|                          | 4                        | 2.00                  |            | 11.80                      | -1.80                   |                 |
|                          | 9                        | 3.00                  |            | 12.00                      | -2.00                   |                 |
|                          | 16                       | 4.00                  |            | 12.20                      | -2.20                   |                 |
|                          | 30                       | 5.48                  |            | 12.50                      | -2.50                   |                 |
|                          | 60                       | 7.75                  |            | 12.80                      | -2.80                   |                 |
|                          | 120                      | 10.95                 |            | 13.00                      | -3.00                   |                 |
|                          | 240                      | 15.49                 |            | 13.10                      | -3.10                   |                 |
|                          | 360                      | 18.97                 |            | 13.20                      | -3.20                   |                 |
| Initial Height (in)      |                          | 3.212                 |            | Init. Vol. (CC             | 2)                      | 114.35          |
| Height Change (in)       |                          | 0.031                 |            | Vol. Change                | (CC)                    | 12.10           |
| Ht. After Cons. (in)     |                          | 3.181                 |            | Cell Exp. (C               | C)                      | 10.32           |
| Initial Area (sq in)     |                          | 2.172                 |            | Net Change                 | (CC)                    | 1.78            |
| Area After Cons. (sq in) |                          | 2.159                 |            | Cons. Vol. (               | CC)                     | 112.56          |
| Data entry by:           | DAW D                    | )ate:                 | 10/16/2012 |                            | 3                       | Stances Testing |

| Data entry by:     | DAW            | Date: |
|--------------------|----------------|-------|
| Checked by: On     | Date: 10/16/12 |       |
| FileName: LKP027P2 |                | /     |





F-70

1.3 Client LATA Environmtal-ky Job No. 2855-04 BoringNo. 2/1-A-027 Depth 22.5-27.5' Sample No. 2/1A027/ERM 2 Project SW Plume RPSI Goo. Sampled / / by\_ Prepped / / by Project No. EATIZ-SW-SWM41211A Tx/Pbp O3 = 2911 ps P LK2855/LKDP27P2 10/16/12

#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

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| CLIENT LATA Envir                                                               | onmental Services - KY                                                                    | JOB NO. 2855-02                                                                        |                                                                             |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION<br>CONF. PRES. PSF | MW513<br>10-12'<br>MW513 PERM1<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical<br>1423 | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>CELL NUMBER<br>SATURATED TEST<br>TEST TYPE | 08/27/12 KD<br>9/15/12 CAL<br>9/24/12 DPM<br>15S<br>Yes<br>TX/Pbp/Tap Water |
| MOISTURE/DENSITY                                                                | BEFORE AFTER                                                                              |                                                                                        |                                                                             |

| DATA                       | TEST    | TEST    |        |
|----------------------------|---------|---------|--------|
| Wt. Soil + Moisture (g)    | 649.7   | 647.0   |        |
| Wt. Wet Soil & Pan (g)     | 664.0   | 661.3   |        |
| Wt. Dry Soil & Pan (g)     | 541.0   | 541.0   |        |
| Wt. Lost Moisture (g)      | 122.9   | 120.2   |        |
| Wt. of Pan Only (g)        | 14.2    | 14.2    |        |
| Wt. of Dry Soil (g)        | 526.8   | 526.8   |        |
| Moisture Content %         | 23.3    | 22.8    |        |
| Wet Density PCF            | 127.0   | 129.8   |        |
| Dry Density PCF            | 103.0   | 105.7   |        |
| lnit. Diameter (ìn)        | 2.839   | (cm)    | 7.211  |
| ínit. Area (sq іп)         | 6.330   | (sq.cm) | 40.843 |
| Init. Height (in)          | 3.078   | (cm)    | 7.818  |
| Vol. Bef. Consol. (cu ft)  | 0.01128 |         |        |
| Vol. After Consol. (cu ft) | 0.01099 |         |        |
| Porosity %                 | 38.64   |         |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting (gear number)<br>Percentage of Pump setting<br>Q (cc/s)<br>Height<br>Diameter<br>Pressure (psi)<br>Area after consol. (cm*cm)<br>Gradient<br>Permeability k (cm/s)<br><b>Permeability k (m/s)</b><br>Back Pressure (psi)<br>Cell Pressure (psi) | 11<br>100<br>5.71E-05<br>3.052<br>2.814<br>0.429<br>40.129<br>3.891<br>3.7E-07<br><b>3.7E-09</b><br>38.0<br>47.9 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Ave. Effective Stress (psi)                                                                                                                                                                                                                                  | 9.686                                                                                                            |
| Average temperature degree C:                                                                                                                                                                                                                                | 22.5                                                                                                             |

Average temperature degree C:

| Data entry by:     | DAW Date:            |
|--------------------|----------------------|
| Checked by:        | Date: <u>9/26/12</u> |
| FileName: LKP05131 |                      |

Safet TERRA TESTING

09/25/2012

# TRIAXAL COMPRESSION TEST DATA

| BORING NO.      | MW513                      | SAMPLED        | 08/27/12 KD      |
|-----------------|----------------------------|----------------|------------------|
| DEPTH           | 10-12'                     | TEST STARTED   | 9/15/12 CAL      |
| SAMPLE NO.      | MW513 PERM1                | TEST FINISHED  | 9/24/12 DPM      |
| SOIL DESCR.     | ERI12-SW-SWMU211A          | SETUP NO.      | 15S              |
| LOCATION        | SW Plume RDSI Geotechnical | SATURATED TEST | Yes              |
| CONF. PRES. PSF | 1423                       | TEST TYPE      | TX/Pbp/Tap Water |
|                 |                            |                |                  |

JOB NO. 2855-02

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# SATURATION DATA

CLIENT LATA Environmental Services - KY

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| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) | Pore<br>Pressure<br>(PSI) |       |      | Change | В |      |  |
|------------------------|------------------------|----------------------------|---------------------------|-------|------|--------|---|------|--|
| 40.0                   | 20.0                   | Close                      | Open                      | Close | Open |        |   |      |  |
| 40.0<br>50.0           | 38.0                   | 3.7<br>11.7                | 12.0                      | 39.1  | 49.1 | 10.0   |   | 1.00 |  |

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#### CONSOLIDATION DATA

|                           | Elapsed              | SQRT  |            | Burette       | Volume       |        |
|---------------------------|----------------------|-------|------------|---------------|--------------|--------|
|                           | Time                 | Time  |            | Reading       | Defl.        |        |
|                           | (Min)                | (Min) |            | (00)          | (cc)         |        |
|                           | 0.00                 | 0.00  |            | 12.10         | 0.00         |        |
|                           | 0.25                 | 0.50  |            | 13.35         | -1.25        |        |
|                           | 0.5                  | 0.71  |            | 13.50         | -1.40        |        |
|                           | 1                    | 1.00  |            | 13.80         | -1.70        |        |
|                           | 2                    | 1.41  |            | 14.20         | -2.10        |        |
|                           | 4                    | 2.00  |            | 14.70         | -2.60        |        |
|                           | 9                    | 3.00  |            | 15.60         | -3.50        |        |
|                           | 16                   | 4,00  |            | 16.50         | -4.40        |        |
|                           | 31                   | 5.57  |            | 17.40         | -5.30        |        |
|                           | 60                   | 7.75  |            | 17.90         | -5.80        |        |
|                           | 120                  | 10.95 |            | 18.20         | -6.10        |        |
|                           | 240                  | 15.49 |            | 18.30         | -6.20        |        |
|                           | 360                  | 18.97 |            | 18.40         | -6.30        |        |
| laitial Hoight (in)       |                      | 2 079 |            | Init Vial (C( | •\           | 210.25 |
| Height Change (in)        |                      | 0.026 |            | Vol. Change   | ")<br>(CC)   | 15 70  |
| Height Charige (iii)      |                      | 2.052 |            | Coll Evp. //  |              | 7.40   |
| Initial Area (min)        |                      | 5.00Z |            | Net Change    | ,0)<br>,(CC) | 7.49   |
| Area After Cons (sq in)   |                      | 6.330 |            | Cons Vol //   |              | 0.21   |
| Area Aiter Cons. (sq iii) |                      | 0.220 |            | Cons. vol. (  | 50)          | DIL.14 |
| Data entry by:            | DAW Da               | ate:  | 09/25/2012 |               |              |        |
| FileName: LKP05131        | Jate: <u>9/26/12</u> |       |            |               |              |        |



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# PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT LATA Envi | ironmental Services-Ky     | JOB NO. 2855-02 |                  |
|------------------|----------------------------|-----------------|------------------|
| BORING NO.       | MW513                      | SAMPLED         | 8/27/12 KD       |
| DEPTH            | 20-21'                     | TEST STARTED    | 9/15/12 CAL      |
| SAMPLE NO.       | MW513Perm2                 | TEST FINISHED   | 9/29/12 CAL      |
| PROJECT NO.      | ERI12-SW-SWMU211A          | CELL NUMBER     | 11P              |
| LOCATION         | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRES, PSF  | 3299                       | TEST TYPE       | TX/Pbp/Tap Water |

| MOISTURE/DENSITY                                                                                                                        | BEFORE                                                 | AFTER                   |                          |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|--------------------------|
| DATA                                                                                                                                    | TEST                                                   | TEST                    |                          |
| Wt. Soil + Moisture (g)                                                                                                                 | 677.3                                                  | 686.4                   |                          |
| Wt. Wet Soil & Pan (g)                                                                                                                  | 692.8                                                  | 701.9                   |                          |
| Wt. Dry Soil & Pan (g)                                                                                                                  | 590.0                                                  | 590.0                   |                          |
| Wt. Lost Moisture (g)                                                                                                                   | 102.8                                                  | 112.0                   |                          |
| Wt. of Pan Only (g)                                                                                                                     | 15.5                                                   | 15.5                    |                          |
| Wt. of Dry Soil (g)                                                                                                                     | 574.5                                                  | 574.5                   |                          |
| Moisture Content %                                                                                                                      | 17.9                                                   | 19.5                    |                          |
| Wet Density PCF                                                                                                                         | 133.0                                                  | 146.4                   |                          |
| Dry Density PCF                                                                                                                         | 112.8                                                  | 122.5                   |                          |
| Init. Diameter (in)<br>Init. Area (sq in)<br>Init. Height (in)<br>Vol. Bef. Consol. (cu ft)<br>Vol. After Consol. (cu ft)<br>Porosity % | 2.830<br>6.290<br>3.085<br>0.01123<br>0.01034<br>38.24 | (cm)<br>(sq cm)<br>(cm) | 7.188<br>40.584<br>7.836 |

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#### FLOW PUMP CALCULATIONS

| Pump Setting                | 5        |
|-----------------------------|----------|
| Velocity CM/Sec             | 3.29E-05 |
| Q (cc/s)                    | 1.05E-06 |
| Height                      | 3.051    |
| Diameter                    | 2.730    |
| Pressure (psi)              | 5.490    |
| Area after consol. (cm*cm)  | 37.769   |
| Gradient                    | 49.808   |
| Permeability k (cm/s)       | 5.6E-10  |
| Permeability k (m/s)        | 5.6E-12  |
| Back Pressure (psi)         | 0.88     |
| Cell Pressure (psi)         | 111.0    |
| Ave. Effective Stress (psi) | 20.255   |
|                             |          |

Average temperature degree C:

| Data entry by:     | MLM    | Date:    |
|--------------------|--------|----------|
| Checked by: 041    | Date:_ | 10/02/12 |
| FileName: LKP05132 |        |          |

10/01/2012

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# TRIAXAL COMPRESSION TEST DATA

| CLIENT                                                           | LATA Envir                        | ronmental Services-Ky                                                                     | JOB NO.                                                                 | 2855-02                |                                                                            |
|------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PR | IO.<br>IO.<br>NO.<br>↓<br>ES. PSF | MW513<br>20-21'<br>MW513Perm2<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical<br>.3299 | SAMPLED<br>TEST STAF<br>TEST FINIS<br>SETUP NO<br>SATURATE<br>TEST TYPE | RTED<br>GHED<br>D TEST | 8/27/12 KD<br>9/15/12 CAL<br>9/29/12 CAL<br>11P<br>Yes<br>TX/Pbp/Tap Water |

#### SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | (    | Change | в |      |
|------------------------|------------------------|----------------------------|------|---------------------------|------|--------|---|------|
|                        |                        | Close                      | Open | Close                     | Open | -      |   |      |
| 40.0                   | 38.0                   | 4.7                        | 13.7 |                           |      |        |   |      |
| 50.0                   | 48.0                   | 15.5                       | 18.0 | 38.5                      | 46.6 | 8.1    |   | 0.81 |
| 60.0                   | 58.0                   | 22.7                       | 24.1 | 48.4                      | 57.5 | 9.1    |   | 0.91 |
| 70.0                   | 68.0                   | 26.9                       | 27.8 | 58.7                      | 68.0 | 9.3    |   | 0.93 |
| 80.0                   | 78.0                   | 28.3                       | 29.1 | 68.5                      | 77.8 | 9.3    |   | 0.93 |
| 90.0                   | 88.0                   | 29.8                       | 30.5 | 78.4                      | 87.8 | 9.4    |   | 0.94 |
| 100.0                  |                        | 31.1                       | 31.1 | 88.5                      | 98.0 | 9.5    |   | 0.95 |

# CONSOLIDATION DATA

| Elapsed<br>Time<br>(Min) | SQRT<br>Time<br>(Min) | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |
|--------------------------|-----------------------|----------------------------|-------------------------|
| 0.00                     | 0.00                  | 0.50                       | 0.00                    |
| 0.25                     | 0.50                  | 2.60                       | -2.10                   |
| 0.5                      | 0.71                  | 2.70                       | -2.20                   |
| 1                        | 1.00                  | 2.80                       | -2.30                   |
| 2                        | 1.41                  | 3.00                       | -2.50                   |
| 4                        | 2.00                  | 3.20                       | -2.70                   |
| 9                        | 3.00                  | 3.60                       | -3.10                   |
| 16                       | 4.00                  | 3.90                       | -3.40                   |
| 30                       | 5.48                  | 4.35                       | -3.85                   |
| 60                       | 7.75                  | 5.05                       | -4.55                   |
| 120                      | 10.95                 | 5.90                       | -5.40                   |
| 240                      | 15,49                 | 7.10                       | -6.60                   |
| 360                      | 18.97                 | 7.95                       | -7.45                   |
|                          |                       |                            |                         |

| Initial Height (in)      |  |
|--------------------------|--|
| Height Change (in)       |  |
| Ht. After Cons. (in)     |  |
| Initial Area (sq in)     |  |
| Area After Cons. (sq in) |  |

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| 5.854 |            |
|-------|------------|
|       | 10/01/2012 |

3.085

0.034

3.051

6.290

| Init. Vol. (CC)<br>Vol. Change (CC)<br>Cell Exp. (CC) | 318.05<br>40.85<br>15.55 |
|-------------------------------------------------------|--------------------------|
| Net Change (CC)                                       | 25.30                    |
| Cons. Vol. (CC)                                       | 292.75                   |
|                                                       | SUPERATE TERRATE         |

| Data entry by:     | MLM         | Date: |
|--------------------|-------------|-------|
| Checked by: CAL    | Date: 10/02 | 12    |
| FileName: LKP05132 | 1           |       |

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#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT LATA E                                                                   | invironmental Services - KY                                                              | JOB NO. 2855-02                                                                        |                                                                              |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION<br>CONF. PRES. PSF | MW513<br>40-42'<br>MW513PERM3<br>ERI12-SW-SWMU211A<br>SW Plume RDS/ Geotechnical<br>5305 | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>CELL NUMBER<br>SATURATED TEST<br>TEST TYPE | 08/23/12 KD<br>09/15/12 CAL<br>09/26/12 CAL<br>1P<br>Yes<br>TX/Pbp/Tap Water |
|                                                                                 |                                                                                          |                                                                                        |                                                                              |

| MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------|---------|---------|--------|
| DATA                       | TEST    | TEST    |        |
| Wt. Soil + Moisture (g)    | 657.4   | 659.7   |        |
| Wt. Wet Soil & Pan (g)     | 664.1   | 666.5   |        |
| Wt. Dry Soil & Pan (g)     | 540.4   | 540.4   |        |
| Wt. Lost Moisture (g)      | 123.7   | 126.1   |        |
| Wt. of Pan Only (g)        | 6.7     | 6.7     |        |
| Wt. of Dry Soil (g)        | 533.7   | 533.7   |        |
| Moisture Content %         | 23.2    | 23.6    |        |
| Wet Density PCF            | 126.7   | 136.8   |        |
| Dry Density PCF            | 102.8   | 110.6   |        |
| Init. Diameter (in)        | 2.857   | (cm)    | 7.257  |
| Init. Area (sq in)         | 6.411   | (sq cm) | 41.362 |
| Init. Height (in)          | 3.084   | (cm)    | 7.833  |
| Vol. Bef. Consol. (cu ft)  | 0.01144 |         |        |
| Vol. After Consol. (cu ft) | 0.01064 |         |        |
| Porosity %                 | 41.86   |         |        |
|                            |         |         |        |

# FLOW PUMP CALCULATIONS

| Pump Setting (gear number)<br>Percentage of Pump setting<br>Q (cc/s)<br>Height<br>Diameter<br>Pressure (psi)<br>Area after consol. (cm*cm)<br>Gradient<br>Permeability k (cm/s)<br><b>Permeability k (cm/s)</b><br>Back Pressure (psi)<br>Cell Pressure (psi)<br>Ave. Effective Stress (psi) | 11<br>100<br>5.71E-05<br>3.057<br>2.767<br>0.850<br>38.786<br>7.697<br>1.9E-07<br><b>1.9E-07</b><br><b>1.9E-09</b><br>48.0<br>84.8<br>36.375 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Average temperature degree C:                                                                                                                                                                                                                                                                | 22.5                                                                                                                                         |

| Data entry by:     | DAW    | Date:     |
|--------------------|--------|-----------|
| Checked by: CAL    | Date:_ | 9/27/2012 |
| FileName: LKP05133 |        |           |

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09/27/2012



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# TRIAXAL COMPRESSION TEST DATA

| CLIENT                                                                  | LATA Envir               | onmental Services - KY                                                                   | JOB NO. 2855-02                                                                      |                                                                              |
|-------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| BORING NO<br>DEPTH<br>SAMPLE NO<br>SOIL DESCR<br>LOCATION<br>CONF. PRES | ).<br>).<br>R.<br>S. PSF | MW513<br>40-42'<br>MW513PERM3<br>ERI12-SW-SWMU211A<br>SW Plume RDSI Geotechnical<br>5305 | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>SETUP NO.<br>SATURATED TEST<br>TEST TYPE | 08/23/12 KD<br>09/15/12 CAL<br>09/26/12 CAL<br>1P<br>Yes<br>TX/Pbp/Tap Water |

# SATURATION DATA

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| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) | Pore<br>Pressure<br>(PSI) |       | c    | Shange | В    |
|------------------------|------------------------|----------------------------|---------------------------|-------|------|--------|------|
|                        |                        | Close                      | Open                      | Close | Open |        |      |
| 40.0                   | 38.0                   | 4.2                        | 15.6                      |       |      |        |      |
| 50.0                   | 48.0                   | 20.9                       | 24.6                      | 38.8  | 45.3 | 6.5    | 0.65 |
| 60.0                   |                        | 24.3                       | 25.5                      | 48.9  | 58.7 | 9.8    | 0.98 |

#### CONSOLIDATION DATA

|                          | Elapsed                | SQRT     |            | Burette        | Volume |                        |
|--------------------------|------------------------|----------|------------|----------------|--------|------------------------|
|                          | Time                   | Time     |            | Reading        | Defl.  |                        |
|                          | (Min)                  | (Min)    |            | (CC)           | (cc)   |                        |
|                          | 0.00                   | 0.00     |            | 0.10           | 0.00   |                        |
|                          | 0.25                   | 0.50     |            | 4.95           | -4.85  |                        |
|                          | 0.5                    | 0.71     |            | 5.20           | -5.10  |                        |
|                          | 1                      | 1.00     |            | 5.60           | -5.50  |                        |
|                          | 2                      | 1.41     |            | 6.20           | -6.10  |                        |
|                          | 4                      | 2.00     |            | 7.00           | -6.90  |                        |
|                          | 9                      | 3.00     |            | 8.40           | -8.30  |                        |
|                          | 16                     | 4.00     |            | 9.60           | -9.50  |                        |
|                          | 30                     | 5.48     |            | 10.70          | -10.60 |                        |
|                          | 64                     | 8.00     |            | 11.50          | -11.40 |                        |
|                          | 120                    | 10.95    |            | 11.85          | -11 75 |                        |
|                          | 240                    | 15.49    |            | 12.10          | -12.00 |                        |
|                          | 360                    | 18.97    |            | 12.20          | -12.10 |                        |
|                          |                        |          |            |                |        |                        |
| Initial Height (in)      |                        | 3.084    |            | Init. Vol. (CC | >)     | 324.04                 |
| Height Change (in)       |                        | 0.027    |            | Vol. Change    | (CC)   | 36.40                  |
| Ht. After Cons. (in)     |                        | 3.057    |            | Cell Exp. (C   | C)     | 13.57                  |
| Initial Area (sq in)     |                        | 6.411    |            | Net Change     | (ĆC)   | 22.83                  |
| Area After Cons. (sq in) |                        | 6.012    |            | Cons. Vol. (   | CC)    | 301.22                 |
| Doto optor by:           |                        | ato:     | 00/27/2012 |                |        | SUPARCED TERRA TESTINO |
| Checked by: Checked by:  | Date: altalta          | ale.     | 0912112012 |                |        |                        |
| FileName: LKP05133       | Date. <u>9[+7] (0]</u> | <u>f</u> | F 01       |                |        |                        |

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Data Entered By:CALData Checked By:OncomeFile Name:LKFP5133



9/26/2012 9/27/2012



Grain Size Analysis

# ASTM D422

Advanced Terra Testing

# MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

| CLIENT LATA K                                                | entucky                                                    |                                         | JOB NO. 2855-06                                   | i                                       |
|--------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------|---------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-007<br>8.0-12.0'<br>211B007G<br>ERI12-SW<br>SW Plume | RNSZ1<br>-SWMU211B<br>RDSI Geotechnical | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE | 10/16/12 KD<br>11/8/12 SKL<br>Yes<br>No |
|                                                              |                                                            |                                         | <u>1</u>                                          |                                         |
| MOISTURE DATA                                                |                                                            |                                         | WASH SIEVE ANAL                                   | YSIS                                    |
| HYGROSCOPIC                                                  | Yes                                                        |                                         | Wt. Total Sample                                  | 973 66                                  |
| NATURAL                                                      | No                                                         |                                         | Weight of + #10                                   | 575.00                                  |
|                                                              |                                                            |                                         | Before Washing (g)<br>Weight of + #10             | 0.00                                    |
| Wt. Wet Soil & Pan<br>Wt. Dry Soil & Pan (                   | (g)<br>g)                                                  | 185.05<br>182.81                        | After Washing (g)<br>Weight of - #10              | 0.00                                    |
| Wt. Lost Moisture (g<br>Wt. of Pan Only (g                   | g)<br>i)                                                   | 2.24<br>6.53                            | Wet (g)<br>Weight of - #10                        | 973.66                                  |
| Wt. of Dry Soil (g)<br>Moisture Content %                    |                                                            | 176.28                                  | Dry (g)<br>Wt. Total Sample                       | 961.44                                  |
|                                                              |                                                            |                                         | Dry (g)                                           | 961.44                                  |
| Wt. Hydrom. Sample                                           | Wet (g)                                                    | 66.01                                   | Calc. Wt. "W" (g)                                 | 65.18                                   |
| Wt. Hydrom. Sample                                           | Dry (g)                                                    | 65.18                                   | Calc. Mass + #10                                  | 0.00                                    |
|                                                              |                                                            |                                         |                                                   |                                         |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | Wt.     | VVt.    | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/8"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #4     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #10    | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
|        | 0.40   |           | 0.45    |         |         |        |
| #20    | 3.18   | 3.33      | 0.15    | 0.15    | 0.2     | 99.8   |
| #40    | 3.02   | 3.30      | 0.29    | 0.44    | 0.7     | 99.3   |
| #60    | 3.12   | 4.59      | 1.47    | 1.91    | 2.9     | 97.1   |
| #100   | 3.17   | 6.77      | 3.60    | 5.52    | 8.5     | 91.5   |
| #200   | 3.02   | 5.61      | 2.59    | 8.11    | 12.4    | 87.6   |

