Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

MAY 15 2015

PPPO-03-2790131-15

Ms. Maria Galanti
Site Coordinator
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

Dear Ms. Galanti:

FINAL SOIL BACKGROUND REPORT FOR THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO (DOE/PPPO/03-0667&D1)

Enclosed for your review and approval, please find the *Final Soil Background Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0667&D1). Included is a compact disc containing the data input files for ProUCL 5.0 discussed in Appendix G. This final soil background report presents the soil background data sets and naturally occurring and/or ubiquitous anthropogenic soil background constituent concentrations developed for the Portsmouth Gaseous Diffusion Plant (PORTS).

The soil background data sets were developed using soil samples collected in accordance with the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* that was approved by the Ohio Environmental Protection Agency (Ohio EPA) on March 1, 2012, and implemented at PORTS in the spring and summer of 2012. Sampling data collected from selected background locations were used to calculate concentrations for naturally occurring constituents in background soils. The purpose of the report is to provide, in accordance with the approved sampling and analysis plan, representative background data for each major soil formation on the U.S. Department of Energy (DOE) reservation, on property easements, and DOE-leased property off the DOE reservation.

If you have any questions or require additional information, please contact Amy Lawson of my staff at (740) 897-2112.

Sincerely,

Joel B. Bradburne
Portsmouth Site Lead
Portsmouth/Paducah Project Office

Enclosure:
D1 Final Soil Background Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (including compact disc)

cc w/enclosure:
Vince.Adams@lex.doe.gov, PPPO/PORTS
Jud.Lilly@lex.doe.gov, PPPO/PORTS
Bert.Gawthorp@lex.doe.gov, PPPO/LEX
Amy.Lawson@lex.doe.gov, PPPO/PORTS
Kristi.Wiehle@lex.doe.gov, PPPO/PORTS
Randy.Tormey@emcbc.doe.gov, EMCBC
Jim.Sferra@epa.ohio.gov, Ohio EPA
Ed.Gortner@epa.ohio.gov, Ohio EPA
Marcus.Glasgow@epa.ohio.gov, Ohio EPA
Justin.Burke@epa.ohio.gov, Ohio EPA
Mardi.Enderle@epa.ohio.gov, Ohio EPA
Dennis.Carr@fbports.com, FBP/PORTS
Marc.Jewett@fbports.com, FBP/PORTS
Jyh-Dong.Chiou@fbports.com, FBP/PORTS
Rosemary.Richmond@lex.doe.gov, RSI/PORTS
ETS.Support@lex.doe.gov
RMDC@WEMS-LLC.com (RCRA AR Files)

FINAL SOIL BACKGROUND REPORT FOR THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

U.S. Department of Energy
DOE/PPPO/03-0667&D1

April 2015

This document has been approved for public release:

Sam Eldridge (signature on file) 4/9/15
Classification & Information Office Date

Sam Eldridge (signature on file) 4/9/15
Export Controlled Information Office Date

FINAL SOIL BACKGROUND REPORT FOR THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

U.S. Department of Energy
DOE/PPPO/03-0667&D1

April 2015

Prepared for
U.S. Department of Energy

Prepared by
Fluor-B&W Portsmouth LLC, Under Contract DE-AC30-10CC40017
FBP-ER-RCRA-WD-RPT-0189, Revision 1

CONTENTS

FIGURES

TABLES

This page is intentionally left blank.

ACRONYMS

AMSL	above mean sea level
ASL	analytical support level
bgs	below ground surface
CMS	Corrective Measures Study
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DQO	data quality objective
DU	deferred unit
EPA	U.S. Environmental Protection Agency
FRL	final remediation level
GEL	General Engineering Laboratories
GIS	geographical information system
GOF	Goodness of Fit
ICP/MS	inductively-coupled plasma/mass spectrometry
KM	Kaplan-Meier
Ohio EPA	Ohio Environmental Protection Agency
OLS	ordinary least squares
PAH	polycyclic aromatic hydrocarbon
PAL	Portsmouth Analytical Laboratory
PCB	polychlorinated biphenyl
PORTS	Portsmouth Gaseous Diffusion Plant
PRG	preliminary remediation goal
Q-Q	quantile-quantile
RFI	Resource Conservation and Recovery Act of 1976, as amended, Facility Investigation
ROS	regression on order statistics
SAP	sampling and analysis plan
SVOC	semivolatile organic compound
UTL	upper tolerance limit