Data entered by: MLM Data checked by: MLM FileName: LKHY07Z1

Date: 11/12/2012 Date: 11/12/2012



# HYDROMETER ANALYSIS - SEDIMENTATION DATA ASTM D 422

| CLIENT LATA                                       | Kentucky                                | JOB NO. 2855-06                      |                                   |
|---------------------------------------------------|-----------------------------------------|--------------------------------------|-----------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.                 | 211-B-007<br>8.0-12.0'<br>211B007GRNSZ1 | SAMPLED<br>DATE TESTED<br>WASH SIEVE | 10/16/12 KD<br>11/8/12 SKL<br>Yes |
| LOCATION                                          | SW Plume RDSI Geotechnical              | DRTSIEVE                             | NO                                |
| Hydrometer #                                      | ASTM 152 H                              | Temp., Deg. C                        | 22.6                              |
| Sp. Gr. of Soil<br>Value of "alpha"               | 2.65                                    | Temp. Coef. K<br>Wt. Dry Sample "W"  | 0.01323 65.178                    |
| Deflocculant<br>Defloc. Corr'n<br>Meniscus Corr'n | Sodium Hexametaphosphate<br>5.0<br>0.0  | % of Total Sample                    | 100.0                             |

# Т

| Elapsed<br>Time | Hydrometer<br>Original | Reading<br>Corrected |         | %<br>Total | Effective<br>Depth | Grain<br>Diameter |
|-----------------|------------------------|----------------------|---------|------------|--------------------|-------------------|
| (min)           |                        | "R"                  | 100Ra/W | Sample     | L                  | (mm)              |
| 0.0             |                        |                      |         |            |                    |                   |
| 0.5             | 56.00                  | 51.00                | 78.2    | 78.2       | 7.11               | 0.0499            |
| 1.0             | 52.00                  | 47.00                | 72.1    | 72.1       | 7.76               | 0.0369            |
| 2.0             | 47.00                  | 42.00                | 64.4    | 64.4       | 8.58               | 0.0274            |
| 5.0             | 37.00                  | 32.00                | 49.1    | 49.1       | 10.22              | 0.0189            |
| 15.0            | 27.00                  | 22.00                | 33.8    | 33.8       | 11.86              | 0.0118            |
| 30.0            | 23.00                  | 18.00                | 27.6    | 27.6       | 12.52              | 0.0085            |
| 60.0            | 19.75                  | 14.75                | 22.6    | 22.6       | 13.05              | 0.0062            |
| 120.0           | 18.00                  | 13.00                | 19.9    | 19.9       | 13.34              | 0.0044            |
| 250.0           | 17.00                  | 12.00                | 18.4    | 18.4       | 13.50              | 0.0031            |
| 1440.0          | 16.00                  | 11.00                | 16.9    | 16.9       | 13.67              | 0.0013            |

Grain Diameter = K\*(SQRT(L/T))

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# MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

| CLIENT LA                                                    | ATA Kentu          | icky                                                                |                                  | JOB NO.                                      | 2855-06            |                                         |
|--------------------------------------------------------------|--------------------|---------------------------------------------------------------------|----------------------------------|----------------------------------------------|--------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION |                    | 211-B-007<br>27.5-31.5<br>211B007GRNS<br>ERI12-SW-SW<br>SW Plume RD | SZ2<br>MU211B<br>SI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEVE | TED<br>VE<br>E     | 10/16/12 KD<br>11/8/12 SKL<br>Yes<br>No |
| 3                                                            |                    |                                                                     |                                  |                                              |                    | 1                                       |
| MOISTURE DA                                                  | ATA                |                                                                     |                                  | WASH SIE                                     | VE ANALYS          | IS                                      |
| HYGROSCOP                                                    | IC                 | Yes                                                                 |                                  | Wt. Total S                                  | ample              | 863.20                                  |
| NATURAL                                                      |                    | No                                                                  |                                  | Weight of +                                  | + #10              | 003.23                                  |
|                                                              |                    |                                                                     |                                  | Before Was<br>Weight of +                    | shing (g)<br>⊦ #10 | 2.64                                    |
| Wt. Wet Soil & Wt. Dry Soil &                                | Pan (g)<br>Pan (g) |                                                                     | 113.21<br>111.93                 | After Wash<br>Weight of -                    | ing (g)<br>#10     | 2.49                                    |
| Wt. Lost Moiste<br>Wt. of Pan Onl                            | ure (g)<br>v (a)   |                                                                     | 1.28<br>8.34                     | Wet<br>- Weight of                           | (g)<br>#10         | 860.65                                  |
| Wt. of Dry Soil<br>Moisture Conte                            | (g)                |                                                                     | 103.59                           | Dry (                                        | g)<br>ample        | 850.29                                  |
| Moistare conte                                               | 511C 70            |                                                                     | 1.2                              | Dry (                                        | g)                 | 852.78                                  |
| Wt. Hydrom. S                                                | ample We           | et (g)                                                              | 67.71                            | Calc. Wt. "                                  | ₩" (g)             | 67.08                                   |
| Wt. Hydrom. S                                                | ample Dr           | y (g)                                                               | 66.89                            | Calc. Mass                                   | + #10              | 0.20                                    |
|                                                              |                    |                                                                     |                                  |                                              |                    |                                         |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | Wt.     | VVt.    | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/8"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #4     | 0.00   | 1.23      | 1.23    | 1.23    | 0.1     | 99.9   |
| #10    | 0.00   | 1.26      | 1.26    | 2.49    | 0.3     | 99.7   |
|        |        |           |         |         |         |        |
| #20    | 3.02   | 3.24      | 0.22    | 0.22    | 0.6     | 99.4   |
| #40    | 3.10   | 4.19      | 1.09    | 1.32    | 2.3     | 97.7   |
| #60    | 3.00   | 7.60      | 4.60    | 5.92    | 9.1     | 90.9   |
| #100   | 3.07   | 11.15     | 8.08    | 13.99   | 21.1    | 78.9   |
| #200   | 3.21   | 12.13     | 8.92    | 22.92   | 34.5    | 65.5   |

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Date: 11/12/2012 Date: 1((12/12



#### HYDROMETER ANALYSIS - SEDIMENTATION DATA ASTM D 422

| CLIENT LATA Ke                                                                                           | entucky                                                                                    | JOB NO. 2855-06                                                           |                                         |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION                                             | 211-B-007<br>27.5-31.5<br>211B007GRNSZ2<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE                         | 10/16/12 KD<br>11/8/12 SKL<br>Yes<br>No |
|                                                                                                          |                                                                                            |                                                                           | ¥                                       |
| Hydrometer #<br>Sp. Gr. of Soil<br>Value of "alpha"<br>Deflocculant<br>Defloc. Corr'n<br>Meniscus Corr'n | ASTM 152 H<br>2.65<br>1.00<br>Sodium Hexametaphosphate<br>5.0<br>0.0                       | Temp., Deg. C<br>Temp. Coef. K<br>Wt. Dry Sample "W"<br>% of Total Sample | 22.6<br>0.01323<br>67.083<br>100.0      |

# Т

| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
|---------|------------|-----------|---------|--------|-----------|----------|
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | Ĺ         | (mm)     |
| 0.0     |            |           |         | -      |           |          |
| 0.5     | 45.00      | 40.00     | 59.6    | 59.6   | 8.91      | 0.0559   |
| 1.0     | 42.00      | 37.00     | 55.2    | 55.2   | 9.40      | 0.0406   |
| 2.0     | 39.75      | 34.75     | 51.8    | 51.8   | 9.77      | 0.0292   |
| 5.0     | 36.50      | 31.50     | 47.0    | 47.0   | 10.30     | 0.0190   |
| 15.0    | 33.00      | 28.00     | 41.7    | 41.7   | 10.88     | 0.0113   |
| 30.0    | 30.50      | 25.50     | 38.0    | 38.0   | 11.29     | 0.0081   |
| 60.0    | 28.50      | 23.50     | 35.0    | 35.0   | 11.62     | 0.0058   |
| 120.0   | 26.50      | 21.50     | 32.0    | 32.0   | 11.94     | 0.0042   |
| 250.0   | 25.00      | 20.00     | 29.8    | 29.8   | 12.19     | 0.0029   |
| 1440.0  | 22.00      | 17.00     | 25.3    | 25.3   | 12.68     | 0.0012   |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: MLM Data checked by: All FileName: LKHY07Z2

Date: 11/12/2012 Date: 11/12/2012





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# MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

| CLIENT LATA K                                                                                                  | entucky                                                    |                                         | JOB NO. 28                                       | 355-06                                    |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------|--------------------------------------------------|-------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION                                                   | 211-B-007<br>42.5-44.0<br>211B007G<br>ERI12-SW<br>SW Plume | RNSZ3<br>-SWMU211B<br>RDSI Geotechnical | SAMPLED<br>DATE TESTE<br>WASH SIEVE<br>DRY SIEVE | 10/16/12 KD<br>D 11/8/12 SKL<br>Yes<br>No |
| ×                                                                                                              |                                                            |                                         |                                                  | *                                         |
| MOISTURE DATA                                                                                                  |                                                            |                                         | WASH SIEVE                                       | ANALYSIS                                  |
| HYGROSCOPIC                                                                                                    | Yes                                                        |                                         | Wt. Total Sam                                    | ple                                       |
| NATURAL                                                                                                        | No                                                         |                                         | Weight of + #1                                   | 890.19                                    |
|                                                                                                                | 110                                                        |                                         | Before Washir<br>Weight of + #1                  | ng (g) 476.93                             |
| Wt. Wet Soil & Pan<br>Wt. Dry Soil & Pan                                                                       | (g)<br>(g)                                                 | 108.24<br>107.11                        | After Washing<br>Weight of - #1                  | (g) 463.85<br>0                           |
| Wt. Lost Moisture (<br>Wt. of Pan Only (                                                                       | g)<br>a)                                                   | 1.13<br>8.21                            | Wet (g)<br>Weight of - #1                        | 413.26<br>0                               |
| Wt. of Dry Soil (g)<br>Moisture Content %                                                                      |                                                            | 98.90<br>1.1                            | Dry (g)<br>Wt. Total Sam                         | 421.52<br>ple                             |
|                                                                                                                |                                                            |                                         | Dry (g)                                          | 885.37                                    |
| Wt. Hydrom. Sample<br>Wt. Hydrom. Sample                                                                       | e Wet (g)<br>e Dry (g)                                     | 67.25<br>66.49                          | Calc. Wt. "W"<br>Calc. Mass + #                  | (g) 139.65<br>#10 73.16                   |
| na na mana na 2011 - na 19 mana ang 20 mang 20 |                                                            |                                         |                                                  |                                           |
|                                                                                                                |                                                            |                                         |                                                  |                                           |

| Sieve<br>Number | Pan<br>Weight | Indiv.<br>Wt. + Pan | Indiv.<br>Wt. | Cum.<br>Wt. | Cum.<br>% | %<br>Finer |
|-----------------|---------------|---------------------|---------------|-------------|-----------|------------|
| (Size)          | (g)           | (g)                 | Retain.       | Retain.     | Retain.   | By Wt.     |
| 3"              | 0.00          | 0.00                | 0.00          | 0.00        | 0.0       | 100.0      |
| 1 1/2"          | 0.00          | 0.00                | 0.00          | 0.00        | 0.0       | 100.0      |
| 3/4"            | 0.00          | 19.48               | 19.48         | 19.48       | 2.2       | 97.8       |
| 3/8"            | 0.00          | 139.98              | 139.98        | 159.46      | 18.0      | 82.0       |
| #4              | 0.00          | 167.21              | 167.21        | 326.67      | 36.9      | 63.1       |
| #10             | 0.00          | 137.18              | 137.18        | 463.85      | 52.4      | 47.6       |
|                 |               |                     |               |             |           |            |
| #20             | 3.25          | 15.75               | 12.50         | 12.50       | 61.3      | 38.7       |
| #40             | 3.08          | 14.50               | 11.42         | 23.93       | 69.5      | 30.5       |
| #60             | 3.29          | 14.99               | 11.70         | 35.62       | 77.9      | 22.1       |
| #100            | 3.12          | 10.27               | 7.16          | 42.78       | 83.0      | 17.0       |
| #200            | 2.98          | 6.45                | 3.47          | 46.25       | 85.5      | 14.5       |

Data entered by: Data checked by: \_\_\_\_\_\_ FileName: LKHY07Z3

Date: 11/12/2012 Date: 11/12/2012



# HYDROMETER ANALYSIS - SEDIMENTATION DATA ASTM D 422

| CLIENT I                                                  | _ATA Kentucky                                                                             | JOB NO. 2855                                                    | 5-06                                    |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------|
| BORING NO<br>DEPTH<br>SAMPLE NO<br>SOIL DESCF<br>LOCATION | . 211-B-007<br>42.5-44.0<br>2. 211B007GRNSZ3<br>R. ERI12-SW-SWMU211<br>SW Plume RDSI Geot | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>B DRY SIEVE<br>echnical | 10/16/12 KD<br>11/8/12 SKL<br>Yes<br>No |
|                                                           |                                                                                           | 74                                                              |                                         |
| Hydrometer #                                              | # ASTM 152 H                                                                              | Temp., Deg. C<br>Temp. Coef. K                                  | 22.6<br>0.01323                         |
| Value of "alpl<br>Deflocculant                            | ha" 1.00<br>Sodium Hexametapho                                                            | wt. Dry Sample '<br>sphate % of Total Samp                      | "W" 139.649<br>le 100.0                 |
| Defloc. Corr'r<br>Meniscus Co                             | n 5.0<br>rr'n 0.0                                                                         |                                                                 |                                         |

|  | - |  |
|--|---|--|
|  |   |  |
|  |   |  |

| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
|---------|------------|-----------|---------|--------|-----------|----------|
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | L         | (mm)     |
| 0.0     |            | -         |         |        |           |          |
| 0.5     | 25.00      | 20.00     | 14.3    | 14.3   | 12.19     | 0.0653   |
| 1.0     | 24.00      | 19.00     | 13.6    | 13.6   | 12.35     | 0.0465   |
| 2.0     | 23.00      | 18.00     | 12.9    | 12.9   | 12.52     | 0.0331   |
| 5.0     | 23.00      | 18.00     | 12.9    | 12.9   | 12.52     | 0.0209   |
| 15.0    | 22.00      | 17.00     | 12.2    | 12.2   | 12.68     | 0.0122   |
| 30.0    | 21.00      | 16.00     | 11.5    | 11.5   | 12.85     | 0.0087   |
| 60.0    | 20.25      | 15.25     | 10.9    | 10.9   | 12.97     | 0.0062   |
| 120.0   | 19.50      | 14.50     | 10.4    | 10.4   | 13.09     | 0.0044   |
| 250.0   | 19.00      | 14.00     | 10.0    | 10.0   | 13.17     | 0.0030   |
| 1442.0  | 19.00      | 14.00     | 10.0    | 10.0   | 13.17     | 0.0013   |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: MLM Date: Data checked by: Data Checked by: Date: Date:

Date: 11/12/2012 Date: 11(12/12





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#### MECHANICAL ANALYSIS - SIEVE TEST DATA ASTM D 422

| CLIENT LATA K                                                | entucky                                                 |                                         | JOB NO. 2855-6                                    |                                         |
|--------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------|---------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-004<br>5-7.5'<br>211B004G<br>ERI12-SW<br>SW Plume | RNSZ1<br>-SWMU211B<br>RDSI Geotechnical | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE | 10/11/12 KD<br>11/8/12 SKL<br>Yes<br>No |
|                                                              |                                                         |                                         |                                                   |                                         |
| MOISTURE DATA                                                |                                                         |                                         | WASH SIEVE ANALY                                  | SIS                                     |
| HYGROSCOPIC                                                  | Yes                                                     |                                         | Wt. Total Sample                                  | 1085 85                                 |
| NATURAL                                                      | No                                                      |                                         | Weight of + #10                                   | 1003.03                                 |
| <u>b</u> :                                                   |                                                         |                                         | Before Washing (g)<br>Weight of + #10             | 2.34                                    |
| Wt. Wet Soil & Pan<br>Wt. Dry Soil & Pan                     | (g)<br>(g)                                              | 33.59<br>33.24                          | After Washing (g)<br>Weight of - #10              | 1.85                                    |
| Wt. Lost Moisture (<br>Wt. of Pan Only (                     | g)<br>(p                                                | 0.35<br>3.04                            | Wet (g)<br>Weight of - #10                        | 1083.51                                 |
| Wt. of Dry Soil (g)                                          |                                                         | 30.20                                   | Dry (g)<br>Wt. Total Sample                       | 1071.58                                 |
| Molstare content A                                           |                                                         | 1.2                                     | Dry (g)                                           | 1073.43                                 |
| Wt. Hydrom. Sample                                           | e Wet (g)                                               | 70.23                                   | Calc. Wt. "W" (g)                                 | 69.54                                   |
| Wt. Hydrom. Sample                                           | e Dry (g)                                               | 69.42                                   | Calc. Mass + #10                                  | 0.12                                    |
|                                                              |                                                         |                                         |                                                   |                                         |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | Wt.     | WVt.    | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/8"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #4     | 0.00   | 0.83      | 0.83    | 0.83    | 0.1     | 99.9   |
| #10    | 0.00   | 1.02      | 1.02    | 1.85    | 0.2     | 99.8   |
|        |        |           |         |         |         |        |
| #20    | 3.00   | 3.26      | 0.25    | 0.25    | 0.5     | 99.5   |
| #40    | 3.00   | 3.32      | 0.31    | 0.56    | 1.0     | 99.0   |
| #60    | 3.08   | 3.98      | 0.91    | 1.47    | 2.3     | 97.7   |
| #100   | 2.97   | 4.73      | 1.76    | 3.24    | 4.8     | 95.2   |
| #200   | 3.08   | 4.22      | 1.14    | 4.38    | 6.5     | 93.5   |

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# HYDROMETER ANALYSIS - SEDIMENTATION DATA ASTM D 422

| CLIENT LATA                                      | Kentucky                                                  | JOB NO. 2855-6                                    |                                         |
|--------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR. | 211-B-004<br>5-7.5'<br>211B004GRNSZ1<br>ERI12-SW-SWMU211B | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE | 10/11/12 KD<br>11/8/12 SKL<br>Yes<br>No |
| LOCATION                                         | SW Plume RDSI Geotechnical                                |                                                   |                                         |
| Hydrometer #                                     | ASTM 152 H                                                | Temp., Deg. C                                     | 22.7                                    |
| Value of "alpha"                                 | 1.00<br>Sodium Hexametanhosphate                          | Wt. Dry Sample "W"                                | 69.543                                  |
| Defloc. Corr'n<br>Meniscus Corr'n                | 5.0<br>0.0                                                | lo or rotal Gample                                | 100.0                                   |

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| Elapsed | Hydrometer I | Reading   |         | %      | Effective | Grain    |
|---------|--------------|-----------|---------|--------|-----------|----------|
| Time    | Original     | Corrected |         | Total  | Depth     | Diameter |
| (min)   |              | "R"       | 100Ra/W | Sample | L         | (mm)     |
| 0.0     |              |           | **      | -      |           |          |
| 0.5     |              |           |         | -      |           |          |
| 1.0     | 58.75        | 53.75     | 77.3    | 77.3   | 6.66      | 0.0341   |
| 2.0     | 52.75        | 47.75     | 68.7    | 68.7   | 7.64      | 0.0258   |
| 5.0     | 42.00        | 37.00     | 53.2    | 53.2   | 9.40      | 0.0181   |
| 15.0    | 30.75        | 25.75     | 37.0    | 37.0   | 11.25     | 0.0114   |
| 30.0    | 26.00        | 21.00     | 30.2    | 30.2   | 12.03     | 0.0084   |
| 60.0    | 22.00        | 17.00     | 24.4    | 24.4   | 12.68     | 0.0061   |
| 120.0   | 21.00        | 16.00     | 23.0    | 23.0   | 12.85     | 0.0043   |
| 250.0   | 19.00        | 14.00     | 20.1    | 20.1   | 13.17     | 0.0030   |
| 1440.0  | 17.00        | 12.00     | 17.3    | 17.3   | 13.50     | 0.0013   |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: MLM Data checked by: MLM FileName: LKHY04Z1

Date: 11/12/2012 Date: (())





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| CLIENT LATA Kentucky                                         |                                                             |                                         | JOB NO.                                     | 2855-6             |                                         |
|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|---------------------------------------------|--------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-004<br>21.1-23.5'<br>211B004G<br>ERI12-SW<br>SW Plume | RNSZ2<br>·SWMU211B<br>RDSI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEV | TED<br>VE<br>E     | 10/11/12 KD<br>11/5/12 SKL<br>Yes<br>No |
| MOISTURE DATA                                                |                                                             |                                         | WASH SIE                                    | VE ANALY           | SIS                                     |
| HYGROSCOPIC                                                  | Yes                                                         |                                         | Wt. Total S                                 |                    | 1098 78                                 |
| NATURAL                                                      | No                                                          |                                         | Weight of -                                 | + #10              | 1000.10                                 |
|                                                              |                                                             |                                         | Before Wa<br>Weight of -                    | shing (g)<br>+ #10 | 530.91                                  |
| Wt. Wet Soil & Pan                                           | (g)                                                         | 74.00                                   | After Wash                                  | ning (g)           | 507.08                                  |
| Wt. Dry Soil & Pan (                                         | g)                                                          | 73.31                                   | Weight of -                                 | - #10              |                                         |
| Wt. Lost Moisture (g                                         | g)                                                          | 0.69                                    | Wet                                         | (g)                | 567.87                                  |
| Wt. of Pan Only (g                                           | )                                                           | 3.13                                    | Weight of -                                 | - #10              |                                         |
| Wt. of Dry Soil (g)                                          |                                                             | 70.18                                   | Dry                                         | (g)                | 585.94                                  |
| Moisture Content %                                           |                                                             | 1.0                                     | Wt. Total S                                 | Sample             |                                         |
|                                                              |                                                             |                                         | Dry                                         | (g)                | 1093.02                                 |
| Wt. Hydrom. Sample                                           | Wet (g)                                                     | 71.67                                   | Calc. Wt. "                                 | W' (g)             | 132.39                                  |
| Wt. Hydrom. Sample                                           | Dry (g)                                                     | 70.97                                   | Calc. Mass                                  | s + #10            | 61.42                                   |
|                                                              |                                                             |                                         |                                             |                    |                                         |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | VVt.    | Wt.     | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 13.47     | 13.47   | 13.47   | 1.2     | 98.8   |
| 3/8"   | 0.00   | 124.78    | 124.78  | 138.25  | 12.6    | 87.4   |
| #4     | 0.00   | 202.57    | 202.57  | 340.82  | 31.2    | 68.8   |
| #10    | 0.00   | 166.26    | 166.26  | 507.08  | 46.4    | 53.6   |
|        |        |           |         |         |         |        |
| #20    | 3.05   | 16.65     | 13.59   | 13.59   | 56.7    | 43.3   |
| #40    | 3.19   | 20.53     | 17.33   | 30.92   | 69.8    | 30.2   |
| #60    | 2.99   | 13.21     | 10.22   | 41.14   | 77.5    | 22.5   |
| #100   | 3.05   | 7.42      | 4.37    | 45.52   | 80.8    | 19.2   |
| #200   | 3 24   | 6 24      | 3.00    | 48.51   | 83.0    | 17.0   |

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Date: 11/07/2012 Date: 11/7/12



| CLIENT                                                                                         | LATA Kentu               | ucky                                                                                        | JOB NO.                                                 | 2855-6                             |                                         |
|------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------|-----------------------------------------|
| BORING NO<br>DEPTH<br>SAMPLE NO<br>SOIL DESCR<br>LOCATION                                      | ).<br>).<br>R.           | 211-B-004<br>21.1-23.5'<br>211B004GRNSZ2<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEVE            | TED<br>VE                          | 10/11/12 KD<br>11/5/12 SKL<br>Yes<br>No |
| Hydrometer :<br>Sp. Gr. of So<br>Value of "alp<br>Deflocculant<br>Defloc. Corr'<br>Meniscus Co | #<br>bil<br>ha"<br>prr'n | ASTM 152 H<br>2.65<br>1.00<br>Sodium Hexametaphosphate<br>5.0<br>0.0                        | Temp., Deg<br>Temp. Coe<br>Wt. Dry Sar<br>% of Total \$ | g. C<br>f. K<br>mple "W"<br>Sample | 22.7<br>0.01322<br>132.394<br>100.0     |

| Т       |            |           |         |        |           |          |
|---------|------------|-----------|---------|--------|-----------|----------|
| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | Ĺ         | (mm)     |
| 0.0     |            |           |         |        |           |          |
| 0.5     | 25.00      | 20.00     | 15.1    | 15.1   | 12.19     | 0.0653   |
| 1.0     | 23.50      | 18.50     | 14.0    | 14.0   | 12.44     | 0.0466   |
| 2.0     | 23.00      | 18.00     | 13.6    | 13.6   | 12.52     | 0.0331   |
| 5.0     | 22.00      | 17.00     | 12.8    | 12.8   | 12.68     | 0.0210   |
| 15.0    | 19.50      | 14.50     | 11.0    | 11.0   | 13.09     | 0.0123   |
| 30.0    | 18.00      | 13.00     | 9.8     | 9.8    | 13.34     | 0.0088   |
| 60.0    | 17.00      | 12.00     | 9.1     | 9.1    | 13.50     | 0.0063   |
| 120.0   | 16.00      | 11.00     | 8.3     | 8.3    | 13.67     | 0.0045   |
| 250.0   | 15.50      | 10.50     | 7.9     | 7.9    | 13.75     | 0.0031   |
| 1440.0  | 15.00      | 10.00     | 7.6     | 7.6    | 13.83     | 0.0013   |

Grain Diameter = K\*(SQRT(L/T))

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Date: 11/7/2012 Date: 11/7/12





| CLIENT LATA Kentucky                                         |                                                                          |                            | JOB NO.                                      | 2855-6                  |                                         |
|--------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------|----------------------------------------------|-------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-004<br>36-38'<br>211B004GRNSZ3<br>ERI12-SW-SWMU<br>SW Plume RDSI 0 | 3<br>J211B<br>Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEVE | TED<br>VE<br>E          | 10/11/12 KD<br>11/5/12 SKL<br>Yes<br>No |
| MOISTURE DATA                                                |                                                                          |                            | WASH SIE                                     | VE ANALYSI              | S                                       |
| HYGROSCOPIC                                                  | Yes                                                                      |                            | Wt. Total S<br>Wet (                         | ample<br>(g)            | 1104.43                                 |
| NATURAL                                                      | No                                                                       |                            | Weight of +<br>Before Was<br>Weight of +     | #10<br>shing (g)<br>#10 | 3.63                                    |
| Wt. Wet Soil & Pan (g)<br>Wt. Dry Soil & Pan (g)             |                                                                          | 78.44<br>77.30             | After Wash<br>Weight of -                    | ing (g)<br>#10          | 3.41                                    |
| Wt. Lost Moisture (g)<br>Wt. of Pan Only (g)                 |                                                                          | 1.14<br>3.07               | Wet (<br>Weight of -                         | (g)<br>#10              | 1100.80                                 |
| Wt. of Dry Soil (g)<br>Moisture Content %                    |                                                                          | 74.23                      | Dry (<br>Wt. Total S                         | g)<br>ample             | 1084.37                                 |
|                                                              |                                                                          |                            | Dry (                                        | g)                      | 1087.78                                 |
| Wt. Hydrom. Sample W                                         | /et (g)                                                                  | 62.93                      | Calc. Wt. "                                  | №' (g)                  | 62.18                                   |
| w. Hydroni. Sample D                                         | (9)                                                                      | 01.00                      | Calc. Widss                                  | + #10                   | 0.19                                    |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | Wt.     | Wt.     | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/8"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #4     | 0.00   | 1.45      | 1.45    | 1.45    | 0.1     | 99.9   |
| #10    | 0.00   | 1.96      | 1.96    | 3.41    | 0.3     | 99.7   |
|        |        |           |         |         |         |        |
| #20    | 2.99   | 3.32      | 0.33    | 0.33    | 0.8     | 99.2   |
| #40    | 3.01   | 4.82      | 1.81    | 2.14    | 3.8     | 96.2   |
| #60    | 3.10   | 7.97      | 4.87    | 7.01    | 11.6    | 88.4   |
| #100   | 2.98   | 9.11      | 6.12    | 13.13   | 21.4    | 78.6   |
| #200   | 2.97   | 7.89      | 4.91    | 18.04   | 29.3    | 70.7   |

Data entered by: MLM Data checked by: MLM FileName: LKHY04Z3

Date: 11/07/2012 Date: 11/7/12



| CLIENT LATA K                                                                                            | entucky                                                                                 | JOB NO. 2855-6                                                            |                                         |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION                                             | 211-B-004<br>36-38'<br>211B004GRNSZ3<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE                         | 10/11/12 KD<br>11/5/12 SKL<br>Yes<br>No |
| Hydrometer #<br>Sp. Gr. of Soil<br>Value of "alpha"<br>Deflocculant<br>Defloc. Corr'n<br>Meniscus Corr'n | ASTM 152 H<br>2.65<br>1.00<br>Sodium Hexametaphosphate<br>5.0<br>0.0                    | Temp., Deg. C<br>Temp. Coef. K<br>Wt. Dry Sample "W"<br>% of Total Sample | 22.7<br>0.01322<br>62.176<br>100.0      |

| т       |            |           |         |        | 1942      |          |
|---------|------------|-----------|---------|--------|-----------|----------|
| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | L         | (mm)     |
| 0.0     |            |           |         | -      |           |          |
| 0.5     | 47.00      | 42.00     | 67.6    | 67.6   | 8.58      | 0.0548   |
| 1.0     | 44.00      | 39.00     | 62.7    | 62.7   | 9.07      | 0.0398   |
| 2.0     | 42.00      | 37.00     | 59.5    | 59.5   | 9.40      | 0.0287   |
| 5.0     | 38.00      | 33.00     | 53.1    | 53.1   | 10.06     | 0.0187   |
| 15.0    | 31.50      | 26.50     | 42.6    | 42.6   | 11.12     | 0.0114   |
| 30.0    | 26.75      | 21.75     | 35.0    | 35.0   | 11.90     | 0.0083   |
| 60.0    | 24.00      | 19.00     | 30.6    | 30.6   | 12.35     | 0.0060   |
| 120.0   | 22.00      | 17.00     | 27.3    | 27.3   | 12.68     | 0.0043   |
| 250.0   | 20.00      | 15.00     | 24.1    | 24.1   | 13.01     | 0.0030   |
| 1440.0  | 17.00      | 12.00     | 19.3    | 19.3   | 13.50     | 0.0013   |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: MLM Data checked by:\_\_\_\_\_ FileName: LKHY04Z3 Date: 11/07/2012 Date:\_\_\_\_\_





| CLIENT LATA Kentucky                                         |                                                                | JOB NO.                                | 2855-6                                       |                    |                                        |
|--------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------|----------------------------------------------|--------------------|----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-001<br>8.0-10.0'<br>211B001GF<br>ERI12-SW-<br>SW Plume I | RNSZ1<br>SWMU211B<br>RDSI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEVE | TED<br>VE<br>E     | 10/9/12 MK<br>11/8/12 SKL<br>Yes<br>No |
| MOISTURE DATA                                                |                                                                |                                        | WASH SIE                                     | VE ANALY           | SIS                                    |
| HYGROSCOPIC                                                  | Yes                                                            |                                        | Wt. Total S                                  | ample              | 102 70                                 |
| NATURAL                                                      | No                                                             |                                        | Weight of +                                  | (g)<br>+ #10       | 103.70                                 |
|                                                              |                                                                |                                        | Before Wa<br>Weight of H                     | shing (g)<br>⊦ #10 | 0.00                                   |
| Wt. Wet Soil & Pan                                           | (g)                                                            | 36.85                                  | After Wash                                   | ning (g)           | 0.00                                   |
| Wt. Dry Soil & Pan (                                         | g)                                                             | 36.27                                  | Weight of -                                  | #10                |                                        |
| Wt. Lost Moisture (g                                         | g)                                                             | 0.58                                   | Wet                                          | (g)                | 103.70                                 |
| Wt. of Pan Only (g                                           | )                                                              | 3.02                                   | Weight of -                                  | #10                |                                        |
| Wt. of Dry Soil (g)                                          |                                                                | 33.25                                  | Dry (                                        | g)                 | 101.92                                 |
| Moisture Content %                                           |                                                                | 1.7                                    | Wt. Total S                                  | ample              |                                        |
|                                                              |                                                                |                                        | Dry (                                        | g)                 | 101.92                                 |
| Wt. Hydrom. Sample                                           | Wet (g)                                                        | 69.89                                  | Calc. Wt. "                                  | W" (g)             | 68.69                                  |
| Wt. Hydrom. Sample                                           | Dry (g)                                                        | 68.69                                  | Calc. Mass                                   | + #10              | 0.00                                   |
|                                                              |                                                                |                                        |                                              |                    |                                        |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | VVt.    | VVt.    | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/8"   | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #4     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| #10    | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
|        |        |           |         |         |         |        |
| #20    | 2.98   | 3.01      | 0.03    | 0.03    | 0.0     | 100.0  |
| #40    | 3.13   | 3.33      | 0.20    | 0.24    | 0.3     | 99.7   |
| #60    | 3.04   | 3.97      | 0.93    | 1.16    | 1.7     | 98.3   |
| #100   | 2.98   | 4.62      | 1.64    | 2.80    | 4.1     | 95.9   |
| #200   | 3.04   | 4.07      | 1.03    | 3.83    | 5.6     | 94.4   |

Data entered by: MLM Data checked by: All FileName: LKHY01Z1 Date: 11/12/2012 Date: 11/12/12



| CLIENT L            | ATA Kentucky             | JOB NO. 2855-6         |                           |
|---------------------|--------------------------|------------------------|---------------------------|
| BORING NO.<br>DEPTH | 211-B-001<br>8.0-10.0'   | SAMPLED<br>DATE TESTED | 10/9/12 MK<br>11/8/12 SKL |
| SAMPLE NO.          | 211B001GRNSZ1            | WASH SIEVE             | Yes                       |
| SOIL DESCR.         | ERI12-SW-SWMU211B        | DRY SIEVE              | No                        |
| LOCATION            | SW Plume RDSI Geotechnic | cal                    |                           |
|                     |                          |                        | 3                         |
| Hydrometer #        | ASTM 152 H               | Temp., Deg. C          | 22.7                      |
| Sp. Gr. of Soil     | 2.65                     | Temp. Coef. K          | 0.01322                   |
| Value of "alph      | a" 1.00                  | Wt. Dry Sample "W"     | 68.687                    |
| Deflocculant        | Sodium Hexametaphosphate | % of Total Sample      | 100.0                     |
| Defloc. Corr'n      | 5.0                      |                        |                           |
| Meniscus Corr       | ťn 0.0                   |                        |                           |

#### Т

| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
|---------|------------|-----------|---------|--------|-----------|----------|
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | L         | (mm)     |
| 0.0     |            |           |         |        |           |          |
| 0.5     |            |           |         |        |           |          |
| 1.0     | 59.00      | 54.00     | 78.6    | 78.6   | 6.61      | 0.0340   |
| 2.0     | 54.00      | 49.00     | 71.3    | 71.3   | 7.43      | 0.0255   |
| 5.0     | 44.00      | 39.00     | 56.8    | 56.8   | 9.07      | 0.0178   |
| 15.0    | 32.50      | 27.50     | 40.0    | 40.0   | 10.96     | 0.0113   |
| 30.0    | 27.00      | 22.00     | 32.0    | 32.0   | 11.86     | 0.0083   |
| 60.0    | 24.00      | 19.00     | 27.7    | 27.7   | 12.35     | 0.0060   |
| 120.0   | 21.75      | 16.75     | 24.4    | 24.4   | 12.72     | 0.0043   |
| 250.0   | 20.00      | 15.00     | 21.8    | 21.8   | 13.01     | 0.0030   |
| 1440.0  | 18.00      | 13.00     | 18.9    | 18.9   | 13.34     | 0.0013   |

Grain Diameter = K\*(SQRT(L/T))

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Date: 11/12/2012 Date: 11/12/2012





| CLIENT LATA Ken                                              | tucky                                                                  |                                 | JOB NO.                                     | 2855-6             |                                        |
|--------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------|---------------------------------------------|--------------------|----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-001<br>18.0-20.0'<br>211B001GRNS<br>ERI12-SW-SWI<br>SW Plume RDS | Z2<br>MU211B<br>SI Geotechnical | SAMPLED<br>DATE TES<br>WASH SIE<br>DRY SIEV | STED<br>SVE<br>E   | 10/9/12 MK<br>11/8/12 SKL<br>Yes<br>No |
|                                                              | 19.0                                                                   | 8                               |                                             |                    | 5.0                                    |
| MOISTURE DATA                                                |                                                                        |                                 | WASH SIE                                    | VE ANALYS          | SIS                                    |
| HYGROSCOPIC                                                  | Yes                                                                    |                                 | Wt. Total S                                 | Sample             | 1093 47                                |
| NATURAL                                                      | No                                                                     |                                 | Weight of                                   | + #10              | 1055.47                                |
|                                                              |                                                                        |                                 | Before Wa<br>Weight of                      | shing (g)<br>+ #10 | 545.18                                 |
| Wt. Wet Soil & Pan (g                                        | )                                                                      | 35.10                           | After Wash                                  | ning (g)           | 493.40                                 |
| Wt. Dry Soll & Pan (g)                                       |                                                                        | 34.56                           | vveight of -                                | #10                | E 49 20                                |
| Wt. Lost Moisture (g)                                        |                                                                        | 3.00                            | Weight of                                   | (g)<br>#10         | 546.29                                 |
| Wt of Dry Soil (g)                                           |                                                                        | 31.56                           | Dry                                         | (a)                | 589 98                                 |
| Moisture Content %                                           |                                                                        | 17                              | Wt Total S                                  | Sample             | 505.50                                 |
|                                                              |                                                                        |                                 | Dry (                                       | (g)                | 1083.38                                |
| Wt. Hydrom. Sample V                                         | Vet (g)                                                                | 90.81                           | Calc. Wt. "                                 | W" (g)             | 163.96                                 |
| Wt. Hydrom. Sample D                                         | )ry (g)                                                                | 89.29                           | Calc. Mass                                  | s + #10            | 74.67                                  |
|                                                              |                                                                        |                                 |                                             |                    |                                        |

| Sieve  | Pan    | Indiv.    | Indiv.  | Cum.    | Cum.    | %      |
|--------|--------|-----------|---------|---------|---------|--------|
| Number | Weight | Wt. + Pan | WVt.    | WVt.    | %       | Finer  |
| (Size) | (g)    | (g)       | Retain. | Retain. | Retain. | By Wt. |
| 3"     | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 1 1/2" | 0.00   | 0.00      | 0.00    | 0.00    | 0.0     | 100.0  |
| 3/4"   | 0.00   | 24.39     | 24.39   | 24.39   | 2.3     | 97.7   |
| 3/8"   | 0.00   | 170.78    | 170.78  | 195.17  | 18.0    | 82.0   |
| #4     | 0.00   | 176.89    | 176.89  | 372.06  | 34.3    | 65.7   |
| #10    | 0.00   | 121.34    | 121.34  | 493.40  | 45.5    | 54.5   |
|        |        |           |         |         |         |        |
| #20    | 3.21   | 15.52     | 12.31   | 12.31   | 53.0    | 47.0   |
| #40    | 3.04   | 18.65     | 15.60   | 27.91   | 62.6    | 37.4   |
| #60    | 3.04   | 16.91     | 13.87   | 41.78   | 71.0    | 29.0   |
| #100   | 3.03   | 8.86      | 5.83    | 47.61   | 74.6    | 25.4   |
| #200   | 3.00   | 5.70      | 2.70    | 50.31   | 76.2    | 23.8   |

Data entered by: MLM Data checked by: FileName: LKHY01Z2

Date: 11/12/2012 Date: 11/12/2012



| CLIENT LAT                                                            | A Kentucky                                                                                  | JOB NO. 2855-6                                    |                                        |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION          | 211-B-001<br>18.0-20.0'<br>211B001GRNSZ2<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE | 10/9/12 MK<br>11/8/12 SKL<br>Yes<br>No |
| Hydrometer #<br>Sp. Gr. of Soil                                       | ASTM 152 H<br>2 65                                                                          | Temp., Deg. C<br>Temp. Coef. K                    | 22.6<br>0.01323                        |
| Value of "alpha"<br>Deflocculant<br>Defloc. Corr'n<br>Meniscus Corr'n | 1.00<br>Sodium Hexametaphosphate<br>5.0<br>0.0                                              | Wt. Dry Sample "W"<br>% of Total Sample           | 163.957<br>100.0                       |

## Т

| Elapsed | Hydrometer | Reading   |         | %      | Effective | Grain    |
|---------|------------|-----------|---------|--------|-----------|----------|
| Time    | Original   | Corrected |         | Total  | Depth     | Diameter |
| (min)   |            | "R"       | 100Ra/W | Sample | L         | (mm)     |
| 0.0     |            |           |         | -      |           |          |
| 0.5     |            |           |         | -      |           |          |
| 1.0     | 42.75      | 37.75     | 23.0    | 23.0   | 9.28      | 0.0403   |
| 2.0     | 40.50      | 35.50     | 21.7    | 21.7   | 9.65      | 0.0291   |
| 5.0     | 38.00      | 33.00     | 20.1    | 20.1   | 10.06     | 0.0188   |
| 15.0    | 34.00      | 29.00     | 17.7    | 17.7   | 10.71     | 0.0112   |
| 30.0    | 32.00      | 27.00     | 16.5    | 16.5   | 11.04     | 0.0080   |
| 60.0    | 31.00      | 26.00     | 15.9    | 15.9   | 11.21     | 0.0057   |
| 120.0   | 29.50      | 24.50     | 14.9    | 14.9   | 11.45     | 0.0041   |
| 250.0   | 28.00      | 23.00     | 14.0    | 14.0   | 11.70     | 0.0029   |
| 1440.0  | 27.00      | 22.00     | 13.4    | 13.4   | 11.86     | 0.0012   |

Grain Diameter = K\*(SQRT(L/T))

Data entered by: MLM Data checked by: Chillename: LKHY01Z2 Date: 11/12/2012 Date: 11/12/2012





F-108

| CLIENT LATA Kent                                             | tucky                                                                                       |      | JOB NO.                                           | 2855-6             |                                        |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------|------|---------------------------------------------------|--------------------|----------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>SOIL DESCR.<br>LOCATION | 211-B-001<br>38.0-40.0'<br>211B001GRNSZ3<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical |      | SAMPLED<br>DATE TESTED<br>WASH SIEVE<br>DRY SIEVE |                    | 10/9/12 MK<br>11/5/12 SKL<br>Yes<br>No |
| MOISTURE DATA                                                |                                                                                             |      | WASH SIE                                          | VE ANALYS          | SIS                                    |
| HYGROSCOPIC                                                  | Yes                                                                                         |      | Wt. Total S                                       | ample              | 1383 18                                |
| NATURAL                                                      | No                                                                                          |      | Weight of H                                       | + #10              | 1303.10                                |
|                                                              |                                                                                             |      | Before Wa<br>Weight of +                          | shing (g)<br>- #10 | 18.17                                  |
| Wt. Wet Soil & Pan (g)                                       | 5                                                                                           | 8.82 | After Wash                                        | ing (g)            | 16.14                                  |
| Wt. Dry Soil & Pan (g)                                       | 5                                                                                           | 8.15 | Weight of -                                       | #10                |                                        |
| Wt. Lost Moisture (g)                                        |                                                                                             | 0.67 | Wet                                               | (g)                | 1365.01                                |
| Wt. of Pan Only (g)                                          |                                                                                             | 3.07 | Weight of -                                       | #10                |                                        |
| Wt. of Dry Soil (g)                                          | 5                                                                                           | 5.08 | Dry (                                             | g)                 | 1350.61                                |
| Moisture Content %                                           |                                                                                             | 1.2  | Wt. Total S                                       | ample              |                                        |
|                                                              |                                                                                             |      | Dry (                                             | (g)                | 1366.75                                |
| Wt. Hydrom. Sample W                                         | /et (g) 6                                                                                   | 4.25 | Calc. Wt. "                                       | W'' (g)            | 64.24                                  |
| Wt. Hydrom. Sample D                                         | ry (g) 6                                                                                    | 3.48 | Calc. Mass                                        | s + #10            | 0.76                                   |

| Sieve  | Pan  | Indiv. | Indiv.  | Cum.    | Cum.    | %<br>Eiper |
|--------|------|--------|---------|---------|---------|------------|
| (Size) | (g)  | (g)    | Retain. | Retain. | Retain. | By Wt.     |
| 3"     | 0.00 | 0.00   | 0.00    | 0.00    | 0.0     | 100.0      |
| 1 1/2" | 0.00 | 0.00   | 0.00    | 0.00    | 0.0     | 100.0      |
| 3/4"   | 0.00 | 0.00   | 0.00    | 0.00    | 0.0     | 100.0      |
| 3/8"   | 0.00 | 0.00   | 0.00    | 0.00    | 0.0     | 100.0      |
| #4     | 0.00 | 7.63   | 7.63    | 7.63    | 0.6     | 99.4       |
| #10    | 0.00 | 8.51   | 8.51    | 16.14   | 1.2     | 98.8       |
|        |      |        |         |         |         |            |
| #20    | 3.08 | 3.85   | 0.77    | 0.77    | 2.4     | 97.6       |
| #40    | 3.05 | 6.59   | 3.54    | 4.31    | 7.9     | 92.1       |
| #60    | 3.02 | 9.23   | 6.21    | 10.52   | 17.6    | 82.4       |
| #100   | 3.02 | 12.10  | 9.09    | 19.61   | 31.7    | 68.3       |
| #200   | 3.08 | 10.36  | 7.29    | 26.89   | 43.0    | 57.0       |

Data entered by: MLM Data checked by: JU FileName: LKHY01Z3

Date: 11/07/2012 Date: 11/7/12



| CLIENT                                                                                      | LATA Kentu                            | ucky                                                             |                                 |                      | JOB NO.                                                 | 2855-6                           |                                        |
|---------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------|---------------------------------|----------------------|---------------------------------------------------------|----------------------------------|----------------------------------------|
| BORING NO<br>DEPTH<br>SAMPLE NO<br>SOIL DESC<br>LOCATION                                    | D.<br>D.<br>R.                        | 211-B-001<br>38.0-40.0'<br>211B001GR<br>ERI12-SW-S<br>SW Plume R | NSZ3<br>WMU211B<br>RDSI Geotech | nical                | SAMPLED<br>DATE TEST<br>WASH SIEV<br>DRY SIEVE          | red<br>/e                        | 10/9/12 MK<br>11/5/12 SKL<br>Yes<br>No |
| Hydrometer<br>Sp. Gr. of So<br>Value of "alp<br>Deflocculant<br>Defloc. Corr<br>Meniscus Co | #<br>oil<br>oha''<br>t<br>ín<br>orr'n | ASTM 152 H<br>2.65<br>1.00<br>Sodium Hex<br>5.0<br>0.0           | l<br>ametaphosph                | nate                 | Temp., Deg<br>Temp. Coef<br>Wt. Dry San<br>% of Total S | . C<br>. K<br>nple "W"<br>Sample | 22.6<br>0.01323<br>64.239<br>100.0     |
| T<br>Elapsed<br>Time<br>(min)                                                               | Hydrometer<br>Original                | Reading<br>Corrected<br>"R"                                      | 100Ra/W                         | %<br>Total<br>Sample | Effective<br>Depth<br>L                                 | Grain<br>Diameter<br>(mm)        |                                        |
| 0.0                                                                                         |                                       |                                                                  |                                 |                      |                                                         |                                  | •                                      |
| 0.5                                                                                         | 38.00                                 | 33.00                                                            | 51.4                            | 51.4                 | 10.06                                                   | 0.0593                           |                                        |
| 1.0                                                                                         | 36.50                                 | 31.50                                                            | 49.0                            | 49.0                 | 10.30                                                   | 0.0425                           |                                        |
| 2.0                                                                                         | 35.00                                 | 30.00                                                            | 46.7                            | 46.7                 | 10.55                                                   | 0.0304                           |                                        |
| 5.0                                                                                         | 31.00                                 | 26.00                                                            | 40.5                            | 40.5                 | 11.21                                                   | 0.0198                           |                                        |
| 15 0                                                                                        | 26 75                                 | 21 75                                                            | 220                             | 22.0                 | 11 00                                                   | 0.0119                           |                                        |

40.5 33.9

28.8

24.9

21.8

19.5

15.6

33.9

28.8 12.44

24.9 12.85

21.8 13.17

19.5 13.42

15.6 13.83

11.90

Grain Diameter = K\*(SQRT(L/T))