EXECUTIVE SUMMARY

A soil background investigation was completed at the Portsmouth Gaseous Diffusion Plant (PORTS), Piketon, Ohio, to provide, in accordance with an approved sampling and analysis plan (SAP), representative background data for each major soil formation on the U.S. Department of Energy (DOE) reservation, on property easements, and DOE-leased property off the DOE reservation, as of April 2015. This investigation builds on background studies completed earlier and addresses limitations of those earlier studies.

"Background" refers to substances or locations that are not influenced by the releases from a site, and are usually described as naturally occurring or anthropogenic. Background sampling is often conducted to help distinguish site-related contamination from naturally occurring or other non-site-related chemicals. This information is useful in evaluating whether operations or activities at a site have impacted the surrounding environment.

The background study for PORTS was designed to characterize concentrations of naturally occurring or ubiquitous anthropogenic constituents in surface and subsurface soils in and around PORTS. Soil background samples were analyzed for radionuclides, metals, and organic chemicals; however, only metals and radionuclides, which are naturally occurring, were retained for evaluation and subsequent calculation of background concentrations in soil.

Results of the soil background investigation will be used during development of the Deferred Units (DU) Resource Conservation and Recovery Act of 1976, as amended, Facility Investigation (RFI)/Corrective Measures Study (CMS) report and during development of other projects where the results of this investigation are useful. As part of the development of the DU RFI/CMS report, natural levels and/or ubiquitous anthropogenic levels of metals and radionuclides in background soils unimpacted by facility operations will be compared to concentrations observed in PORTS soils. Characterization of naturally occurring or ubiquitous anthropogenic soil background concentrations of constituents from this study will provide reference data for a determination of the extent of soil contamination, support development of risk-based soil preliminary remediation goals (PRGs) under the 1989 Ohio Consent Decree and U.S. Environmental Protection Agency (EPA) Administrative Consent Order, and support real property transfer under Section 120 (h) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. During remediation activities, it is common practice to clean up to risk-based values, but not to levels less than background concentrations. Therefore, some of the background concentrations developed in this soil background report may be used as PRGs, and ultimately final remediation levels, when risk-based values are less than background concentrations.

This final soil background report presents the soil background data sets used to define the naturally occurring and ubiquitous anthropogenic soil background constituent concentrations for PORTS. The soil background data sets were developed using soil samples collected in accordance with the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (referred to hereafter as the SAP) that was approved by the Ohio Environmental Protection Agency (Ohio EPA) on March 1, 2012, and implemented at PORTS in the spring and summer of 2012. Sampling data collected from selected background locations were used to calculate concentrations for naturally occurring constituents in background soils.

This report builds on a previous preliminary report entitled, *Preliminary Soil Background Study Sampling and Analysis Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* that provided a preliminary statistical evaluation of the data sets to assist in further data evaluation. Following Ohio EPA review of this preliminary report, DOE and Ohio EPA agreed that additional meetings were necessary to begin discussion to evaluate the data and establish background values. This final soil background report reflects decisions made concerning evaluation of the background data during additional meetings between DOE and Ohio EPA in 2013 and 2014.

Soil samples were collected from 10 study areas (Areas A through J; Figure ES.1) selected and sampled using the following fundamental criteria:

- Similar environment of deposition and geologic source material as found at PORTS
- Unimpacted by site operations where the geologic formations of interest are present
- In reasonable proximity to PORTS.

The selection of soil background sampling locations included locations in the Scioto River Valley that were deposited during the same depositional event as the materials in the area that contain the DOE pump houses and pipe lines. Other selected soil background sampling locations included additional off-site areas that have similar geologic source areas as PORTS, and are unaffected by PORTS or other significant sources of contamination. These additional off-site areas were selected for the sampling of upwind, upland deposits as well as deposits representative of soils observed at PORTS, including the Minford silt and clay and the Gallia sand and gravel. The upland areas on the western side of the DOE reservation were selected for soil background sample collection because prevailing winds from the west may have contributed to the deposition of radiological constituents originating from historical nuclear testing in the western United States.

To obtain representative samples of Scioto River Valley soils, sample locations were selected in Areas A, B, and C; to obtain representative samples of off-site Minford soils and Gallia deposits, sample locations were selected in Areas D, E, F, and G; and to obtain representative samples of upwind, upland surface soils, sample locations were selected in Areas H, I, and J. The Gallia deposits extend to a depth of 90 ft below ground surface (bgs) in some areas as a result of channel migration and erosion of the underlying bedrock. Soil samples were collected from the following formations and depths:

- Unsaturated Minford clay surface soils (0 to 1 ft bgs)

- Unsaturated Minford clay (1 to 16 ft bgs)

- Saturated Minford clay/silt (16 to 30 ft bgs – immediately above the Minford/Gallia interface)

- Saturated Gallia deposits (variable from 14 to 90 ft bgs – immediately below the Minford clay/silt)

- Surface and subsurface soils in the unconsolidated, unsaturated Scioto River Valley immediately west of the DOE reservation

- Surface soils in upland area along western on-site boundary (0 to 1 ft bgs).