15.0

30.0

60.0 120.0

250.0

1440.0

26.75

23.50

21.00

19.00

15.00

17.50

21.75

18.50

16.00

14.00

12.50

10.00

Data entered by: Data checked by: FileName: LKHY01Z3 MLM

11/07/2012 Date: Date: 11



0.0118

0.0085

0.0061

0.0044

0.0031

0.0013



Classification: Classification Not Performed

Permeability Tests

# ASTM D5084-10

Advanced Terra Testing

## PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT LAT     | A Environmental Services of Ky | JOB NO. 2855-06 |                  |
|----------------|--------------------------------|-----------------|------------------|
| BORING NO.     | 211-B-001                      | SAMPLED         | 10/09/12 KD      |
| DEPTH          | 32.0-37.0' C                   | TEST STARTED    | 11/21/12 CAL     |
| SAMPLE NO.     | 211B001PERM3                   | TEST FINISHED   | 12/02/12 CAL     |
| SOIL DESCR.    | ERI12-SW-SWMU211B              | CELL NUMBER     | 7P               |
| LOCATION       | SW Plume RDSI Geotechnical     | SATURATED TEST  | Yes              |
| CONF. PRES. PS | SF 4658                        | TEST TYPE       | TX/Pbp/Tap Water |

| MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------|---------|---------|--------|
| DATA                       | TEST    | TEST    |        |
| Wt. Soil + Moisture (g)    | 211.1   | 206.3   |        |
| Wt. Wet Soil & Pan (g)     | 217.6   | 212.8   |        |
| Wt. Dry Soil & Pan (g)     | 182.3   | 182.3   |        |
| Wt. Lost Moisture (g)      | 35.3    | 30.5    |        |
| Wt. of Pan Only (g)        | 6.5     | 6.5     |        |
| Wt. of Dry Soil (g)        | 175.8   | 175.8   |        |
| Moisture Content %         | 20.1    | 17.4    |        |
| Wet Density PCF            | 130.2   | 136.9   |        |
| Dry Density PCF            | 108.4   | 116.6   |        |
| Init. Diameter (in)        | 1.613   | (cm)    | 4.097  |
| Init. Area (sq in)         | 2.043   | (sq cm) | 13.184 |
| Init. Height (in)          | 3.022   | (cm)    | 7.676  |
| Vol. Bef. Consol. (cu ft)  | 0.00357 |         |        |
| Vol. After Consol. (cu ft) | 0.00332 |         |        |
| Porosity %                 | 32.41   |         |        |
|                            |         |         |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 5        |
|-------------------------------|----------|
| Velocity CM/Sec               | 3.29E-05 |
| Q (cc/s)                      | 1.05E-06 |
| Height                        | 2.984    |
| Diameter                      | 1.565    |
| Pressure (psi)                | 4.740    |
| Area after consol. (cm*cm)    | 12.415   |
| Gradient                      | 43.969   |
| Permeability k (cm/s)         | 1.9E-09  |
| Permeability k (m/s)          | 1.9E-11  |
| Back Pressure (psi)           | 68.0     |
| Cell Pressure (psi)           | 100.3    |
| Ave. Effective Stress (psi)   | 29.930   |
| Average temperature degree C: | 22.4     |

| Data entry by:     | MLM        | Date: |  |
|--------------------|------------|-------|--|
| Checked by: 04-    | Date:12/4/ | 12    |  |
| FileName: LKP00013 |            |       |  |

12/04/2012



# TRIAXAL COMPRESSION TEST DATA

| CLIENT    | LATA Env | ironmental Services of Ky  | JOB NO.   | 2855-06 |                  |
|-----------|----------|----------------------------|-----------|---------|------------------|
| BORING N  | 0.       | 211-B-001                  | SAMPLED   | í       | 10/09/12 KD      |
| DEPTH     |          | 32.0-37.0' C               | TEST STA  | RTED    | 11/21/12 CAL     |
| SAMPLE N  | 0.       | 211B001PERM3               | TEST FINI | SHED    | 12/02/12 CAL     |
| SOIL DESC | CR.      | ERI12-SW-SWMU211B          | SETUP NO  | D.      | 7P               |
| LOCATION  | i        | SW Plume RDSI Geotechnical | SATURAT   | ED TEST | Yes              |
| CONF. PR  | ES. PSF  | 4658                       | TEST TYP  | ΡE      | TX/Pbp/Tap Water |
|           |          |                            |           |         | *                |

## SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | С    | hange | в    |
|------------------------|------------------------|----------------------------|------|---------------------------|------|-------|------|
|                        |                        | Close                      | Open | Close                     | Open |       |      |
| 40.0                   | 38.0                   | 1.5                        | 10.2 |                           |      |       |      |
| 50.0                   | 48.0                   | 14.4                       | 15.4 | 38.5                      | 47.8 | 9.3   | 0.93 |
| 60.0                   | 58.0                   | 16.2                       | 17.1 | 48.5                      | 57.9 | 9.4   | 0.94 |
| 70.0                   | 68.0                   | 17.3                       | 18.2 | 58.5                      | 67.8 | 9.3   | 0.93 |
| 80.0                   |                        | 18.9                       | 18.9 | 68.1                      | 77.9 | 9.8   | 0.98 |

## CONSOLIDATION DATA

| Elapsed | SQRT  | Burette        | Volume<br>Defl |
|---------|-------|----------------|----------------|
| (Min)   | (Min) | (CC)           | (cc)           |
| 0.00    | 0.00  | 0.30           | 0.00           |
| 0.25    | 0.50  | 3.00           | -2.70          |
| 0.5     | 0.71  | 3.10           | -2.80          |
| 1       | 1.00  | 3.15           | -2.85          |
| 2       | 1.41  | 3.20           | -2.90          |
| 4       | 2.00  | 3.30           | -3.00          |
| 9       | 3.00  | 3.50           | -3.20          |
| 16      | 4.00  | 3.70           | -3.40          |
| 30      | 5.48  | 3.90           | -3.60          |
| 60      | 7.75  | 4.50           | -4.20          |
| 138     | 11.75 | 5.30           | -5.00          |
| 240     | 15.49 | 6.10           | -5.80          |
| 360     | 18.97 | 6.80           | -6.50          |
|         | 3.022 | Init. Vol. (CC | 2)             |
|         | 0.038 | Vol. Change    | (CC)           |
|         | 2.984 | Cell Exp. (C   | (C)            |

| Initial Height (in)      |  |
|--------------------------|--|
| Height Change (in)       |  |
| Ht. After Cons. (in)     |  |
| Initial Area (sq in)     |  |
| Area After Cons. (sq in) |  |

| Vol. Change (CC) |
|------------------|
| Cell Exp. (CC)   |
| Net Change (CC)  |
| Cons. Vol. (CC)  |
|                  |



101.21

| Data entry by:     | MLM Date:     |
|--------------------|---------------|
| Checked by:        | Date: 12/4/12 |
| FileName: LKP00013 |               |

12/04/2012

2.043

1.924



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Client LATTA ENV. SERVICES of KY Job No. 2855-06 Boring No. 211-8-001 Boring No. 211-B-001 Depth 35-37 C Sample No. 211BOOI PERM 3 Project SW Plume ROSI Geotechnical Sampled 1019 / 12 by KD Prepped 11 / 21 / 12 by CHE Project No. ERI 12-SW-SWMUZIIB Tx/Pbp T3 4658 psf LK2855/LKDP0013 12/03/12

#### PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT    | LATA Envi | ronmental Services of KY   | JOB NO.    | 2855-06 |                  |
|-----------|-----------|----------------------------|------------|---------|------------------|
| BORING N  | Ο.        | 211-B-001                  | SAMPLED    |         | 10/09/12 KD      |
| DEPTH     |           | 5.0-7.0' B                 | TEST STAR  | RTED    | 11/14/12 CAL     |
| SAMPLE N  | ю.        | 211B001PERM1               | TEST FINIS | SHED    | 11/28/12 CAL     |
| SOIL DESC | CR.       | ERI12-SW-SWMU211B          | CELL NUM   | IBER    | 9P               |
| LOCATION  | 1         | SW Plume RDSI Geotechnical | SATURATE   | ED TEST | Yes              |
| CONF. PR  | ES. PSF   | 776                        | TEST TYPE  | E       | TX/Pbp/Tap Water |

| MOISTURE/DENSITY<br>DATA   | BEFORE<br>TEST | AFTER<br>TEST |        |
|----------------------------|----------------|---------------|--------|
| Wt. Soil + Moisture (g)    | 229.1          | 229.1         |        |
| Wt. Wet Soil & Pan (g)     | 235.6          | 235.6         |        |
| Wt. Dry Soil & Pan (g)     | 194.8          | 194.8         |        |
| Wt. Lost Moisture (g)      | 40.8           | 40.8          |        |
| Wt. of Pan Only (g)        | 6.5            | 6.5           |        |
| Wt. of Dry Soil (g)        | 188.3          | 188.3         |        |
| Moisture Content %         | 21.7           | 21.7          |        |
| Wet Density PCF            | 127.6          | 124.2         |        |
| Dry Density PCF            | 104.8          | 102.1         |        |
| Init. Diameter (in)        | 1.654          | (cm)          | 4.201  |
| Init. Area (sq in)         | 2.149          | (sq cm)       | 13.863 |
| Init. Height (in)          | 3.184          | (cm)          | 8.087  |
| Vol. Bef. Consol. (cu ft)  | 0.00396        | (A., 1977)    |        |
| Vol. After Consol. (cu ft) | 0.00407        |               |        |
| Porosity %                 | 35.47          |               |        |

#### FLOW PUMP CALCULATIONS

| Pump Setting                  | 25       |
|-------------------------------|----------|
| Velocity CM/Sec               | 1.64E-04 |
| Q (cc/s)                      | 5.25E-06 |
| Height                        | 3.163    |
| Diameter                      | 1.682    |
| Pressure (psi)                | 1.160    |
| Area after consol. (cm*cm)    | 14.333   |
| Gradient                      | 10.151   |
| Permeability k (cm/s)         | 3.6E-08  |
| Permeability k (m/s)          | 3.6E-10  |
| Back Pressure (psi)           | 98.0     |
| Cell Pressure (psi)           | 103.4    |
| Ave. Effective Stress (psi)   | 4.820    |
| Average temperature degree C: | 22.5     |

## Average temperature degree C:

DAW Data entry by: Date: Checked by: \_\_\_\_\_\_ FileName: LKP00011 Date: 11/30/12

11/29/2012



#### TRIAXAL COMPRESSION TEST DATA

| CLIENT                | LATA Envir | onmental Services of KY           | JOB NO.    | 2855-06 |                             |
|-----------------------|------------|-----------------------------------|------------|---------|-----------------------------|
| BORING NO             | ).         | 211-B-001<br>5.0-7.0' B           | SAMPLED    | RTED    | 10/09/12 KD<br>11/14/12 CAL |
| SAMPLE NO             | ).<br>R.   | 211B001PERM1<br>ERI12-SW-SWMU211B | TEST FINIS | SHED    | 11/28/12 CAL<br>9P          |
| LOCATION<br>CONF. PRE | S. PSF     | SW Plume RDSI Geotechnical<br>776 | SATURATE   | ED TEST | Yes<br>TX/Pbp/Tap Water     |

#### SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) |       | Change | В |      |
|------------------------|------------------------|----------------------------|------|---------------------------|-------|--------|---|------|
|                        |                        | Close                      | Open | Close                     | Open  |        |   |      |
| 40.0                   | 38.0                   | 4.1                        | 9.3  |                           |       |        |   |      |
| 50.0                   | 48.0                   | 9.8                        | 11.0 | 38.7                      | 47.0  | 8.3    |   | 0.83 |
| 60.0                   | 58.0                   | 11.0                       | 11.9 | 48.8                      | 57.1  | 8.3    |   | 0.83 |
| 70.0                   | 68.0                   | 12.0                       | 12.9 | 58.6                      | 67.1  | 8.5    |   | 0.85 |
| 80.0                   | 78.0                   | 13.6                       | 14.4 | 68.7                      | 77.6  | 8.9    |   | 0.89 |
| 90.0                   | 88.0                   | 14.7                       | 15.5 | 78.7                      | 88.0  | 9.3    |   | 0.93 |
| 100.0                  | 98.0                   | 15.4                       | 16.2 | 88.7                      | 97.9  | 9.2    |   | 0.92 |
| 110.0                  |                        | 16.3                       | 16.4 | 98.7                      | 108.2 | 9.5    |   | 0.95 |

## CONSOLIDATION DATA

|                          | Elapsed | SQRT  | Burette Volu     | me    |
|--------------------------|---------|-------|------------------|-------|
|                          | Time    | Time  | Reading De       | π.    |
|                          | (Min)   | (Min) | (CC) (CC         | c)    |
|                          | 0.00    | 0.00  | 16.40            | 0.00  |
|                          | 0.25    | 0.50  | 16.70            | -0.30 |
|                          | 0.5     | 0.71  | 16.70            | -0.30 |
|                          | 1       | 1.00  | 16.75            | -0.35 |
|                          | 2       | 1.41  | 16.75            | -0.35 |
|                          | 4       | 2.00  | 16.80            | -0.40 |
|                          | 9       | 3.00  | 16.80            | -0.40 |
|                          | 16      | 4.00  | 16.85            | -0.45 |
|                          | 30      | 5.48  | 16.90            | -0.50 |
|                          | 60      | 7.75  | 16.95            | -0.55 |
|                          | 120     | 10.95 | 17.05            | -0.65 |
|                          | 240     | 15.49 | 17.05            | -0.65 |
|                          | 360     | 18.97 | 17.05            | -0.65 |
| Initial Height (in)      |         | 3.184 | Init, Vol. (CC)  |       |
| Height Change (in)       |         | 0.021 | Vol. Change (CC) |       |
| Ht. After Cons. (in)     |         | 3.163 | Cell Exp. (CC)   |       |
| Initial Area (sg in)     |         | 2.149 | Net Change (CC)  |       |
| Area After Cons. (sq in) |         | 2.222 | Cons. Vol. (CC)  |       |
|                          |         |       |                  |       |

| Data entry by:     | DAW   | Date:    |
|--------------------|-------|----------|
| Checked by: On     | Date: | 11/30/12 |
| FileName: LKP00011 |       | / .      |

11/29/2012



112.13 13.10 16.15

-3.05

115.18





Client LATA Environmental Services Job No. 2855-06 Boring No. 211-8-001 Depth 5.0-7.0' B Sample No. 2116001 PERM1 Project SW Plume RDST Gestechnical Sampled 10/ 9 / 12 by KD Prepped 11 / 14 / 12 by CL Project No. ERIIZ- SW-SWMUZIB Tx/Pbp 5 76psf LK2855/LKDP0011 129/12

## PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT    | LATA Enviro | nmental Services - KY      | JOB NO.    | 2855-06 |                  |
|-----------|-------------|----------------------------|------------|---------|------------------|
| BORING N  | 0.          | 211-B-001                  | SAMPLED    |         | 10/09/12 KD      |
| DEPTH     |             | 15-17' A                   | TEST STAP  | RTED    | 11/13/12 CAL     |
| SAMPLE N  | Ο.          | 211B001PERM2               | TEST FINIS | SHED    | 11/19/12 CAL     |
| SOIL DESC | R.          | ERI12-SW-SWMU211B          | CELL NUM   | BER     | 13S              |
| LOCATION  |             | SW Plume RDSI Geotechnical | SATURATE   | D TEST  | Yes              |
| CONF. PRE | ES. PSF     | 2070                       | TEST TYPE  | E       | TX/Pbp/Tap Water |

| BEFORE  | AFTER                                                                                                                                                 |                                                                                                                                                                                                                                                              |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TEST    | TEST                                                                                                                                                  |                                                                                                                                                                                                                                                              |
| 231.9   | 237.0                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 238.3   | 243.5                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 214.3   | 214.3                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 24.1    | 29.2                                                                                                                                                  |                                                                                                                                                                                                                                                              |
| 6.5     | 6.5                                                                                                                                                   |                                                                                                                                                                                                                                                              |
| 207.8   | 207.8                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 11.6    | 14.1                                                                                                                                                  |                                                                                                                                                                                                                                                              |
| 134.0   | 140.1                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 120.1   | 122.8                                                                                                                                                 |                                                                                                                                                                                                                                                              |
| 1.617   | (cm)                                                                                                                                                  | 4.107                                                                                                                                                                                                                                                        |
| 2.054   | (sq cm)                                                                                                                                               | 13.250                                                                                                                                                                                                                                                       |
| 3.210   | (cm)                                                                                                                                                  | 8.153                                                                                                                                                                                                                                                        |
| 0.00381 |                                                                                                                                                       |                                                                                                                                                                                                                                                              |
| 0.00373 |                                                                                                                                                       |                                                                                                                                                                                                                                                              |
| 27.66   |                                                                                                                                                       |                                                                                                                                                                                                                                                              |
|         | BEFORE<br>TEST<br>231.9<br>238.3<br>214.3<br>24.1<br>6.5<br>207.8<br>11.6<br>134.0<br>120.1<br>1.617<br>2.054<br>3.210<br>0.00381<br>0.00373<br>27.66 | BEFORE<br>TEST AFTER<br>TEST   231.9 237.0   238.3 243.5   214.3 214.3   24.1 29.2   6.5 6.5   207.8 207.8   11.6 14.1   134.0 140.1   120.1 122.8   1.617 (cm)   2.054 (sq cm)   3.210 (cm)   0.00381 0.00373   27.66 1000000000000000000000000000000000000 |

## FLOW PUMP CALCULATIONS

| Pump Setting (gear number)  | 9        |
|-----------------------------|----------|
| Percentage of Pump setting  | 100      |
| Q (cc/s)                    | 2.28E-04 |
| Height                      | 3.189    |
| Diameter                    | 1.604    |
| Pressure (psi)              | 0.716    |
| Area after consol. (cm*cm)  | 13.041   |
| Gradient                    | 6.215    |
| Permeability k (cm/s)       | 2.8E-06  |
| Permeability k (m/s)        | 2.8E-08  |
| Back Pressure (psi)         | 58.0     |
| Cell Pressure (psi)         | 72.4     |
| Ave. Effective Stress (psi) | 14.042   |

Average temperature degree C: 21.6 NOTE: Filling required on top, bottom and sides to fill gravel voids.

| Data entry by:     | DAW        | Date: | 11/26/2012 |
|--------------------|------------|-------|------------|
| Checked by:        | Date: ///z | 7/12  |            |
| FileName: LKP00012 | 1          |       |            |



## TRIAXAL COMPRESSION TEST DATA

| CLIENT     | LATA Envir | onmental Services - KY     | JOB NO. 2855-06 |                  |
|------------|------------|----------------------------|-----------------|------------------|
| BORING NO  | Q.         | 211-B-001                  | SAMPLED         | 10/09/12 KD      |
| DEPTH      |            | 15-17' A                   | TEST STARTED    | 11/13/12 CAL     |
| SAMPLE NO  | ).         | 211B001PERM2               | TEST FINISHED   | 11/19/12 CAL     |
| SOIL DESCR | τ.         | ERI12-SW-SWMU211B          | SETUP NO.       | 13S              |
| LOCATION   |            | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRES | S. PSF     | 2070                       | TEST TYPE       | TX/Pbp/Tap Water |

## SATURATION DATA

| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) | I    | Pore<br>Pressure<br>(PSI) | C    | hange | в    |
|------------------------|------------------------|----------------------------|------|---------------------------|------|-------|------|
| 40.0                   | 28.0                   | Close                      | Open | Close                     | Open |       |      |
| 40.0                   | 38.0                   | 11.7                       | 17.9 | 00 7                      | 10.1 |       | 0.77 |
| 50.0                   | 48.0                   | 18.6                       | 19.4 | 38.7                      | 46.4 | 1.1   | 0.77 |
| 60.0                   | 58.0                   | 19.5                       | 20.2 | 48.6                      | 56.9 | 8.3   | 0.83 |
| 70.0                   |                        | 20.3                       | 20.4 | 58.5                      | 68.0 | 9.5   | 0.95 |

## CONSOLIDATION DATA

|                          | Elapse<br>Time<br>(Min | ed<br>e<br>1) | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |        |
|--------------------------|------------------------|---------------|-----------------------|------------|----------------------------|-------------------------|--------|
|                          |                        | 0.00          | 0.00                  |            | 0.50                       | 0.00                    |        |
|                          |                        | 0.25          | 0.50                  |            | 1.80                       | -1.30                   |        |
|                          |                        | 0.5           | 0.71                  |            | 1.90                       | -1.40                   |        |
|                          |                        | 1             | 1.00                  |            | 2.20                       | -1.70                   |        |
|                          |                        | 2             | 1.41                  |            | 2.45                       | -1.95                   |        |
|                          |                        | 5             | 2.24                  |            | 2.90                       | -2.40                   |        |
|                          |                        | 9             | 3.00                  |            | 3.15                       | -2.65                   |        |
|                          |                        | 16            | 4.00                  |            | 3.20                       | -2.70                   |        |
|                          |                        | 30            | 5.48                  |            | 3.45                       | -2.95                   |        |
|                          |                        | 60            | 7.75                  |            | 3.60                       | -3.10                   |        |
|                          |                        | 120           | 10.95                 |            | 3.70                       | -3.20                   |        |
|                          |                        | 240           | 15.49                 |            | 3.70                       | -3.20                   |        |
|                          |                        | 360           | 18.97                 |            | 3.70                       | -3.20                   |        |
| Initial Height (in)      |                        |               | 3.210                 |            | Init. Vol. (C              | C)                      | 108.04 |
| Height Change (in)       |                        |               | 0.021                 |            | Vol. Change                | e (CC)                  | 12.20  |
| Ht. After Cons. (in)     |                        |               | 3.189                 |            | Cell Exp. (                | CC)                     | 9.81   |
| Initial Area (sg in)     |                        |               | 2.054                 |            | Net Change                 | (CC)                    | 2.39   |
| Area After Cons. (sq in) |                        |               | 2.021                 |            | Cons. Vol.                 | (CC)                    | 105.65 |
| Data entry by:           | DAW                    | Da            | te:                   | 11/26/2012 |                            |                         |        |

| 2 | 1 | .00 |    |    | 1 |
|---|---|-----|----|----|---|
| 1 |   | AN  |    | 11 |   |
|   |   | 10  | UI | UI | 1 |

| Data entry by:     | DAW     | Date:   |
|--------------------|---------|---------|
| Checked by:        | Date:_/ | 1/27/12 |
| FileName: LKP00012 |         |         |





Client LATA ENV. Services - KY Job No. 2865-06 BoringNo. 211-8-001 Depth\_ 15 -17 A Sample No. 211BOOI PERMZ Project Sw Plume RDSI Gestechnical Sampled 10/9/12 by KD Prepped 11/13/12 by CAL Project No. ERFIR-SWMUZIIB Tx/Pbp of 2070 pof LK2855/LKDP0012 11/20/12

## PERMEABILITY TEST - BACK PRESSURE SATURATED - FLOW PUMP METHOD ASTM D 5084

| CLIENT                                                 | LATA Envi         | ronmental Services of Ky                                                                  | JOB NO. 2855-06                                                           |                                                          |
|--------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>SOIL DES(<br>LOCATION | 10.<br>10.<br>CR. | 211-B-004<br>8-10' (A)<br>211B004PERM1<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>CELL NUMBER<br>SATURATED TEST | 10/11/12 KD<br>11/02/12 CAL<br>11/17/12 CAL<br>7P<br>Yes |
| CONF. PR                                               | ES. PSF           | 1164                                                                                      | TEST TYPE                                                                 | TX/Pbp/Tap Water                                         |

| MOISTURE/DENSITY                                                                                                                        | BEFORE                                                 | AFTER                   |                    |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|--------------------|
| DATA                                                                                                                                    | TEST                                                   | TEST                    |                    |
| Wt. Soil + Moisture (g)                                                                                                                 | 229.7                                                  | 227.8                   |                    |
| Wt. Wet Soil & Pan (g)                                                                                                                  | 236.2                                                  | 234.3                   |                    |
| Wt. Dry Soil & Pan (g)                                                                                                                  | 195.2                                                  | 195.2                   |                    |
| Wt. Lost Moisture (g)                                                                                                                   | 41.0                                                   | 39.1                    |                    |
| Wt. of Pan Only (g)                                                                                                                     | 6.5                                                    | 6.5                     |                    |
| Wt. of Dry Soil (g)                                                                                                                     | 188.7                                                  | 188.7                   |                    |
| Moisture Content %                                                                                                                      | 21.7                                                   | 20.7                    |                    |
| Wet Density PCF                                                                                                                         | 128.1                                                  | 140.1                   |                    |
| Dry Density PCF                                                                                                                         | 105.2                                                  | 116.0                   |                    |
| Init. Diameter (in)                                                                                                                     | 1.660                                                  | (cm)                    | 4.216              |
| Init. Area (sq in)                                                                                                                      | 2.164                                                  | (sq cm)                 | 13.964             |
| Init. Height (in)                                                                                                                       | 3.157                                                  | (cm)                    | 8.019              |
| Vol. Bef. Consol. (cu ft)                                                                                                               | 0.00395                                                |                         |                    |
| Vol. After Consol. (cu ft)                                                                                                              | 0.00359                                                |                         |                    |
| Porosity %                                                                                                                              | 38.54                                                  |                         |                    |
| Init. Diameter (in)<br>Init. Area (sq in)<br>Init. Height (in)<br>Vol. Bef. Consol. (cu ft)<br>Vol. After Consol. (cu ft)<br>Porosity % | 1.660<br>2.164<br>3.157<br>0.00395<br>0.00359<br>38.54 | (cm)<br>(sq cm)<br>(cm) | 4.2<br>13.9<br>8.0 |

## FLOW PUMP CALCULATIONS

| Pump Setting                  | 45       |
|-------------------------------|----------|
| Velocity CM/Sec               | 2.95E-04 |
| Q (cc/s)                      | 9.44E-06 |
| Height                        | 3.133    |
| Diameter                      | 1.587    |
| Pressure (psi)                | 0.166    |
| Area after consol. (cm*cm)    | 12.759   |
| Gradient                      | 1.467    |
| Permeability k (cm/s)         | 5.0E-07  |
| Permeability k (m/s)          | 5.0E-09  |
| Back Pressure (psi)           | 38.0     |
| Cell Pressure (psi)           | 46.1     |
| Ave. Effective Stress (psi)   | 8.017    |
| Average temperature degree C: | 22.1     |

Average temperature degree C:

| Data entry by:     | MLM   | 1     | Date: |  |
|--------------------|-------|-------|-------|--|
| Checked by: Che    | Date: | 11/19 | IZ    |  |
| FileName: LKP00041 | _     | 1     | -     |  |

11/19/2012



## TRIAXAL COMPRESSION TEST DATA

| CLIENT                                                             | LATA Environmental Services of Ky |                                                                                                   | JOB NO. 2855-06                                                                      |                                                                              |  |  |
|--------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--|--|
| BORING N<br>DEPTH<br>SAMPLE N<br>SOIL DESC<br>LOCATION<br>CONF. PR | O.<br>IO.<br>CR.<br>J<br>ES. PSF  | 211-B-004<br>8-10' (A)<br>211B004PERM1<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>1164 | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>SETUP NO.<br>SATURATED TEST<br>TEST TYPE | 10/11/12 KD<br>11/02/12 CAL<br>11/17/12 CAL<br>7P<br>Yes<br>TX/Pbp/Tap Water |  |  |

#### SATURATION DATA

| Cell           | Back           | Burette         |      | Pore              |      |        |   |      |
|----------------|----------------|-----------------|------|-------------------|------|--------|---|------|
| Pres.<br>(PSI) | Pres.<br>(PSI) | Reading<br>(CC) |      | Pressure<br>(PSI) |      | Change | В |      |
|                |                | Close           | Open | Close             | Open |        |   |      |
| 40.0           | 38.0           | 1.2             | 9.7  |                   |      |        |   |      |
| 50.0           |                | 13.0            | 13.2 | 38.8              | 48.5 | 9.7    |   | 0.97 |

## CONSOLIDATION DATA

|                                                     | Elapsed<br>Time<br>(Min) | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |        |
|-----------------------------------------------------|--------------------------|-----------------------|------------|----------------------------|-------------------------|--------|
|                                                     | 0.00                     | 0.00                  |            | 0.30                       | 0.00                    |        |
|                                                     | 0.25                     | 0.50                  |            | 0.90                       | -0.60                   |        |
|                                                     | 0.5                      | 0.71                  |            | 0.95                       | -0.65                   |        |
|                                                     | 1                        | 1.00                  |            | 1.00                       | -0.70                   |        |
|                                                     | 2                        | 1.41                  |            | 1.00                       | -0.70                   |        |
|                                                     | 4                        | 2.00                  |            | 1.10                       | -0.80                   |        |
|                                                     | 9                        | 3.00                  |            | 1.20                       | -0.90                   |        |
|                                                     | 16                       | 4.00                  |            | 1.30                       | -1.00                   |        |
|                                                     | 30                       | 5.48                  |            | 1.40                       | -1.10                   |        |
|                                                     | 60                       | 7.75                  |            | 1.70                       | -1.40                   |        |
|                                                     | 120                      | 10.95                 |            | 1.95                       | -1.65                   |        |
|                                                     | 240                      | 15.49                 |            | 2.20                       | -1.90                   |        |
|                                                     | 360                      | 18.97                 |            | 2.60                       | -2.30                   |        |
| Initial Height (in)                                 |                          | 3,157                 |            | Init. Vol. (CC             | 2)                      | 111,98 |
| Height Change (in)                                  |                          | 0.024                 |            | Vol. Change                | (CC)                    | 24.20  |
| Ht. After Cons. (in)                                |                          | 3.133                 |            | Cell Exp. (C               | C)                      | 13.76  |
| Initial Area (sq in)                                |                          | 2.164                 |            | Net Change                 | (CC)                    | 10.44  |
| Area After Cons. (sq in)                            |                          | 1.978                 |            | Cons. Vol. (               | (D)                     | 101.55 |
| Data entry by:<br>Checked by:<br>FileName: LKP00041 | MLM Date: 11/19/12       | )ate:                 | 11/19/2012 |                            |                         | ATT    |





Client LATA ENV. Services of Ky Job No. 2855-06 BoringNo. 211-8-004 Depth 8-10' (A) Sample No. 211BCO4PERM1 Project SW Aume RD SI Gestechnical Sampled 10 / 11 / 12 by FD Prepped 11 / oz / 12 by car Project No. ERID-SW-SWMUZIB TX/Pbp 53 1164 psf LK2855/LKDP810A 11/19/12
| CLIENT L   | ATA Envi | ronmental Services of KY   | JOB NO.    | 2855-06 |                  |
|------------|----------|----------------------------|------------|---------|------------------|
| BORING NO. |          | 211-B-004                  | SAMPLED    |         | 10/11/12 KD      |
| DEPTH      |          | 18-20' A                   | TEST STA   | RTED    | 11/02/12 CAL     |
| SAMPLE NO  |          | 211B004PERM2               | TEST FINIS | SHED    | 11/14/12 CAL     |
| SOIL DESCR | ς.       | ERI12-SW-SWMU211B          | CELL NUM   | IBER    | 9P               |
| LOCATION   |          | SW Plume RDSI Geotechnical | SATURATE   | ED TEST | Yes              |
| CONF. PRES | S. PSF   | 2458                       | TEST TYP   | E       | TX/Pbp/Tap Water |
|            |          |                            |            |         |                  |

| MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------|---------|---------|--------|
| DATA                       | TEST    | TEST    |        |
| Wt. Soil + Moisture (g)    | 210.0   | 210.5   |        |
| Wt. Wet Soil & Pan (g)     | 216.5   | 217.1   |        |
| Wt. Dry Soil & Pan (g)     | 191.0   | 191.0   |        |
| Wt. Lost Moisture (g)      | 25.5    | 26.1    |        |
| Wt. of Pan Only (g)        | 6.6     | 6.6     |        |
| Wt. of Dry Soil (g)        | 184.4   | 184.4   |        |
| Moisture Content %         | 13.8    | 14.1    |        |
| Wet Density PCF            | 138.5   | 142.0   |        |
| Dry Density PCF            | 121.7   | 124.4   |        |
| Init. Diameter (in)        | 1.651   | (cm)    | 4.194  |
| Init. Area (sq in)         | 2.141   | (sq cm) | 13.813 |
| Init. Height (in)          | 2.697   | (cm)    | 6.850  |
| Vol. Bef. Consol. (cu ft)  | 0.00334 |         |        |
| Vol. After Consol. (cu ft) | 0.00327 |         |        |
| Porosity %                 | 28.16   |         |        |
|                            |         |         |        |

### FLOW PUMP CALCULATIONS

| Pump Setting                | 5        |
|-----------------------------|----------|
| Velocity CM/Sec             | 3.29E-05 |
| Q (cc/s)                    | 1.05E-06 |
| Height                      | 2.679    |
| Diameter                    | 1.639    |
| Pressure (psi)              | 4.700    |
| Area after consol. (cm*cm)  | 13.605   |
| Gradient                    | 48.562   |
| Permeability k (cm/s)       | 1.6E-09  |
| Permeability k (m/s)        | 1.6E-11  |
| Back Pressure (psi)         | 88.0     |
| Cell Pressure (psi)         | 105.1    |
| Ave. Effective Stress (psi) | 14.750   |

Average temperature degree C: NOTE: Filling required due to 1" gravel in sample.

| Data entry by:     | DAW      | Date:    | 11/19/2012 |
|--------------------|----------|----------|------------|
| Checked by: Cwc    | Date: // | 119/2012 |            |
| FileName: LKP00042 |          | , ,      |            |



22.1

| LATA Envi | ronmental Services of KY                 | JOB NO. 2855-06                                                                                                                                         |                                                                                                                                                                                                           |
|-----------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ο.        | 211-B-004                                | SAMPLED                                                                                                                                                 | 10/11/12 KD                                                                                                                                                                                               |
|           | 18-20' A                                 | TEST STARTED                                                                                                                                            | 11/02/12 CAL                                                                                                                                                                                              |
| O.        | 211B004PERM2                             | TEST FINISHED                                                                                                                                           | 11/14/12 CAL                                                                                                                                                                                              |
| R.        | ERI12-SW-SWMU211B                        | SETUP NO.                                                                                                                                               | 9P                                                                                                                                                                                                        |
|           | SW Plume RDSI Geotechnical               | SATURATED TEST                                                                                                                                          | Yes                                                                                                                                                                                                       |
| ES. PSF   | 2458                                     | TEST TYPE                                                                                                                                               | TX/Pbp/Tap Water                                                                                                                                                                                          |
|           | LATA Envir<br>O.<br>O.<br>CR.<br>ES. PSF | LATA Environmental Services of KY<br>0. 211-B-004<br>18-20' A<br>0. 211B004PERM2<br>CR. ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>ES. PSF 2458 | LATA Environmental Services of KYJOB NO.2855-06O.211-B-004SAMPLED18-20' ATEST STARTEDO.211B004PERM2TEST FINISHEDCR.ERI12-SW-SWMU211BSETUP NO.SW Plume RDSI GeotechnicalSATURATED TESTES. PSF2458TEST TYPE |

#### SATURATION DATA

|      |   |                                        |                                                      | Pore                                                  |                                                             | Burette                                                     | Back                                         | Cell                                                  |
|------|---|----------------------------------------|------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------|
|      |   |                                        |                                                      | ressure                                               | P                                                           | Reading                                                     | Pres.                                        | Pres.                                                 |
|      | В | hange                                  | CI                                                   | (PSI)                                                 |                                                             | (CC)                                                        | (PSI)                                        | (PSI)                                                 |
|      |   |                                        | Open                                                 | Close                                                 | Open                                                        | Close                                                       |                                              |                                                       |
|      |   |                                        |                                                      |                                                       | 7.2                                                         | 1.2                                                         | 38.0                                         | 40.0                                                  |
| 0.76 |   | 7.6                                    | 45.9                                                 | 38.3                                                  | 11.0                                                        | 9.6                                                         | 48.0                                         | 50.0                                                  |
| 0.79 |   | 7.9                                    | 56.5                                                 | 48.6                                                  | 12.3                                                        | 11.4                                                        | 58.0                                         | 60.0                                                  |
| 0.86 |   | 8.6                                    | 67.2                                                 | 58.6                                                  | 13.8                                                        | 13.0                                                        | 68.0                                         | 70.0                                                  |
| 0.89 |   | 8.9                                    | 77.5                                                 | 68.6                                                  | 15.1                                                        | 14.3                                                        | 78.0                                         | 80.0                                                  |
| 0.90 |   | 9.0                                    | 87.6                                                 | 78.6                                                  | 16.4                                                        | 15.6                                                        | 88.0                                         | 90.0                                                  |
| 0.96 |   | 9.6                                    | 97.9                                                 | 88.3                                                  | 16.9                                                        | 16.8                                                        |                                              | 100.0                                                 |
|      |   | 7.6<br>7.9<br>8.6<br>8.9<br>9.0<br>9.6 | Open<br>45.9<br>56.5<br>67.2<br>77.5<br>87.6<br>97.9 | Close<br>38.3<br>48.6<br>58.6<br>68.6<br>78.6<br>88.3 | Open<br>7.2<br>11.0<br>12.3<br>13.8<br>15.1<br>16.4<br>16.9 | Close<br>1.2<br>9.6<br>11.4<br>13.0<br>14.3<br>15.6<br>16.8 | 38.0<br>48.0<br>58.0<br>68.0<br>78.0<br>88.0 | 40.0<br>50.0<br>60.0<br>70.0<br>80.0<br>90.0<br>100.0 |

## CONSOLIDATION DATA

|                          | Elapsed | SQRT  |            | Burette       | Volume      |
|--------------------------|---------|-------|------------|---------------|-------------|
|                          | Time    | Time  |            | Reading       | Defl.       |
|                          | (Min)   | (Min) |            | (CC)          | (cc)        |
|                          | 0.00    | 0.00  |            | 0.40          | 0.00        |
|                          | 0.25    | 0.50  |            | 1.80          | -1.40       |
|                          | 0.5     | 0.71  |            | 1.80          | -1.40       |
|                          | 1       | 1.00  |            | 1.90          | -1.50       |
|                          | 2       | 1.41  |            | 1.90          | -1.50       |
|                          | 4       | 2.00  |            | 1.95          | -1.55       |
|                          | 9       | 3.00  |            | 2.05          | -1.65       |
|                          | 16      | 4.00  |            | 2.10          | -1.70       |
|                          | 30      | 5.48  |            | 2.20          | -1.80       |
|                          | 60      | 7.75  |            | 2.30          | -1.90       |
|                          | 120     | 10.95 |            | 2.45          | -2.05       |
|                          | 240     | 15.49 |            | 2.60          | -2.20       |
|                          | 360     | 18.97 |            | 2.60          | -2.20       |
| Initial Height (in)      |         | 2 607 |            | Init Vol. (CC | )           |
| Height Change (in)       |         | 0.018 |            | Vol Change    |             |
| Ht After Cons (in)       |         | 2 679 |            | Cell Exp (C   |             |
| Initial Area (sq in)     |         | 2 141 |            | Net Change    |             |
| Area After Cons. (sq in) |         | 2.109 |            | Cons. Vol. (C | (00)<br>CC) |
| Data antar hu            | DAVA    | Data  | 11/10/2012 |               | NAMCED      |

| Data entry by:     | DAW   | Date:      |  |
|--------------------|-------|------------|--|
| Checked by: 044    | Date: | 11/19/2012 |  |
| FileName: LKP00042 |       | . ,        |  |

11/19/2012



94.63

18.40 16.36

2.04 92.59



# Preliminary Flow Pump Data LATA-KY, SW Plume Geotech, 211B004PERM2



Client LATA Environmental Services-Ky Job No. <u>2855-72</u> Boring No. <u>241-B-004</u> Depth <u>181-20' A</u> Sample No. <u>216004 PEPMZ</u> Project SN Rume. RDST Geotechnical Sampled 10/11/12 by KD Project No. <u>ERTQ-50'SWMUZIIB</u> Project No. <u>ERTQ-50'SWMUZIIB</u> TR/Pbp J 17.1 psi = 2458 psf LK2855/LKDP0042 11/15/12

| CLIENT LATA En  | vironmental Services of Ky | JOB NO. 2855-06 |                  |
|-----------------|----------------------------|-----------------|------------------|
| BORING NO.      | 211-B-004                  | SAMPLED         | 10/11/12 KD      |
| DEPTH           | 38-40' (A)                 | TEST STARTED    | 11/02/12 CAL     |
| SAMPLE NO.      | 211B004PERM3               | TEST FINISHED   | 11/13/12 CAL     |
| SOIL DESCR.     | ERI12-SW-SWMU211B          | CELL NUMBER     | 13S              |
| LOCATION        | SW Plume RDSI Geotechnical | SATURATED TEST  | Yes              |
| CONF. PRES. PSF | 5046                       | TEST TYPE       | TX/Pbp/Tap Water |
|                 |                            |                 |                  |

| MOISTURE/DENSITY           | BEFORE  | AFTER   |        |
|----------------------------|---------|---------|--------|
| DATA                       | TEST    | TEST    |        |
| Wt. Soil + Moisture (g)    | 236.9   | 233.1   |        |
| Wt. Wet Soil & Pan (g)     | 243.7   | 239.9   |        |
| Wt. Dry Soil & Pan (g)     | 203.0   | 203.0   |        |
| Wt. Lost Moisture (g)      | 40.8    | 36.9    |        |
| Wt. of Pan Only (g)        | 6.8     | 6.8     |        |
| Wt. of Dry Soil (g)        | 196.2   | 196.2   |        |
| Moisture Content %         | 20.8    | 18.8    |        |
| Wet Density PCF            | 131.8   | 133.8   |        |
| Dry Density PCF            | 109.1   | 112.6   |        |
| Init. Diameter (in)        | 1.662   | (cm)    | 4.221  |
| Init. Area (sq in)         | 2.169   | (sq cm) | 13.997 |
| Init. Height (in)          | 3.157   | (cm)    | 8.019  |
| Vol. Bef. Consol. (cu ft)  | 0.00396 |         |        |
| Vol. After Consol. (cu ft) | 0.00384 |         |        |
| Porosity %                 | 33.95   |         |        |

# FLOW PUMP CALCULATIONS

| Pump Setting                  | 5        |
|-------------------------------|----------|
| Velocity CM/Sec               | 3.29E-05 |
| Q (cc/s)                      | 1.05E-06 |
| Height                        | 3.090    |
| Diameter                      | 1.654    |
| Pressure (psi)                | 3.490    |
| Area after consol. (cm*cm)    | 13.863   |
| Gradient                      | 31.264   |
| Permeability k (cm/s)         | 2.4E-09  |
| Permeability k (m/s)          | 2.4E-11  |
| Back Pressure (psi)           | 48.0     |
| Cell Pressure (psi)           | 83.0     |
| Ave. Effective Stress (psi)   | 33.255   |
| Average temperature degree C: | 22.0     |

| Data entry by:     | MLM .    | Date:            | 11 |
|--------------------|----------|------------------|----|
| Checked by: CM     | Date: II | 14/12            |    |
| FileName: LKP00043 |          | A hilling page 1 |    |

1/14/2012



| CLIENT LATA     | Environmental Services of Ky | JOB NO. 2855-06 |                  |
|-----------------|------------------------------|-----------------|------------------|
| BORING NO.      | 211-B-004                    | SAMPLED         | 10/11/12 KD      |
| DEPTH           | 38-40' (A)                   | TEST STARTED    | 11/02/12 CAL     |
| SAMPLE NO.      | 211B004PERM3                 | TEST FINISHED   | 11/13/12 CAL     |
| SOIL DESCR.     | ERI12-SW-SWMU211B            | SETUP NO.       | 13S              |
| LOCATION        | SW Plume RDSI Geotechnical   | SATURATED TEST  | Yes              |
| CONF. PRES. PSI | F 5046                       | TEST TYPE       | TX/Pbp/Tap Water |
|                 | ×                            | 114-11          |                  |

### SATURATION DATA

| Cell  | Back  | Burette |      | Pore     |      |       |     |    |
|-------|-------|---------|------|----------|------|-------|-----|----|
| Pres. | Pres. | Reading |      | Pressure |      |       |     |    |
| (PSI) | (PSI) | (CC)    |      | (PSI)    | C    | hange | В   |    |
|       |       | Close   | Open | Close    | Open |       |     |    |
| 40.0  | 38.0  | 1.8     | 6.8  |          |      |       |     |    |
| 50.0  | 48.0  | 7.3     | 8.1  | 38.2     | 47.5 | 9.3   | 0.9 | 33 |
| 60.0  |       | 8.3     | 8.4  | 48.7     | 58.2 | 9.5   | 0.9 | 95 |
|       |       |         |      |          |      |       |     |    |

# CONSOLIDATION DATA

|                                                     | Elapsed<br>Time<br>(Min)       | SQRT<br>Time<br>(Min) | Burette Volume<br>Reading Defl.<br>(CC) (cc) |
|-----------------------------------------------------|--------------------------------|-----------------------|----------------------------------------------|
|                                                     | 0.00                           | 0.00                  | 0.40 0.00                                    |
|                                                     | 0.25                           | 0.50                  | 3.00 -2.60                                   |
|                                                     | 0.5                            | 0.71                  | 3.15 -2.75                                   |
|                                                     | 1                              | 1.00                  | 3.30 -2.90                                   |
|                                                     | 2                              | 1.41                  | 3.50 -3.10                                   |
|                                                     | 4                              | 2.00                  | 3.70 -3.30                                   |
|                                                     | 9                              | 3.00                  | 4.05 -3.65                                   |
|                                                     | 16                             | 4.00                  | 4.40 -4.00                                   |
|                                                     | 30                             | 5.48                  | 4.90 -4.50                                   |
|                                                     | 60                             | 7.75                  | 5.50 -5.10                                   |
|                                                     | 120                            | 10.95                 | 6.30 -5.90                                   |
|                                                     | 240                            | 15.49                 | 6.80 -6.40                                   |
|                                                     | 360                            | 18.97                 | 7.00 -6.60                                   |
| Initial Height (in)                                 |                                | 3.157                 | Init. Vol. (CC) 112.25                       |
| Height Change (in)                                  |                                | 0.067                 | Vol. Change (CC) 14.20                       |
| Ht. After Cons. (in)                                |                                | 3.090                 | Cell Exp. (CC) 10.77                         |
| Initial Area (sq in)                                |                                | 2.169                 | Net Change (CC) 3.43                         |
| Area After Cons. (sq in)                            |                                | 2.149                 | Cons. Vol. (CC) 108.82                       |
| Data entry by:<br>Checked by:<br>FileName: LKP00043 | MLM D<br>Date: <u>เป็นปูเส</u> | )ate:                 | 11/14/2012                                   |





Client LATA ENV. Services of Ky Job No. 2855-06 BoringNo. 211-B-004 Depth 38-40' A Sample No. 2118 004 PERM3 Project SW Plume RDSI Geotechnical Sampled 10 / 11 / 12 by KD Prepped 11 / 02 / 12 by CAL Project No. ERI 12-50- 5000 211 B Tx/Pbp 53 5046 psf LK2855/LKDP0043 11/14/12

| CLIENT                                                           | LATA Envir                 | onmental Services-Ky                                                                  |     | JOB NO.                                                                 | 2855-02                        |                                                                            |
|------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PR | io.<br>No.<br>I<br>Es. PSF | MW516<br>10-12'<br>MW516Perm1<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechni<br>1423 | cal | SAMPLED<br>TEST STAF<br>TEST FINIS<br>CELL NUM<br>SATURATE<br>TEST TYPE | RTED<br>SHED<br>BER<br>ED TEST | 8/22/12 CB<br>9/13/12 CAL<br>9/22/12 CAL<br>27S<br>Yes<br>TX/Pbp/Tap Water |

| MOISTURE/DENSITY                                                                                                                        | BEFORE                                                 | AFTER                   |                          |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|--------------------------|
| DATA                                                                                                                                    | TEST                                                   | TEST                    |                          |
| Wt. Soil + Moisture (g)                                                                                                                 | 688.7                                                  | 696.0                   |                          |
| Wt. Wet Soil & Pan (g)                                                                                                                  | 695.2                                                  | 702.5                   |                          |
| Wt. Dry Soil & Pan (g)                                                                                                                  | 604.7                                                  | 604.7                   |                          |
| Wt. Lost Moisture (g)                                                                                                                   | 90.5                                                   | 97.8                    |                          |
| Wt. of Pan Only (g)                                                                                                                     | 6.5                                                    | 6.5                     |                          |
| Wt. of Dry Soil (g)                                                                                                                     | 598.2                                                  | 598.2                   |                          |
| Moisture Content %                                                                                                                      | 15.1                                                   | 16.3                    |                          |
| Wet Density PCF                                                                                                                         | 134.1                                                  | 137.6                   |                          |
| Dry Density PCF                                                                                                                         | 116.5                                                  | 118.3                   |                          |
| Init. Diameter (in)<br>Init. Area (sq in)<br>Init. Height (in)<br>Vol. Bef. Consol. (cu ft)<br>Vol. After Consol. (cu ft)<br>Porosity % | 2.847<br>6.366<br>3.073<br>0.01132<br>0.01115<br>30.97 | (cm)<br>(sq cm)<br>(cm) | 7.231<br>41.073<br>7.805 |

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# FLOW PUMP CALCULATIONS

| Pump Setting                | 99       |
|-----------------------------|----------|
| Velocity CM/Sec             | 6.50E-04 |
| Q (cc/s)                    | 2.08E-05 |
| Height                      | 3.058    |
| Diameter                    | 2.832    |
| Pressure (psi)              | 0.064    |
| Area after consol. (cm*cm)  | 40.644   |
| Gradient                    | 0.579    |
| Permeability k (cm/s)       | 8.8E-07  |
| Permeability k (m/s)        | 8.8E-09  |
| Back Pressure (psi)         | 48.0     |
| Cell Pressure (psi)         | 57.9     |
| Ave. Effective Stress (psi) | 9.868    |
|                             |          |

Average temperature degree C:

| Data entry by:     | MLM Date:            |
|--------------------|----------------------|
| Checked by: C++-   | Date: <u>9/25/IZ</u> |
| FileName: LKP05161 | 1 1                  |

09/24/2012

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| CLIENT                                                            | LATA Envi                    | ronmental Services-Ky                                                                   | JOB NO. 2                                                                   | 2855-02              |                                                                            |
|-------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PRI | 0.<br>10.<br>NO.<br>ES. PSF. | MW516<br>10-12<br>MW516Perm1<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>1423 | SAMPLED<br>TEST START<br>TEST FINISH<br>SETUP NO.<br>SATURATED<br>TEST TYPE | TED<br>HED<br>D TEST | 8/22/12 CB<br>9/13/12 CAL<br>9/22/12 CAL<br>27S<br>Yes<br>TX/Pbp/Tap Water |

#### SATURATION DATA

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| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) | c    | Change | в |      |
|------------------------|------------------------|----------------------------|------|---------------------------|------|--------|---|------|
|                        |                        | Close                      | Open | Close                     | Open |        |   |      |
| 40.0                   | 38.0                   | 3.4                        | 15.4 |                           |      |        |   |      |
| 50.0                   | 48.0                   | 17.2                       | 18.8 | 38.4                      | 47.7 | 9.3    |   | 0.93 |
| 60.0                   |                        | 19.8                       | 19.9 | 48.8                      | 58.7 | 9.9    |   | 0.99 |

# CONSOLIDATION DATA

|                                                                | Elapsed<br>Time<br>(Min)            | SQRT<br>Time<br>(Min) |            | Burette<br>Reading<br>(CC)  | Volume<br>Defl.<br>(cc) |        |
|----------------------------------------------------------------|-------------------------------------|-----------------------|------------|-----------------------------|-------------------------|--------|
|                                                                | 0.00                                | 0.00                  |            | 1.80                        | 0.00                    |        |
|                                                                | 0.25                                | 0.50                  |            | 3.50                        | -1.70                   |        |
|                                                                | 0.5                                 | 0.71                  |            | 3.75                        | -1.95                   |        |
|                                                                | 1                                   | 1.00                  |            | 4.00                        | -2.20                   |        |
|                                                                | 2                                   | 1.41                  |            | 4.30                        | -2.50                   |        |
|                                                                | 4                                   | 2.00                  |            | 4.65                        | -2.85                   |        |
|                                                                | 9                                   | 3.00                  |            | 4.90                        | -3.10                   |        |
|                                                                | 16                                  | 4.00                  |            | 5.10                        | -3.30                   |        |
|                                                                | 34                                  | 5.83                  |            | 5.20                        | -3.40                   |        |
|                                                                | 60                                  | 7.75                  |            | 5.30                        | -3.50                   |        |
|                                                                | 120                                 | 10.95                 |            | 5.40                        | -3.60                   |        |
|                                                                | 240                                 | 15.49                 |            | 5.50                        | -3.70                   |        |
|                                                                | 360                                 | 18.97                 |            | 5.50                        | -3.70                   |        |
| Initial Height (in)                                            |                                     | 2 073                 |            | nit Vol. (CC                | •                       | 220.62 |
| Height Change (in)                                             |                                     | 0.015                 | 1          | Vol. Chongo                 |                         | 320.03 |
| Height Change (in)                                             |                                     | 2.059                 |            | Coll Eve (C                 |                         | 22.00  |
| Initial Area (ag in)                                           |                                     | 3.000<br>e pee        |            | Jeli Exp. (C                |                         | 17.12  |
| Area Affer Cone (ag in)                                        |                                     | 6.300                 | 1          | Net Ghange<br>Cons. Vol. 70 |                         | 4.00   |
| Area Aller Colls. (sq III)                                     |                                     | 0.300                 | L L        | Jons, vol. (                |                         | 313.75 |
| Data entry by:<br>Checked by: <b>_04c</b><br>FileName:LKP05161 | MLM [<br>Date: <u><b>9/25//</b></u> | Date:<br>∡            | 09/24/2012 |                             |                         | TATT T |





| CLIENT LATA Enviro                                                                                                                                                                                             | nmental Services-Ky                                                                      |                                                                           | JOB NO. 2855-02                                                                        |                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| BORING NO.<br>DEPTH<br>SAMPLE NO.<br>PROJECT NO.<br>LOCATION<br>CONF. PRES. PSF                                                                                                                                | MW-516<br>25-26'<br>MW516PERM2<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnica<br>3299 | 31                                                                        | SAMPLED<br>TEST STARTED<br>TEST FINISHED<br>CELL NUMBER<br>SATURATED TEST<br>TEST TYPE | 8/22/12 CB<br>9/13/12 CAL<br>9/25/12 CAL<br>26S<br>Yes<br>TX/Pbp/Tap Water |
| MOISTURE/DENSITY<br>DATA                                                                                                                                                                                       | BEFORE<br>TEST                                                                           | AFTER<br>TEST                                                             |                                                                                        |                                                                            |
| Wt. Soil + Moisture (g)<br>Wt. Wet Soil & Pan (g)<br>Wt. Dry Soil & Pan (g)<br>Wt. Lost Moisture (g)<br>Wt. of Pan Only (g)<br>Wt. of Dry Soil (g)<br>Moisture Content %<br>Wet Density PCF<br>Dry Density PCF | 647.0<br>653.5<br>569.2<br>84.3<br>6.5<br>562.7<br>15.0<br>127.0<br>110.4                | 654.8<br>661.3<br>569.2<br>92.1<br>6.5<br>562.7<br>16.4<br>137.3<br>117.9 |                                                                                        |                                                                            |
| Init. Diameter (in)<br>Init. Area (sq in)<br>Init. Height (in)                                                                                                                                                 | 2.841<br>6.339<br>3.062                                                                  | (cm)<br>(sq.cm)<br>(cm)                                                   | ) 7.216<br>) 40.900<br>) 7.777                                                         |                                                                            |

| Init. Diameter (in)        | 2,841   | (cm)    | 7.21  |
|----------------------------|---------|---------|-------|
| Init. Area (sq in)         | 6.339   | (sq.cm) | 40.90 |
| Init. Height (in)          | 3.062   | (cm)    | 7.77  |
| Vol. Bef. Consol. (cu ft)  | 0.01123 |         |       |
| Vol. After Consol. (cu ft) | 0.01052 |         |       |
| Porosity %                 | 30.92   |         |       |
|                            |         |         |       |

#### FLOW PUMP CALCULATIONS

Date:

| Pump Setting (gear number)    | 12             |
|-------------------------------|----------------|
| Percentage of Pump setting    | 100            |
| Q (cc/s)                      | 2.30E-05       |
| Height                        | 2.985          |
| Diameter                      | 2.784          |
| Pressure (psi)                | 1.414          |
| Area after consol. (cm*cm)    | 39.280         |
| Gradient                      | 13.112         |
| Permeability k (cm/s)         | 4.5E-08        |
| <b>Permeability k (m/s)</b>   | <b>4.5E-10</b> |
| Back Pressure (psi)           | 48.0           |
| Cell Pressure (psi)           | 71.0           |
| Ave. Effective Stress (psi)   | 22.293         |
| Average temperature degree C: | 22.9           |

| Data entry by:     | MLM , E       |
|--------------------|---------------|
| Checked by: 04     | Date: 9/26/12 |
| FileName: LKP05162 |               |

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09/26/2012



| CLIENT                                                           | IENT LATA Environmental Services-Ky |                                                                                           |                                                                      | 2855-02                            |                                                                            |
|------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PR | ∛O.<br>NO.<br>NO.<br>NES. PSF       | MW-516<br>25-26'<br>MW516PERM2<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>3299 | SAMPLED<br>TEST STA<br>TEST FINI<br>SETUP NC<br>SATURATI<br>TEST TYP | RTED<br>SHED<br>).<br>ED TEST<br>E | 8/22/12 CB<br>9/13/12 CAL<br>9/25/12 CAL<br>26S<br>Yes<br>TX/Pbp/Tap Water |
|                                                                  |                                     |                                                                                           |                                                                      |                                    |                                                                            |

#### SATURATION DATA

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| Cell<br>Pres.<br>(PSI) | Back<br>Pres,<br>(PSI) | Burette<br>Reading<br>(CC) | Pore<br>Pressure<br>(PSI) |       | С    | hange | В |      |
|------------------------|------------------------|----------------------------|---------------------------|-------|------|-------|---|------|
|                        |                        | Close                      | Open                      | Close | Open |       |   |      |
| 40.0                   | 38.0                   | 6.3                        | 21.9                      |       | -    |       |   |      |
| 50.0                   | 48.0                   | 25.6                       | 26.9                      | 38.6  | 47.7 | 9.1   |   | 0.91 |
| 60.0                   |                        | 27.2                       | 27.4                      | 48.8  | 58.3 | 9.5   |   | 0.95 |

# CONSOLIDATION DATA

|                          | Elapsed              | SQRT  |            | Burette        | Volume |         |        |
|--------------------------|----------------------|-------|------------|----------------|--------|---------|--------|
|                          | Time                 | Time  |            | Reading        | Defl.  |         |        |
|                          | (Min)                | (Min) |            | (CC)           | (cc)   |         |        |
|                          | 0.00                 | 0.00  |            | 0.20           | 0.00   |         |        |
|                          | 0.25                 | 0.50  |            | 5.90           | -5.70  |         |        |
|                          | 0.5                  | 0.71  |            | 6.60           | -6.40  |         |        |
| ,                        | 1                    | 1.00  |            | 7.50           | -7.30  |         |        |
|                          | 2                    | 1.41  |            | 8.40           | -8.20  |         |        |
|                          | 4                    | 2.00  |            | 9.40           | -9.20  |         |        |
|                          | 9                    | 3.00  |            | 10.60          | -10.40 |         |        |
|                          | 16                   | 4.00  |            | 11.40          | -11.20 |         |        |
|                          | 30                   | 5.48  |            | 12.40          | -12.20 |         |        |
|                          | 60                   | 7.75  |            | 13.50          | -13.30 |         |        |
|                          | 120                  | 10.95 |            | 14.40          | -14.20 |         |        |
|                          | 240                  | 15,49 |            | 15.00          | -14.80 |         |        |
|                          | 360                  | 18.97 |            | 15.10          | -14.90 |         |        |
|                          |                      |       |            |                |        |         |        |
| Initial Height (in)      |                      | 3.062 |            | Init. Vol. (CC | ;)     |         | 318.14 |
| Height Change (in)       |                      | 0.077 |            | Vol. Change    | (CC)   |         | 38.20  |
| Ht. After Cons. (in)     |                      | 2.985 |            | Cell Exp. (C   | :C)    |         | 17.93  |
| Initial Area (sq in)     |                      | 6.339 |            | Net Change     | (CC)   |         | 20.27  |
| Area After Cons. (sq in) |                      | 6.088 |            | Cons. Vol. (   | CC)    | TERRA T | 297.87 |
| Data entry by:           | MLM , Da             | ate:  | 09/26/2012 |                |        | APP     |        |
| Checked by: CAL          | Date: <u>9/26/12</u> |       |            |                |        |         | UI 🦯   |
| FileName: LKP05162       | 1 1                  |       |            |                |        |         |        |





Data Entered By:CALDate:9/25/2012Data Checked By: $\frac{24m}{10}$ Date Checked: $\frac{9}{24/10}$ File Name:LKFP5162

| CLIENT                                                           | LATA Envir                 | onmental Services-Ky                                                                     | JOB NO.                                                                 | 2855-02                        |                                                                            |
|------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PR | 0.<br>0.<br>NO.<br>ES. PSF | MW516<br>40-42'<br>MW516PERM3<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>5305 | SAMPLED<br>TEST STAF<br>TEST FINIS<br>CELL NUM<br>SATURATE<br>TEST TYPE | RTED<br>SHED<br>BER<br>ED TEST | 8/23/12 KD<br>9/13/12 CAL<br>9/15/12 CAL<br>15S<br>Yes<br>TX/Pbp/Tap Water |

| MOISTURE/DENSITY<br>DATA   | BEFORE<br>TEST | AFTER<br>TEST |        |
|----------------------------|----------------|---------------|--------|
| Wt. Soil + Moisture (g)    | 706.5          | 704.6         |        |
| Wt. Wet Soil & Pan (g)     | 713.1          | 711.2         |        |
| Wt. Dry Soil & Pan (g)     | 617.5          | 617.5         |        |
| Wt. Lost Moisture (g)      | 95.6           | 93.7          |        |
| Wt. of Pan Only (g)        | 6.6            | 6.6           |        |
| Wt. of Dry Soil (g)        | 610.9          | 610.9         |        |
| Moisture Content %         | 15.7           | 15.3          |        |
| Wet Density PCF            | 134.8          | 140.4         |        |
| Dry Density PCF            | 116.5          | 121.7         |        |
| Init. Diameter (in)        | 2.862          | (cm)          | 7.269  |
| Init. Area (sq in)         | 6.433          | (sq cm)       | 41.507 |
| Init. Height (in)          | 3.104          | (cm)          | 7.884  |
| Vol. Bef. Consol. (cu ft)  | 0.01156        |               |        |
| Vol. After Consol. (cu ft) | 0.01106        |               |        |
| Porosity %                 | 29.92          |               |        |
|                            |                |               |        |

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# FLOW PUMP CALCULATIONS

| Pump Setting<br>Velocity CM/Sec<br>Q (cc/s)<br>Height<br>Diameter<br>Pressure (psi)<br>Area after consol. (cm*cm)<br>Gradient<br>Permeability k (cm/s)<br><b>Permeability k (m/s)</b><br>Back Pressure (psi)<br>Cell Pressure (psi) | 45<br>2.95E-04<br>9.44E-06<br>3.081<br>2.811<br>0.240<br>40.026<br>2.156<br>1.1E-07<br><b>1.1E-09</b><br>38.0<br>74.8 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Ave. Effective Stress (psi)                                                                                                                                                                                                         | 36.680                                                                                                                |
| Average temperature degree C:                                                                                                                                                                                                       | 23.0                                                                                                                  |

# Average temperature degree C:

| Data entry by:        | MLM    | Date:          |
|-----------------------|--------|----------------|
| Checked by: <u>C4</u> | Date:_ | <u>9/22//2</u> |
| FileName: LKP05163    | _      | <i>,</i> , _   |

09/17/2012



| CLIENT                                                            | LATA Envir                       | onmental Services-Ky                                                                     | JOB NO.                                                                 | 2855-02                 |                                                                            |
|-------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------|
| BORING N<br>DEPTH<br>SAMPLE N<br>PROJECT<br>LOCATION<br>CONF. PRI | 0.<br>10.<br>NO.<br>I<br>ES. PSF | MW516<br>40-42'<br>MW516PERM3<br>ERI12-SW-SWMU211B<br>SW Plume RDSI Geotechnical<br>5305 | SAMPLED<br>TEST STAF<br>TEST FINIS<br>SETUP NO<br>SATURATE<br>TEST TYPE | RTED<br>SHED<br>ED TEST | 8/23/12 KD<br>9/13/12 CAL<br>9/15/12 CAL<br>15S<br>Yes<br>TX/Pbp/Tap Water |

# SATURATION DATA

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| Cell<br>Pres.<br>(PSI) | Back<br>Pres.<br>(PSI) | Burette<br>Reading<br>(CC) |      | Pore<br>Pressure<br>(PSI) |      | Change | в |      |
|------------------------|------------------------|----------------------------|------|---------------------------|------|--------|---|------|
|                        |                        | Close                      | Open | Close                     | Open |        |   |      |
| 40.0                   | 38.0                   | 3.0                        | 12.8 |                           |      |        |   |      |
| 50.0                   |                        | 13.5                       | 13.7 | 39.1                      | 48.7 | 9.6    |   | 0.96 |

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# CONSOLIDATION DATA

|                                                                 | Elapsed<br>Time<br>(Min)    | SQRT<br>Time<br>(Min)      |            | Burette<br>Reading<br>(CC) | Volume<br>Defl.<br>(cc) |        |
|-----------------------------------------------------------------|-----------------------------|----------------------------|------------|----------------------------|-------------------------|--------|
|                                                                 | 0.00                        | 0.00                       |            | 0.50                       | 0.00                    |        |
|                                                                 | 0.25                        | 0.50                       |            | 5.35                       | -4.85                   |        |
|                                                                 | 0.5                         | 0.71                       |            | 5.70                       | -5.20                   |        |
|                                                                 | 1                           | 1.00                       |            | 6.30                       | -5.80                   |        |
|                                                                 | 2                           | 1.41                       |            | 7.10                       | -6.60                   |        |
|                                                                 | 4                           | 2.00                       |            | 8.30                       | -7.80                   |        |
|                                                                 | 9                           | 3.00                       |            | 9.70                       | -9.20                   |        |
|                                                                 | 16                          | 4.00                       |            | 10.40                      | -9.90                   |        |
|                                                                 | 30                          | 5.48                       |            | 11.05                      | -10.55                  |        |
|                                                                 | 60                          | 7.75                       |            | 11.35                      | -10.85                  |        |
|                                                                 | 120                         | 10.95                      |            | 11.60                      | -11,10                  |        |
|                                                                 | 240                         | 15.49                      |            | 12.00                      | -11.50                  |        |
|                                                                 | 360                         | 18.97                      |            | 12.20                      | -11.70                  |        |
| Initial Height (in)                                             |                             | 3.104                      |            | Init. Vol. (CC             | ;)                      | 327.29 |
| Height Change ((in)                                             |                             | 0.023                      |            | Vol. Change                | ícci                    | 24.00  |
| Ht. After Cons. (in)                                            |                             | 3.081                      |            | Cell Exp. (C               | C)                      | 10.00  |
| Initial Area (sq in)                                            |                             | 6.433                      |            | Net Change                 | (ĆC)                    | 14.00  |
| Area After Cons. (sq in)                                        |                             | 6.204                      |            | Cons. Vol. (               | CC) (                   | 313.29 |
| Data entry by:<br>Checked by: <u>Cet.</u><br>FileName: LKP05163 | MLM [<br>Date: <u>9/22/</u> | Date:<br>// <del>2</del> - | 09/17/2012 |                            |                         | ATT    |



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| DATE     | 10/23         | /2012          | TIME            | 11:     | :40     | WELL ID | MW    | -511            |
|----------|---------------|----------------|-----------------|---------|---------|---------|-------|-----------------|
| ADJ WELL | MW            | -513           | TECH            | J. Brov | vnfield | RECD BY | T. N  | /ills           |
|          |               |                |                 |         |         |         |       |                 |
| TIME     | FLOW<br>(gpm) | PRESS<br>(psi) | DTW Adj<br>Well |         | TIME    | FLOW    | PRESS | DTW Adj<br>Well |
| 11:40    | 2.5           | 25             | 16.63           |         |         |         |       |                 |
| 11:43    | 2.2           | 25             | 13.31           |         |         |         |       |                 |
| 11:46    | 2.2           | 25             | 12.89           |         |         |         |       |                 |
| 11:49    | 2.2           | 25             | 12.78           |         |         |         |       |                 |
| 11:52    | 3.1           | 50             | 12.42           |         |         |         |       |                 |
| 11:55    | 3.1           | 50             | 11.85           |         |         |         |       |                 |
| 11:58    | 3.1           | 50             | 11.67           |         |         |         |       |                 |
| 12:01    | 3.9           | 75             | 11.14           |         |         |         |       |                 |
| 12:04    | 3.9           | 75             | 10.37           |         |         |         |       |                 |
| 12:07    | 3.9           | 75             | 9.79            |         |         |         |       |                 |
| 12:10    | 4.8           | 100            | 9.55            |         |         |         |       |                 |
| 12:13    | 4.8           | 100            | 9.42            |         |         |         |       |                 |
| 12:16    | 4.8           | 100            | 9.42            |         |         |         |       |                 |
| Tes      | st Complete   | e per Ken Da   | vis             |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |

| DATE     | 10/23         | /2012          | TIME            | 12:30   |        | WELL ID | MW    | -512            |
|----------|---------------|----------------|-----------------|---------|--------|---------|-------|-----------------|
| ADJ WELL | N,            | /A             | TECH            | J. Brow | nfield | RECD BY | T. N  | Aills           |
|          |               |                |                 |         |        |         |       |                 |
| TIME     | FLOW<br>(gpm) | PRESS<br>(psi) | DTW Adj<br>Well |         | TIME   | FLOW    | PRESS | DTW Adj<br>Well |
| 12:35    | 2.3           | 25             | N/A             |         |        |         |       |                 |
| 12:38    | 1.5           | 25             | N/A             |         |        |         |       |                 |
| 12:41    | 1.5           | 25             | N/A             |         |        |         |       |                 |
| 12:44    | 2.0           | 25             | N/A             |         |        |         |       |                 |
| 12:47    | 2.2           | 25             | N/A             |         |        |         |       |                 |
| 12:50    | 2.2           | 25             | N/A             |         |        |         |       |                 |
| 12:53    | 2.2           | 25             | N/A             |         |        |         |       |                 |
| 12:56    | 3.3           | 50             | N/A             |         |        |         |       |                 |
| 12:59    | 3.3           | 50             | N/A             |         |        |         |       |                 |
| 13:02    | 3.3           | 50             | N/A             |         |        |         |       |                 |
| 13:05    | 4.1           | 75             | N/A             |         |        |         |       |                 |
| 13:08    | 4.1           | 75             | N/A             |         |        |         |       |                 |
| 13:11    | 4.2           | 75             | N/A             |         |        |         |       |                 |
| 13:14    | 4.7           | 100            | N/A             |         |        |         |       |                 |
| 13:17    | 4.7           | 100            | N/A             |         |        |         |       |                 |
| 13:20    | 4.7           | 100            | N/A             |         |        |         |       |                 |
| Tes      | st Complete   | e per Ken Da   | ivis            |         |        |         |       |                 |
|          |               |                |                 |         |        |         |       |                 |
|          |               |                |                 |         |        |         |       |                 |
|          |               |                |                 |         |        |         |       |                 |
|          |               |                |                 |         |        |         |       |                 |

#### DATE 10/23/2012 TIME 9:00 WELL ID MW-513 MW-511 J. Brownfield T. Mills ADJ WELL TECH **RECD BY** FLOW PRESS DTW Adj DTW Adj PRESS TIME TIME FLOW (gpm) Well Well (psi) 9:30 1.5 25 7.48 9:33 0.5 25 7.48 0.7 25 6.03 9:36 9:39 0.9 25 5.96 9:42 1.0 25 5.90 9:45 1.0 25 5.89 9:48 1.0 25 5.87 9:51 1.9 50 5.81 9:54 1.9 50 5.81 Test Paused Due To Equipment Issue 10:10 1.9 50 5.97 2.0 5.97 10:13 50 2.1 10:16 50 6.01 10:19 3.0 75 5.27 10:22 3.0 75 4.11 10:25 3.1 75 0.00 Test Complete per Ken Davis

| DATE     | 10/23         | /2012          | TIME            | 15:05   |         | WELL ID | MW    | -514            |
|----------|---------------|----------------|-----------------|---------|---------|---------|-------|-----------------|
| ADJ WELL | MW-515        | MW-516         | TECH            | J. Brov | vnfield | RECD BY | T. N  | /ills           |
|          |               |                | 1               |         |         | 1       |       |                 |
| TIME     | FLOW<br>(gpm) | PRESS<br>(psi) | DTW Adj<br>Well |         | TIME    | FLOW    | PRESS | DTW Adj<br>Well |
| 15:10    | 2.3           | 25             | 1.20/14.28      |         |         |         |       |                 |
| 15:13    | 2.3           | 25             | 0.0/13.27       |         |         |         |       |                 |
| 15:16    | 2.3           | 25             | 0.0/12.91       |         |         |         |       |                 |
| 15:19    | 2.4           | 50             | 0.0/12.67       |         |         |         |       |                 |
| 15:22    | 2.4           | 50             | 0.0/12.42       |         |         |         |       |                 |
| 15:25    | 2.5           | 50             | 0.0/12.29       |         |         |         |       |                 |
| 15:28    | 3.1           | 75             | 0.0/11.99       |         |         |         |       |                 |
| 13:31    | 3.1           | 75             | 0.0/11.93       |         |         |         |       |                 |
| 15:34    | 3.1           | 75             | 0.0/11.86       |         |         |         |       |                 |
| 15:37    | 3.4           | 100            | 0.0/11.78       |         |         |         |       |                 |
| 15:40    | 3.4           | 100            | 0.0/11.76       |         |         |         |       |                 |
| 15:43    | 3.4           | 100            | 0.0/11.74       |         |         |         |       |                 |
| Test Con | nplete Per K  | (en Davis      |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |

| DATE     | 10/23         | /2012          | TIME            | 13:35   |         | WELL ID | MW    | -515            |
|----------|---------------|----------------|-----------------|---------|---------|---------|-------|-----------------|
| ADJ WELL | MW-514        | MW-516         | TECH            | J. Brov | vnfield | RECD BY | T. N  | ⁄lills          |
|          |               |                |                 |         |         | 1       |       |                 |
| TIME     | FLOW<br>(gpm) | PRESS<br>(psi) | DTW Adj<br>Well |         | TIME    | FLOW    | PRESS | DTW Adj<br>Well |
| 13:38    | 2.5           | 25             | 8.49/22.31      |         |         |         |       |                 |
| 13:41    | 1.7           | 25             | 8.37/20.91      |         |         |         |       |                 |
| 13:44    | 1.6           | 25             | 5.95/20.98      |         |         |         |       |                 |
| 13:47    | 1.7           | 25             | 0.0/21.46       |         |         |         |       |                 |
| 13:50    | 2.8           | 50             | 0.0/21.62       |         |         |         |       |                 |
| 13:53    | 2.9           | 50             | 0.0/21.73       |         |         |         |       |                 |
| 13:56    | 2.9           | 50             | 0.0/21.82       |         |         |         |       |                 |
| 13:59    | 3.8           | 75             | 0.0/21.90       |         |         |         |       |                 |
| 14:02    | 3.7           | 75             | 0.0/21.98       |         |         |         |       |                 |
| 14:05    | 3.7           | 75             | 0.0/22.02       |         |         |         |       |                 |
| 14:08    | 4.5           | 100            | 0.0/22.10       |         |         |         |       |                 |
| 14:11    | 4.5           | 100            | 0.0/22.14       |         |         |         |       |                 |
| 14:14    | 4.5           | 100            | 0.0/22.16       |         |         |         |       |                 |
| Te       | st Complete   | e per Ken Da   | avis            |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |

| DATE     | 10/23         | /2012          | TIME            | 14:20   |         | WELL ID | MW    | -516            |
|----------|---------------|----------------|-----------------|---------|---------|---------|-------|-----------------|
| ADJ WELL | MW-515        | MW-514         | TECH            | J. Brov | vnfield | RECD BY | T. N  | ⁄lills          |
|          |               |                |                 |         |         |         |       |                 |
| TIME     | FLOW<br>(gpm) | PRESS<br>(psi) | DTW Adj<br>Well |         | TIME    | FLOW    | PRESS | DTW Adj<br>Well |
| 14:20    | 2.0           | 25             | 4.21/5.25       |         |         |         |       |                 |
| 14:23    | 1.9           | 25             | 0.0/0.81        |         |         |         |       |                 |
| 14:26    | 1.9           | 25             | 0.0/0.81        |         |         |         |       |                 |
| 14:29    | 1.9           | 25             | 0.0/0.79        |         |         |         |       |                 |
| 14:32    | 3.1           | 50             | 0.0/0.80        |         |         |         |       |                 |
| 14:35    | 3.1           | 50             | 0.0/0.84        |         |         |         |       |                 |
| 14:38    | 3.1           | 50             | 0.0/0.85        |         |         |         |       |                 |
| 14:41    | 3.1           | 75             | 0.0/0.81        |         |         |         |       |                 |
| 14:44    | 3.1           | 75             | 0.0/<0.70       |         |         |         |       |                 |
| 14:47    | 3.1           | 75             | 0.0/<0.50       |         |         |         |       |                 |
| 14:50    | 3.3           | 100            | 0.0/0.0         |         |         |         |       |                 |
| 14:53    | 3.3           | 100            | 0.0/0.0         |         |         |         |       |                 |
| 14:56    | 4.3           | 100            | 0.0/0.0         |         |         |         |       |                 |
| 14:59    | 4.3           | 100            | 0.0/0.0         |         |         |         |       |                 |
| 15:02    | 4.3           | 100            | 0.0/0.0         |         |         |         |       |                 |
| Te       | st Complete   | e Per Ken Da   | ivis            |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |
|          |               |                |                 |         |         |         |       |                 |

**APPENDIX G** 

SUMMARY OF SOILS VOC DATA FOR SWMU 211-B

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| Station                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-D(<br>[µg/kậ | CE<br>g] | <i>cis-</i> 1,2<br>DCE<br>[µg/kg | -<br>;] | trans-1,<br>DCE<br>[µg/kg | ,2-<br>;] | VC<br>[µg/l | C<br>kg] |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------------|----------------|---|------------------|----------|----------------------------------|---------|---------------------------|-----------|-------------|----------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 4.9                         | 27             |   | 1.5              | U        | 0.56                             | U       | 0.87                      | U         | 0.4         | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 8.5                         | 78             |   | 1.8              | U        | 0.71                             | J       | 1.1                       | U         | 0.49        | U        |
| 211-B-001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   | 10.5                        | 150            |   | 1.6              | U        | 0.78                             | J       | 0.93                      | U         | 0.42        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | (10.5)DUP                   | 100            |   | 1.7              | U        | 0.62                             | U       | 0.98                      | U         | 0.45        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 19.5                        | 91             |   | 1.4              | U        | 0.52                             | U       | 0.81                      | U         | 0.37        | U        |
| Station    211-B-001    211-B-002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   | 23                          | 1,700          |   | 22               | U        | 9.5                              | U       | 7.4                       | U         | 25          | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10/0/2012         | 25.1                        | 19             |   | 1.9              | U        | 0.7                              | U       | 1.1                       | U         | 0.5         | U        |
| 211-B-001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10/9/2012         | 34                          | 15             |   | 2                | U        | 0.74                             | U       | 1.2                       | U         | 0.53        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 39.5                        | 93             |   | 1.6              | U        | 0.61                             | U       | 0.95                      | U         | 0.43        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 44                          | 310            |   | 25               | U        | 11                               | U       | 8.3                       | U         | 28          | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 49.5                        | 61             |   | 1.6              | U        | 0.59                             | U       | 0.92                      | U         | 0.42        | U        |
| Station   211-B-001   211-B-002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 53                          | 84             |   | 1.8              | U        | 0.68                             | U       | 1.1                       | U         | 0.49        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 55.5                        | 24             |   | 2                | U        | 0.73                             | U       | 1.1                       | U         | 0.52        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 60.5                        | 1.2            | J | 1.7              | U        | 0.62                             | U       | 0.97                      | U         | 0.44        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | Average                     | 197            |   | ***              |          | 1                                |         | ***                       |           | ***         |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 3                           | 0.41           | U | 1.7              | U        | 0.63                             | U       | 0.99                      | U         | 0.45        | U        |
| 211-В-001<br>211-В-002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                   | 9                           | 0.36           | U | 1.5              | U        | 0.56                             | U       | 0.87                      | U         | 0.4         | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 14                          | 0.35           | U | 1.4              | U        | 0.53                             | U       | 0.83                      | U         | 0.38        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 18.5                        | 2.2            | J | 2.1              | U        | 0.77                             | U       | 1.2                       | U         | 0.55        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 21                          | 170            | J | 23               | U        | 9.8                              | U       | 7.6                       | U         | 26          | U        |
| 211-B-001   10.9/2012   10.5   150     10/9/2012   19.5   91   23   1,700     23   1,700   25.1   19   34   15     39.5   93   44   310   44   310   10     44   310   44   310   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10   10 | 1.5               | U                           | 0.55           | U | 0.87             | U        | 0.4                              | U       |                           |           |             |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10/10/2012        | 31.5                        | 52             |   | 1.8              | U        | 0.68                             | U       | 1.1                       | U         | 0.49        | U        |
| 211- <b>D</b> -002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   | 35.5                        | 210            |   | 1.7              | U        | 0.64                             | U       | 1                         | U         | 0.46        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 44.5                        | 93             |   | 1.6              | U        | 0.61                             | U       | 0.95                      | U         | 0.43        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 47.5                        | 23             |   | 1.5              | U        | 0.58                             | U       | 0.9                       | U         | 0.41        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 50.5                        | 0.39           | U | 1.6              | U        | 0.6                              | U       | 0.94                      | U         | 0.43        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 59.5                        | 4.1            | J | 1.9              | U        | 0.72                             | U       | 1.1                       | U         | 0.52        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 62.5                        | 1.8            | J | 2.1              | U        | 0.78                             | U       | 1.2                       | U         | 0.56        | U        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | Average                     | 43             |   | ***              |          | ***                              |         | ***                       |           | ***         |          |

# Summary of Soils VOC Data for SWMU 211-B

| Station   | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-D(<br>[µg/k | CE<br>g] | cis-1,2<br>DCE<br>[µg/kg | 2-<br>g] | trans-1<br>DCE<br>[µg/kg | ,2-<br>;] | V(<br>[µg/l | C<br>kg] |
|-----------|-------------------|-----------------------------|----------------|---|-----------------|----------|--------------------------|----------|--------------------------|-----------|-------------|----------|
|           |                   | 4                           | 0.41           | U | 1.7             | U        | 0.63                     | U        | 0.98                     | U         | 0.45        | U        |
|           |                   | 9                           | 0.41           | U | 1.7             | U        | 0.63                     | U        | 0.98                     | U         | 0.45        | U        |
|           |                   | 14.5                        | 1              | J | 1.6             | U        | 0.6                      | U        | 0.93                     | U         | 0.43        | U        |
|           |                   | 19.5                        | 0.46           | J | 1.4             | U        | 0.51                     | U        | 0.8                      | U         | 0.37        | U        |
|           |                   | (19.5)DUP                   | 0.5            | J | 1.5             | U        | 0.56                     | U        | 0.88                     | U         | 0.4         | U        |
| 211-B-003 | 10/10/2012        | 23                          | 0.35           | U | 1.4             | U        | 0.54                     | U        | 0.84                     | U         | 0.38        | U        |
|           |                   | 28.5                        | 0.33           | U | 1.4             | U        | 0.51                     | U        | 0.79                     | U         | 0.36        | U        |
|           |                   | 34                          | 0.87           | J | 1.3             | U        | 0.5                      | U        | 0.78                     | U         | 0.36        | U        |
|           |                   | 39                          | 17             |   | 1.6             | U        | 0.61                     | U        | 0.95                     | U         | 0.43        | U        |
|           |                   | 40.5                        | 19             |   | 1.4             | U        | 0.51                     | U        | 0.8                      | U         | 0.37        | U        |
|           |                   |                             |                |   |                 |          |                          |          |                          |           |             |          |
|           |                   | 49.5                        | 17             |   | 1.7             | U        | 0.64                     | U        | 1                        | U         | 0.46        | U        |
|           |                   | 52                          | 61             |   | 1.7             | U        | 0.63                     | U        | 0.99                     | U         | 0.45        | U        |
|           |                   | 58.5                        | 9              | J | 1.5             | U        | 0.55                     | U        | 0.86                     | U         | 0.39        | U        |
|           |                   | Average                     | 10             |   | ***             |          | ***                      |          | ***                      |           | ***         |          |
|           |                   | 3.5                         | 12             |   | 1.4             | U        | 1.4                      | J        | 0.8                      | U         | 0.37        | U        |
|           |                   | 7                           | 30             |   | 1.6             | U        | 20                       |          | 0.93                     | U         | 0.42        | U        |
|           |                   | 14.5                        | 1,800          |   | 25              | U        | 66                       | J        | 8.3                      | U         | 28          | U        |
|           |                   | 17.5                        | 72             |   | 1.6             | U        | 4.2                      | J        | 0.96                     | U         | 0.44        | U        |
|           |                   | 20.1                        | 380            |   | 25              | U        | 11                       | U        | 8.5                      | U         | 29          | U        |
|           |                   | 25.5                        | 920            |   | 21              | U        | 9                        | U        | 7                        | U         | 24          | U        |
| 211 B 004 | 10/11/2012        | 30.1                        | 900            |   | 27              | U        | 11                       | U        | 8.9                      | U         | 30          | U        |
| 211-D-004 |                   | 35.1                        | 250            |   | 24              | U        | 10                       | U        | 7.9                      | U         | 27          | U        |
|           |                   | 41                          | 620            |   | 24              | U        | 10                       | U        | 8                        | U         | 27          | U        |
|           |                   | 49.9                        | 270            |   | 23              | U        | 9.8                      | U        | 7.7                      | U         | 26          | U        |
|           |                   | 51                          | 19             | U | 26              | U        | 11                       | U        | 8.8                      | U         | 30          | U        |
|           |                   | 55.1                        | 75             |   | 1.5             | U        | 0.57                     | U        | 0.9                      | U         | 0.41        | U        |
|           |                   | 62                          | 100            | J | 23              | U        | 10                       | U        | 7.8                      | U         | 26          | U        |
|           |                   | Average                     | 418            |   | ***             |          | 10                       |          | ***                      |           | ***         |          |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station                | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg]   | l | 1,1-D(<br>[µg/kậ | CE<br>g] | <i>cis</i> -1,2<br>DCE<br>[µg/kg | 2-<br>5] | trans-1,<br>DCE<br>[µg/kg | ,2-<br>;] | V(<br>[µg/l | C<br>kg] |
|------------------------|-------------------|-----------------------------|------------------|---|------------------|----------|----------------------------------|----------|---------------------------|-----------|-------------|----------|
|                        |                   | 4.9                         | 46               |   | 1.8              | U        | 6.8                              | J        | 1                         | U         | 0.47        | U        |
|                        |                   | 5.1                         | 71               |   | 1.7              | U        | 8.3                              | J        | 0.97                      | U         | 0.45        | U        |
|                        |                   | 13.5                        | 340              |   | 26               | U        | 11                               | U        | 8.6                       | U         | 29          | U        |
|                        |                   | 18                          | 130              |   | 1.8              | U        | 0.66                             | U        | 1                         | U         | 0.47        | U        |
|                        |                   | 23                          | 3,100            |   | 24               | U        | 10                               | U        | 7.9                       | U         | 27          | U        |
|                        |                   | (29.5)DUP                   | 2,900            |   | 33               | U        | 14                               | U        | 11                        | U         | 38          | U        |
| 211-B-005              | 10/15/2012        | 29.5                        | 700              |   | 23               | U        | 10                               | U        | 7.9                       | U         | 27          | U        |
|                        | 10/13/2012        | 30.5                        | 1,400            |   | 32               | U        | 14                               | U        | 11                        | U         | 36          | U        |
|                        |                   | 35.5                        | 380              |   | 26               | U        | 11                               | U        | 8.6                       | U         | 29          | U        |
| 211-B-005<br>211-B-006 |                   | 40.5                        | 1,500            |   | 28               | U        | 12                               | U        | 9.6                       | U         | 32          | U        |
|                        |                   | 48                          | <mark>690</mark> |   | 23               | U        | 10                               | U        | 7.8                       | U         | 26          | U        |
|                        |                   | 50.5                        | 360              |   | 26               | U        | 11                               | U        | 8.7                       | U         | 30          | U        |
|                        |                   | 59                          | 340              |   | 25               | U        | 11                               | U        | 8.5                       | U         | 29          | U        |
|                        |                   | 60.1                        | 120              | J | 46               | U        | 20                               | U        | 15                        | U         | 52          | U        |
|                        |                   | Average                     | 863              |   | ***              |          | 6                                |          | ***                       |           | ***         |          |
|                        |                   | 4.5                         | 0.41             | U | 1.7              | U        | 0.63                             | U        | 0.98                      | U         | 0.45        | U        |
|                        |                   | 9                           | 0.41             | U | 1.7              | U        | 0.63                             | U        | 0.99                      | U         | 0.45        | U        |
| 211-B-005<br>211-B-006 |                   | 13.5                        | 4.7              | J | 1.6              | U        | 0.61                             | U        | 0.95                      | U         | 0.43        | U        |
|                        |                   | 17.5                        | 29               |   | 1.6              | U        | 0.59                             | U        | 0.92                      | U         | 0.42        | U        |
|                        |                   | 21                          | 92               |   | 1.9              | U        | 0.7                              | U        | 1.1                       | U         | 0.5         | U        |
|                        |                   | 29.5                        | 25               |   | 1.7              | U        | 0.64                             | U        | 1                         | U         | 0.46        | U        |
| 211 D 006              | 10/15/2012        | 31                          | 3.3              | J | 2                | U        | 0.73                             | U        | 1.1                       | U         | 0.52        | U        |
| 211- <b>D</b> -000     |                   | 37.5                        | 4                | J | 1.5              | U        | 0.56                             | U        | 0.87                      | U         | 0.4         | U        |
|                        |                   | 44.9                        | 14               |   | 1.6              | U        | 0.59                             | U        | 0.93                      | U         | 0.43        | U        |
|                        |                   | 49.5                        | 11               |   | 1.8              | U        | 0.67                             | U        | 1                         | U         | 0.48        | U        |
|                        |                   | 52.5                        | 7.6              | J | 1.7              | U        | 0.62                             | U        | 0.98                      | U         | 0.45        | U        |
|                        |                   | 59                          | 1.2              | J | 1.7              | U        | 0.65                             | U        | 1                         | U         | 0.46        | U        |
|                        |                   | 62                          | 0.47             | U | 1.9              | U        | 0.73                             | U        | 1.1                       | U         | 0.52        | U        |
|                        |                   | Average                     | 15               |   | ***              |          | ***                              |          | ***                       |           | ***         |          |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station   | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg]                                         |   | 1,1-DC<br>[µg/kş | CE<br>g] | <i>cis</i> -1,2<br>DCE<br>[µg/kg | -<br>] | <i>trans-</i> 1,<br>DCE<br>[µg/kg | ,2-<br>g] | V(<br>[µg/l | C<br>kg] |
|-----------|-------------------|-----------------------------|--------------------------------------------------------|---|------------------|----------|----------------------------------|--------|-----------------------------------|-----------|-------------|----------|
|           |                   | 2.5                         | 0.35                                                   | U | 1.4              | U        | 0.54                             | U      | 0.85                              | U         | 0.39        | U        |
|           |                   | 5.5                         | 0.32                                                   | U | 1.3              | U        | 0.49                             | U      | 0.77                              | U         | 0.35        | U        |
|           |                   | 11                          | 0.39                                                   | U | 1.6              | U        | 0.6                              | U      | 0.94                              | U         | 0.43        | U        |
|           |                   | 17.5                        | 0.4                                                    | U | 1.7              | U        | 0.62                             | U      | 0.97                              | U         | 0.44        | U        |
|           |                   | 23                          | 0.98                                                   | J | 1.5              | U        | 0.55                             | U      | 0.86                              | U         | 0.39        | U        |
|           |                   | (23)DUP                     | 0.73                                                   | J | 1.4              | U        | 0.52                             | U      | 0.82                              | U         | 0.37        | U        |
|           | 10/16/2012        | 25.1                        | 0.51                                                   | J | 1.4              | U        | 0.53                             | U      | 0.83                              | U         | 0.38        | U        |
| 211-B-007 | 10/10/2012        | 33.5                        | 15                                                     |   | 1.6              | U        | 0.61                             | U      | 0.95                              | U         | 0.44        | U        |
|           |                   | 35.5                        | 7.4                                                    | J | 1.5              | U        | 0.56                             | U      | 0.88                              | U         | 0.4         | U        |
|           |                   | 44.5                        | 9.7                                                    | J | 1.6              | U        | 0.59                             | U      | 0.93                              | U         | 0.42        | U        |
|           |                   | 49                          | 0.35                                                   | U | 1.4              | U        | 0.54                             | U      | 0.84                              | U         | 0.39        | U        |
|           |                   | 53.5                        | 7.3                                                    | J | 1.7              | U        | 0.64                             | U      | 0.99                              | U         | 0.46        | U        |
|           |                   | 55.1                        | 6.3                                                    | J | 1.7              | U        | 0.63                             | U      | 0.99                              | U         | 0.45        | U        |
|           |                   | 60.1                        | $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |   |                  |          |                                  |        |                                   |           |             |          |
|           |                   | Average                     | 4                                                      |   | ***              |          | ***                              |        | ***                               |           | ***         |          |
|           |                   | 0.5                         | 0.42                                                   | U | 1.7              | U        | 0.65                             | U      | 1                                 | U         | 0.46        | U        |
|           |                   | (8)DUP                      | 0.37                                                   | U | 1.5              | U        | 0.57                             | U      | 0.89                              | U         | 0.41        | U        |
|           |                   | 8                           | 0.39                                                   | U | 1.6              | U        | 0.6                              | U      | 0.95                              | U         | 0.43        | U        |
|           |                   | 12.5                        | 0.38                                                   | U | 1.6              | U        | 0.58                             | U      | 0.91                              | U         | 0.42        | U        |
|           |                   | 16.5                        | 0.35                                                   | U | 1.5              | U        | 0.54                             | U      | 0.85                              | U         | 0.39        | U        |
|           |                   | 24                          | 5.2                                                    | J | 1.7              | U        | 0.63                             | U      | 0.99                              | U         | 0.45        | U        |
|           | 10/0/2012         | 28.5                        | 0.36                                                   | U | 1.5              | U        | 0.55                             | U      | 0.86                              | U         | 0.39        | U        |
| 211-B-008 | 10/9/2012         | 32                          | 0.41                                                   | U | 1.7              | U        | 0.63                             | U      | 0.98                              | U         | 0.45        | U        |
|           |                   | 37                          | 0.39                                                   | U | 1.6              | U        | 0.61                             | U      | 0.95                              | U         | 0.43        | U        |
|           |                   | 40.1                        | 0.4                                                    | U | 1.7              | U        | 0.62                             | U      | 0.97                              | U         | 0.44        | U        |
|           |                   | 48                          | 0.37                                                   | U | 1.5              | U        | 0.56                             | U      | 0.88                              | U         | 0.4         | U        |
|           |                   | 50.5                        | 0.41                                                   | U | 1.7              | U        | 0.64                             | U      | 1                                 | U         | 0.46        | U        |
|           |                   | 58.5                        | 0.43                                                   | U | 1.8              | U        | 0.66                             | U      | 1                                 | U         | 0.47        | U        |
|           |                   | 62.5                        | 0.43                                                   | U | 1.8              | U        | 0.67                             | U      | 1                                 | U         | 0.48        | U        |
|           |                   | Average                     | 0.6                                                    |   | ***              |          | ***                              |        | ***                               |           | ***         |          |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station                           | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-DC<br>[µg/kş | CE<br>g] | cis-1,2<br>DCE<br>[µg/kg | <b>2-</b><br>g] | trans-1,<br>DCE<br>[µg/kg | ,2-<br>;] | V(<br>[µg/l | C<br><b>kg]</b> |
|-----------------------------------|-------------------|-----------------------------|----------------|---|------------------|----------|--------------------------|-----------------|---------------------------|-----------|-------------|-----------------|
|                                   |                   | 4                           | 3              | J | 1.8              | U        | 0.66                     | U               | 1                         | U         | 0.47        | U               |
| Station    211-B-009    211-B-010 |                   | 6.5                         | 3.5            | J | 1.8              | U        | 0.65                     | U               | 1                         | U         | 0.47        | U               |
|                                   |                   | 14.5                        | 10             |   | 1.6              | U        | 0.87                     | J               | 0.92                      | U         | 0.42        | U               |
|                                   |                   | 16                          | 8.4            | J | 1.5              | U        | 0.56                     | U               | 0.88                      | U         | 0.4         | U               |
|                                   |                   | 22                          | 0.38           | U | 1.6              | U        | 0.58                     | U               | 0.91                      | U         | 0.42        | U               |
|                                   |                   | 28.5                        | 1.9            | J | 1.6              | U        | 0.59                     | U               | 0.93                      | U         | 0.42        | U               |
|                                   | 10/9/2012         | (34.5)DUP                   | 0.46           | U | 1.9              | U        | 0.7                      | U               | 1.1                       | U         | 0.5         | U               |
| 211-B-009                         | 10/8/2012         | 34.5                        | 0.4            | U | 1.7              | U        | 0.62                     | U               | 0.98                      | U         | 0.45        | U               |
|                                   |                   | 36                          | 0.35           | U | 1.4              | U        | 0.54                     | U               | 0.84                      | U         | 0.39        | U               |
|                                   |                   | 44                          | 0.41           | U | 1.7              | U        | 0.63                     | U               | 0.99                      | U         | 0.45        | U               |
|                                   |                   | 49.5                        | 0.41           | U | 1.7              | U        | 0.63                     | U               | 0.98                      | U         | 0.45        | U               |
|                                   |                   | 51.5                        | 0.39           | U | 1.6              | U        | 0.6                      | U               | 0.94                      | U         | 0.43        | U               |
|                                   |                   | 59.5                        | 0.41           | U | 1.7              | U        | 0.63                     | U               | 0.99                      | U         | 0.45        | U               |
|                                   |                   | 62                          | 0.4            | U | 1.6              | U        | 0.61                     | U               | 0.96                      | U         | 0.44        | U               |
|                                   |                   | Average                     | 2              |   | ***              |          | 0.3                      |                 | ***                       |           | ***         |                 |
|                                   |                   | 4                           | 0.38           | U | 1.6              | U        | 0.58                     | U               | 0.91                      | U         | 0.42        | U               |
|                                   |                   | 9.9                         | 2.1            | J | 1.7              | U        | 0.62                     | U               | 0.97                      | U         | 0.44        | U               |
|                                   |                   | 14                          | 8.4            | J | 1.5              | U        | 0.63                     | J               | 0.86                      | U         | 0.39        | U               |
|                                   |                   | 16                          | 1.7            | J | 1.5              | U        | 0.54                     | U               | 0.85                      | U         | 0.39        | U               |
|                                   |                   | 20.5                        | 2.4            | J | 1.5              | U        | 0.57                     | U               | 0.89                      | U         | 0.41        | U               |
|                                   |                   | 28.5                        | 9.7            | J | 1.7              | U        | 0.64                     | U               | 1                         | U         | 0.46        | U               |
| 211 D 010                         | 10/5/2012         | 31                          | 0.39           | U | 1.6              | U        | 0.6                      | U               | 0.94                      | U         | 0.43        | U               |
| 211-B-010                         |                   | 39                          | 2.3            | J | 1.5              | U        | 0.55                     | U               | 0.86                      | U         | 0.4         | U               |
|                                   |                   | 41                          | 3.2            | J | 1.6              | U        | 0.59                     | U               | 0.92                      | U         | 0.42        | U               |
|                                   |                   | 46                          | 3              | J | 1.5              | U        | 0.55                     | U               | 0.86                      | U         | 0.39        | U               |
|                                   |                   | 51.5                        | 4              | J | 1.5              | U        | 0.55                     | U               | 0.86                      | U         | 0.39        | U               |
|                                   |                   | 59.5                        | 1.7            | J | 1.6              | U        | 0.58                     | U               | 0.91                      | U         | 0.42        | U               |
|                                   |                   | 62                          | 0.62           | J | 1.7              | U        | 0.63                     | U               | 0.99                      | U         | 0.45        | U               |
|                                   |                   | Average                     | 3              |   | ***              |          | 0.3                      |                 | ***                       |           | ***         |                 |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station                           | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-DC<br>[µg/kậ | CE<br>g] | <i>cis</i> -1,2<br>DCE<br>[µg/kg | ;-<br>;] | trans-1<br>DCE<br>[µg/kg | ,2-<br>g] | V(<br>[µg/l | C<br><b>kg]</b> |
|-----------------------------------|-------------------|-----------------------------|----------------|---|------------------|----------|----------------------------------|----------|--------------------------|-----------|-------------|-----------------|
|                                   |                   | 4                           | 0.41           | U | 1.7              | U        | 0.63                             | U        | 0.99                     | U         | 0.45        | U               |
| Station<br>211-B-011<br>211-B-012 |                   | 9                           | 4.3            | J | 1.8              | U        | 0.67                             | U        | 1.1                      | U         | 0.48        | U               |
|                                   |                   | 14.5                        | 15             |   | 1.4              | U        | 0.54                             | U        | 0.84                     | U         | 0.38        | U               |
|                                   |                   | 19.5                        | 12             |   | 1.5              | U        | 0.57                             | U        | 0.9                      | U         | 0.41        | U               |
|                                   |                   | 20.5                        | 15             |   | 1.3              | U        | 0.5                              | U        | 0.78                     | U         | 0.36        | U               |
|                                   |                   | (20.5)DUP                   | 5.8            | J | 1.5              | U        | 0.56                             | U        | 0.87                     | U         | 0.4         | U               |
|                                   | 10/8/2012         | 29.5                        | 1.6            | J | 1.7              | U        | 0.63                             | U        | 0.99                     | U         | 0.45        | U               |
| 211-B-011                         | 10/8/2012         | 32                          | 0.36           | U | 1.5              | U        | 0.55                             | U        | 0.87                     | U         | 0.4         | U               |
|                                   |                   | 39                          | 0.84           | J | 1.6              | U        | 0.59                             | U        | 0.92                     | U         | 0.42        | U               |
|                                   |                   | 44                          | 1.5            | J | 1.5              | U        | 0.56                             | U        | 0.87                     | U         | 0.4         | U               |
|                                   |                   | 45.1                        | 2.4            | J | 1.6              | U        | 0.61                             | U        | 0.96                     | U         | 0.44        | U               |
|                                   |                   | 51                          | 2.2            | J | 1.4              | U        | 0.53                             | U        | 0.83                     | U         | 0.38        | U               |
|                                   |                   | 59                          | 0.39           | U | 1.6              | U        | 0.61                             | U        | 0.95                     | U         | 0.44        | U               |
|                                   |                   | 64.9                        | 2              | J | 1.7              | U        | 0.64                             | U        | 1                        | U         | 0.46        | U               |
|                                   |                   | Average                     | 5              |   | ***              |          | ***                              |          | ***                      |           | ***         |                 |
|                                   |                   | 2                           | 0.38           | U | 1.6              | U        | 0.59                             | U        | 0.93                     | U         | 0.42        | U               |
|                                   |                   | 5.5                         | 0.38           | U | 1.6              | U        | 0.58                             | U        | 0.92                     | U         | 0.42        | U               |
|                                   |                   | 10.1                        | 0.4            | U | 1.7              | U        | 0.62                             | U        | 0.96                     | U         | 0.44        | U               |
|                                   |                   | 15.1                        | 0.34           | U | 1.4              | U        | 0.52                             | U        | 0.82                     | U         | 0.38        | U               |
|                                   |                   | 23.5                        | 0.43           | U | 1.8              | U        | 0.67                             | U        | 1                        | U         | 0.48        | U               |
|                                   |                   | 29.5                        | 0.36           | U | 1.5              | U        | 0.56                             | U        | 0.88                     | U         | 0.4         | U               |
| 211 D 012                         | 10/4/2012         | 32                          | 0.89           | J | 1.5              | U        | 0.56                             | U        | 0.88                     | U         | 0.4         | U               |
| 211- <b>D-</b> 012                |                   | 39                          | 4.6            | J | 1.9              | U        | 0.7                              | U        | 1.1                      | U         | 0.5         | U               |
|                                   |                   | 40.1                        | 5.9            | J | 1.5              | U        | 0.54                             | U        | 0.85                     | U         | 0.39        | U               |
|                                   |                   | 49.9                        | 0.39           | U | 1.6              | U        | 0.6                              | U        | 0.93                     | U         | 0.43        | U               |
|                                   |                   | 50.5                        | 0.39           | U | 1.6              | U        | 0.6                              | U        | 0.94                     | U         | 0.43        | U               |
|                                   |                   | 59                          | 0.43           | U | 1.8              | U        | 0.66                             | U        | 1                        | U         | 0.47        | U               |
|                                   |                   | 61                          | 0.39           | U | 1.6              | U        | 0.6                              | U        | 0.94                     | U         | 0.43        | U               |
|                                   |                   | Average                     | 1.0            |   | ***              |          | ***                              |          | ***                      |           | ***         |                 |

Summary of Soils VOC Data for SWMU 211-B (Continued)
| Station   | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-DC<br>[µg/kậ | CE<br>g] | <i>cis-</i> 1,2-<br>DCE<br>[µg/kg] |   | <i>trans</i> -1,2-<br>DCE<br>[μg/kg] |   | VC<br>[µg/kg] |   |
|-----------|-------------------|-----------------------------|----------------|---|------------------|----------|------------------------------------|---|--------------------------------------|---|---------------|---|
|           |                   | 1.5                         | 0.38           | U | 1.6              | U        | 0.58                               | U | 0.91                                 | U | 0.42          | U |
|           |                   | 9                           | 0.41           | U | 1.7              | U        | 0.63                               | U | 0.98                                 | U | 0.45          | U |
|           |                   | 14                          | 0.44           | U | 1.8              | U        | 0.67                               | U | 1.1                                  | U | 0.48          | U |
|           |                   | (16)DUP                     | 0.39           | U | 1.6              | U        | 0.6                                | U | 0.95                                 | U | 0.43          | U |
|           |                   | 16                          | 0.43           | U | 1.8              | U        | 0.66                               | U | 1                                    | U | 0.48          | U |
|           |                   | 21                          | 0.47           | U | 1.9              | U        | 0.72                               | U | 1.1                                  | U | 0.52          | U |
|           | 10/4/2012         | 28                          | 0.33           | U | 1.4              | U        | 0.51                               | U | 0.8                                  | U | 0.37          | U |
| 211-B-013 | 10/4/2012         | 30.1                        | 0.35           | U | 1.5              | U        | 0.54                               | U | 0.85                                 | U | 0.39          | U |
|           |                   | 36.5                        | 0.35           | U | 1.4              | U        | 0.54                               | U | 0.84                                 | U | 0.38          | U |
|           |                   | 43.5                        | 1.2            | J | 1.5              | U        | 0.57                               | U | 0.9                                  | U | 0.41          | U |
|           |                   | 48                          | 0.31           | U | 1.3              | U        | 0.47                               | U | 0.74                                 | U | 0.34          | U |
|           |                   | 50.1                        | 0.42           | U | 1.7              | U        | 0.64                               | U | 1                                    | U | 0.46          | U |
|           |                   | 59.5                        | 0.37           | U | 1.5              | U        | 0.57                               | U | 0.89                                 | U | 0.41          | U |
|           |                   | 61.5                        | 0.39           | U | 1.6              | U        | 0.61                               | U | 0.95                                 | U | 0.43          | U |
|           |                   | Average                     | 0.3            |   | ***              |          | ***                                |   | ***                                  |   | ***           |   |
|           |                   | 3                           | 1.6            | J | 1.9              | U        | 4.5                                | J | 1.1                                  | U | 0.5           | U |
|           | 10/16/2012        | 5.1                         | 2.2            | J | 1.7              | U        | 2.5                                | J | 0.98                                 | U | 0.45          | U |
|           |                   | 13.5                        | 4.9            | J | 1.6              | U        | 0.73                               | J | 0.93                                 | U | 0.43          | U |
|           |                   | 19.9                        | 1              | J | 1.5              | U        | 0.56                               | U | 0.87                                 | U | 0.4           | U |
|           |                   | 21.5                        | 170            |   | 1.5              | U        | 6.1                                | J | 0.85                                 | U | 0.39          | U |
|           |                   | 29.5                        | 120            |   | 1.5              | U        | 4.7                                | J | 0.86                                 | U | 0.39          | U |
| 211 D 015 |                   | 30.5                        | 5.4            | J | 2                | U        | 0.74                               | U | 1.2                                  | U | 0.53          | U |
| 211-В-015 |                   | 37                          | 5.5            | J | 1.4              | U        | 0.53                               | U | 0.84                                 | U | 0.38          | U |
|           |                   | 41.5                        | 37             |   | 1.7              | U        | 0.91                               | J | 0.98                                 | U | 0.45          | U |
|           |                   | 48.5                        | 17             |   | 1.5              | U        | 0.57                               | U | 0.9                                  | U | 0.41          | U |
|           |                   | 52                          | 39             |   | 1.7              | U        | 0.63                               | U | 0.99                                 | U | 0.45          | U |
|           |                   | 56                          | 42             |   | 1.7              | U        | 0.63                               | U | 0.99                                 | U | 0.45          | U |
|           |                   | 60.5                        | 67             |   | 1.6              | U        | 0.61                               | U | 0.95                                 | U | 0.43          | U |
|           |                   | Average                     | 39             |   | ***              |          | 2                                  |   | ***                                  |   | ***           |   |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station            | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-D(<br>[µg/kậ | CE<br>g] | <i>cis</i> -1,2<br>DCE<br>[µg/kg | -<br>;] | trans-1<br>DCE<br>[µg/kg | ,2-<br>g] | VC<br>[µg/kg] |   |
|--------------------|-------------------|-----------------------------|----------------|---|------------------|----------|----------------------------------|---------|--------------------------|-----------|---------------|---|
|                    |                   | 1                           | 0.43           | U | 1.8              | U        | 0.65                             | U       | 1                        | U         | 0.47          | U |
|                    |                   | 5.1                         | 0.43           | U | 1.8              | U        | 0.67                             | U       | 1                        | U         | 0.48          | U |
|                    |                   | 14                          | 7.7            | J | 1.4              | U        | 0.53                             | U       | 0.83                     | U         | 0.38          | U |
|                    |                   | (16)DUP                     | 0.33           | U | 1.4              | U        | 0.52                             | U       | 0.81                     | U         | 0.37          | U |
|                    |                   | 16                          | 3              | J | 1.6              | U        | 0.6                              | U       | 0.93                     | U         | 0.43          | U |
|                    |                   | 21.5                        | 19             |   | 1.4              | U        | 0.52                             | U       | 0.82                     | U         | 0.37          | U |
|                    | 10/17/2012        | 29.5                        | 23             |   | 1.5              | U        | 1.1                              | J       | 0.88                     | U         | 0.4           | U |
| 211-B-016          | 10/17/2012        | 33.5                        | 16             |   | 1.8              | U        | 0.87                             | J       | 1                        | U         | 0.47          | U |
|                    |                   | 36.5                        | 18             |   | 1.6              | U        | 0.6                              | U       | 0.94                     | U         | 0.43          | U |
|                    |                   | 43.5                        | 23             |   | 1.6              | U        | 0.58                             | U       | 0.91                     | U         | 0.42          | U |
|                    |                   | 48.5                        | 31             |   | 1.7              | U        | 0.64                             | U       | 1                        | U         | 0.46          | U |
|                    |                   | 50.1                        | 42             |   | 1.8              | U        | 0.67                             | U       | 1                        | U         | 0.48          | U |
|                    |                   | 55.1                        | 20             |   | 1.8              | U        | 0.69                             | U       | 1.1                      | U         | 0.49          | U |
|                    |                   | 60.1                        | 4.3            | J | 1.7              | U        | 0.63                             | U       | 0.98                     | U         | 0.45          | U |
|                    |                   | Average                     | 15             |   | ***              |          | 0.4                              |         | ***                      |           | ***           |   |
|                    | 10/17/2012        | 4                           | 6.1            | J | 1.5              | U        | 2.4                              | J       | 0.89                     | U         | 0.41          | U |
|                    |                   | 8                           | 26             |   | 1.7              | U        | 1.3                              | J       | 0.97                     | U         | 0.44          | U |
|                    |                   | 14                          | 28             |   | 1.8              | U        | 0.69                             | U       | 1.1                      | U         | 0.49          | U |
|                    |                   | 16                          | 13             |   | 1.5              | U        | 0.55                             | U       | 0.86                     | U         | 0.39          | U |
|                    |                   | 23.5                        | 13             |   | 1.5              | U        | 0.55                             | U       | 0.86                     | U         | 0.39          | U |
|                    |                   | 29.9                        | 16             |   | 1.7              | U        | 0.64                             | U       | 1                        | U         | 0.46          | U |
| 211 P 017          |                   | 30.5                        | 39             |   | 2                | U        | 0.73                             | U       | 1.1                      | U         | 0.53          | U |
| 211- <b>B-</b> 017 |                   | 35.1                        | 8.9            | J | 1.7              | U        | 0.63                             | U       | 0.98                     | U         | 0.45          | U |
|                    |                   | 44.5                        | 120            |   | 1.7              | U        | 0.64                             | U       | 1                        | U         | 0.46          | U |
|                    |                   | 48                          | 37             |   | 1.6              | U        | 0.61                             | U       | 0.96                     | U         | 0.44          | U |
|                    |                   | 52                          | 20             |   | 1.5              | U        | 0.58                             | U       | 0.9                      | U         | 0.41          | U |
|                    |                   | 56                          | 3.4            | J | 1.8              | U        | 0.69                             | U       | 1.1                      | U         | 0.49          | U |
|                    |                   | 62.5                        | 0.38           | U | 1.6              | U        | 0.59                             | U       | 0.93                     | U         | 0.42          | U |
|                    |                   | Average                     | 25             |   | ***              |          | 0.6                              |         | ***                      |           | ***           |   |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station   | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] |   | 1,1-DC<br>[µg/kş | CE<br>g] | <i>cis</i> -1,2<br>DCE<br>[µg/kg | ;-<br>;] | trans-1,<br>DCE<br>[µg/kg | ,2-<br>g] | VC<br>[µg/kg] |   |
|-----------|-------------------|-----------------------------|----------------|---|------------------|----------|----------------------------------|----------|---------------------------|-----------|---------------|---|
|           |                   | 3.5                         | 2.5            | J | 1.7              | U        | 0.62                             | U        | 0.97                      | U         | 0.45          | U |
|           |                   | 4.9                         | 3.3            | J | 1.7              | U        | 0.64                             | U        | 1                         | U         | 0.46          | U |
|           |                   | 14                          | 0.59           | J | 1.4              | U        | 0.53                             | U        | 0.83                      | U         | 0.38          | U |
|           |                   | 19.5                        | 0.36           | U | 1.5              | U        | 0.55                             | U        | 0.86                      | U         | 0.39          | U |
|           |                   | 21                          | 28             |   | 1.4              | U        | 0.52                             | U        | 0.81                      | U         | 0.37          | U |
|           |                   | 28                          | 13             |   | 2                | U        | 0.76                             | U        | 1.2                       | U         | 0.54          | U |
| 211 D 019 | 10/18/2012        | 30.1                        | 2.2            | J | 1.5              | U        | 0.57                             | U        | 0.89                      | U         | 0.41          | U |
| 211-D-016 |                   | 37.5                        | 1.9            | J | 1.7              | U        | 0.63                             | U        | 0.99                      | U         | 0.45          | U |
|           |                   | 40.5                        | 2              | J | 1.7              | U        | 0.62                             | U        | 0.97                      | U         | 0.45          | U |
|           |                   | 47.5                        | 0.37           | U | 1.5              | U        | 0.57                             | U        | 0.9                       | U         | 0.41          | U |
|           |                   | 53.5                        | 0.46           | U | 1.9              | U        | 0.71                             | U        | 1.1                       | U         | 0.51          | U |
|           |                   | 58                          | 0.38           | U | 1.6              | U        | 0.58                             | U        | 0.91                      | U         | 0.41          | U |
|           |                   | 60.1                        | 0.82           | U | 3.4              | U        | 1.3                              | U        | 2                         | U         | 0.9           | U |
|           | Average           |                             | 4              |   | ***              |          | ***                              |          | ***                       |           | ***           |   |
|           |                   | 2.5                         | 10             |   | 1.5              | U        | 1                                | J        | 0.9                       | U         | 0.41          | U |
|           |                   | (2.5)DUP                    | 6.7            | J | 1.7              | U        | 0.66                             | J        | 1                         | U         | 0.46          | U |
|           | 10/18/2012        | 9.5                         | 28             |   | 1.5              | U        | 7                                | J        | 0.9                       | U         | 0.41          | U |
|           |                   | 12                          | 110            |   | 1.8              | U        | 26                               |          | 1.1                       | U         | 0.49          | U |
|           |                   | 19.5                        | 3.2            | J | 1.3              | U        | 0.5                              | U        | 0.78                      | U         | 0.36          | U |
|           |                   | 23                          | 2,700          |   | 22               | U        | 9.3                              | U        | 7.3                       | U         | 25            | U |
|           |                   | 25.1                        | 13,000         |   | 54               | U        | 23                               | U        | 18                        | U         | 62            | U |
| 211-B-019 |                   | 32                          | 170            |   | 1.4              | U        | 2.4                              | J        | 0.82                      | U         | 0.37          | U |
|           |                   | 37                          | 100            |   | 1.4              | U        | 1.4                              | J        | 0.84                      | U         | 0.38          | U |
|           |                   | 40.5                        | 170            |   | 1.9              | U        | 1.6                              | J        | 1.1                       | U         | 0.52          | U |
|           |                   | 45.1                        | 130            |   | 1.5              | U        | 0.58                             | J        | 0.87                      | U         | 0.4           | U |
|           |                   | 54                          | 44             |   | 1.5              | U        | 0.57                             | U        | 0.89                      | U         | 0.41          | U |
|           |                   | 58                          | 22             |   | 1.5              | U        | 0.56                             | U        | 0.88                      | U         | 0.4           | U |
|           |                   | 64.5                        | 0.46           | U | 1.9              | U        | 0.71                             | U        | 1.1                       | U         | 0.51          | U |
|           |                   | Average                     | 1,178          |   | ***              |          | 4                                |          | ***                       |           | ***           |   |

Summary of Soils VOC Data for SWMU 211-B (Continued)

| Station            | Date<br>Collected | Sample<br>Depth<br>[ft bls] | TCE<br>[µg/kg] | 1,1-DCE<br>[µg/kg] | <i>cis</i> -1,2-<br>DCE<br>[µg/kg] | trans-1,2-<br>DCE<br>[μg/kg] | VC<br>[µg/kg] |
|--------------------|-------------------|-----------------------------|----------------|--------------------|------------------------------------|------------------------------|---------------|
|                    | 10/19/2012        | 4                           | 4.2 J          | 1.7 U              | 0.64 U                             | 1 U                          | 0.46 U        |
|                    |                   | 9                           | 6.2 J          | 1.7 U              | 0.65 U                             | 1 U                          | 0.47 U        |
|                    |                   | 13.5                        | 12             | 1.8 U              | 0.66 U                             | 1 U                          | 0.48 U        |
| 011 D 000          |                   | 19.5                        | 36             | 1.4 U              | 0.52 U                             | 0.81 U                       | 0.37 U        |
|                    |                   | 22                          | 20             | 1.5 U              | 0.55 U                             | 0.86 U                       | 0.4 U         |
|                    |                   | 28                          | 12             | 1.6 U              | 0.6 U                              | 0.94 U                       | 0.43 U        |
|                    |                   | 30.1                        | 0.34 U         | 1.4 U              | 0.52 U                             | 0.81 U                       | 0.37 U        |
| 211- <b>D</b> -020 |                   | 39.5                        | 9.2 J          | 1.6 U              | 0.6 U                              | 0.94 U                       | 0.43 U        |
|                    |                   | 40.1                        | 12             | 1.6 U              | 0.6 U                              | 0.94 U                       | 0.43 U        |
|                    |                   | 48.5                        | 12             | 1.6 U              | 0.61 U                             | 0.95 U                       | 0.44 U        |
|                    |                   | 50.5                        | 7.3 J          | 1.5 U              | 0.58 U                             | 0.9 U                        | 0.41 U        |
|                    |                   | 59.5                        | 1.6 J          | 1.5 U              | 0.55 U                             | 0.87 U                       | 0.4 U         |
|                    |                   | 61                          | 4.6 J          | 1.8 U              | 0.67 U                             | 1.1 U                        | 0.48 U        |
|                    |                   | Average                     | 11             | ***                | ***                                | ***                          | ***           |

Summary of Soils VOC Data for SWMU 211-B (Continued)

Notes:

 Groundwater Protection Remediation Goals from Remedial Design Work Plan for Solid Waste Management Units 1, 211-A, and 211-B Volatile Organic Compound Sources for the Southwest Groundwater Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, (DOE 2012a).

2. J - Indicates an estimated value.

3. U - Compound analyzed for but not detected at or below the lowest concentration reported.

4. DUP - Indicated that a duplicate sample was taken for the interval given in parentheses.

5. Sample depth represents the discrete depth at which an EnCore® sample was taken.

6. For "U" qualified samples a value of one half the concentration reported was used in calculating the average borehole concentration.

7. \*\*\* - indicates average concentration not calculated as all boring samples were "U" qualified for specific VOC.

8. Yellow shading and bold text indicates an exceedance of Groundwater Protection Remediation Goals.

9. Soil boring 211-B-014 was collected and archived. Boring was not logged or screened for VOC impacts.