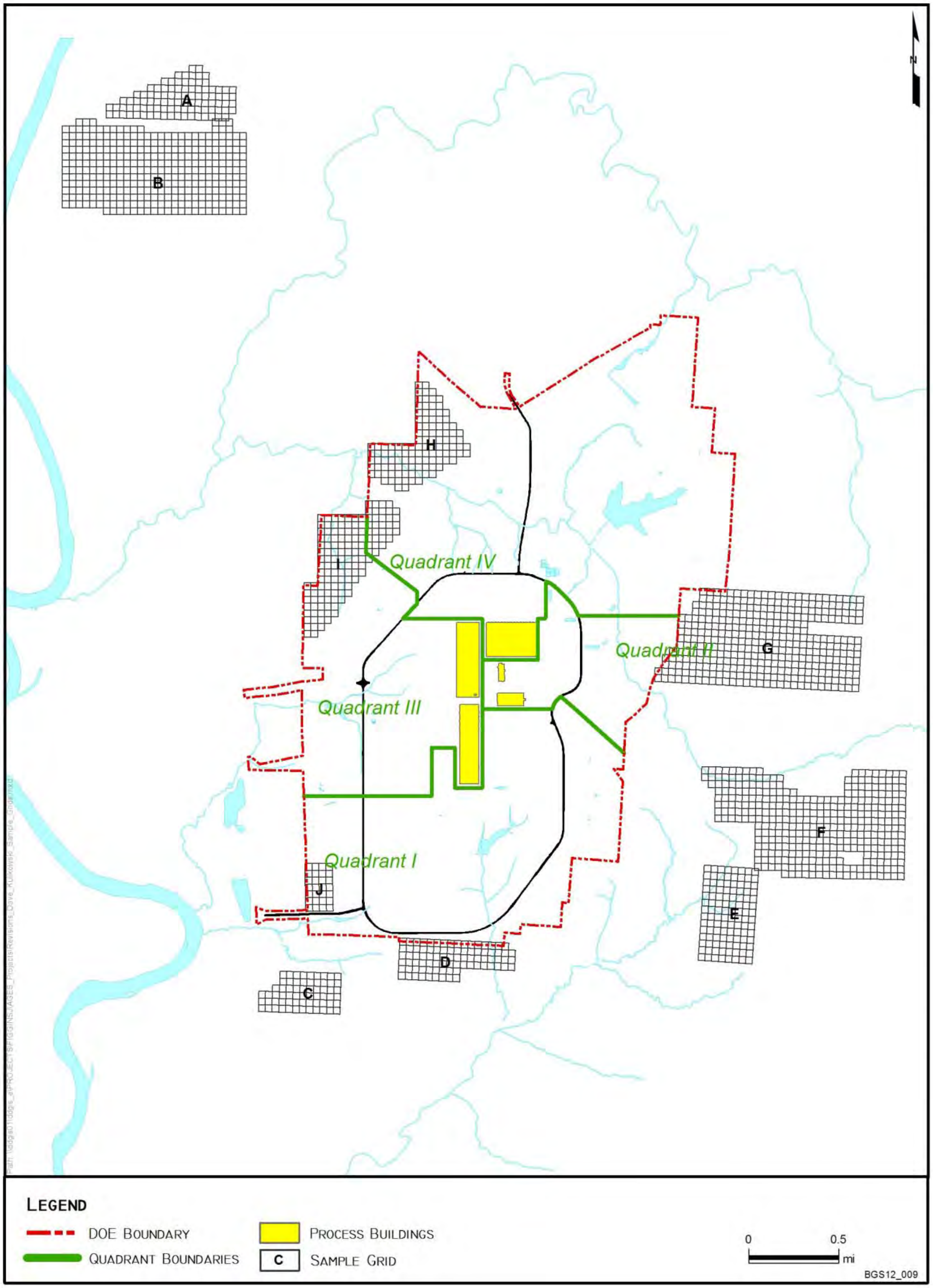


Figure ES.1. Background Study Areas, A through J

The data for this study were collected, analyzed, and reported at the highest possible analytical support level, as indicated by the SAP. The background study for PORTS was designed to characterize concentrations of naturally occurring or ubiquitous anthropogenic constituents in surface and subsurface soils in and around PORTS. Soil background samples were submitted for laboratory analysis of radionuclides, metals, semivolatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and herbicides; however, during meetings with Ohio EPA, it was decided that this report will not contain analysis of constituents not ubiquitously anthropogenic or not naturally occurring, such as PCBs and PAHs. Only metals and radionuclides, which are naturally occurring, were retained for evaluation and subsequent calculation of background concentrations in soil.

The background soil data was initially reviewed to establish the grouping of the data from different sampling areas and depths to create data sets that are comparable and representative of the various soil formations observed at PORTS, in nearby upland areas, and at locations within the floodplain area of the Scioto River Valley. Data sets comprised of comparable background data were then used to calculate background concentrations for naturally occurring metals and radionuclides at PORTS. Statistical and graphical evaluation of data for the purpose of determining background soil concentrations was performed using EPA's ProUCL software.

To establish comparable background data sets, multiple lines of evidence were reviewed, including site geology, preliminary data statistics, quantile-quantile plots, outlier tests, goodness of fit tests, and hypothesis tests. The purpose of each of these evaluation tools is listed in Table ES.1.

Table ES.1. Evaluation of Background Area Data Sets

Evaluation Element	Purpose
Geology at PORTS	• Assess geology to identify comparable lithologic formations within background area data sets
Preliminary Data Statistics	• Aid in the development of further statistical tests
Quantile-Quantile Plots	• Evaluate the normal, linear distribution of detected values • Visually identify potential outliers • Assess the presence of more than a single population within a data set
Outlier Test	• Evaluate the data sets for sampling, laboratory, or reporting error in the data to explain the presence of potential outliers • Identify observations within a data set needing further investigation for being a possible outlier using Rosner and Dixon outlier tests and regression analysis scatter plots • Using the Order of Magnitude test, determine if an observation is an outlier and should be removed from the final PORTS background data set
Goodness of Fit Test	• Determine the most representative distribution (i.e., normal, lognormal, or gamma) of each study area data set by assessing the correlation values for each distribution
Hypothesis Test	• Compare data from different depths within a single background study area to determine if depth intervals are comparable

PORTS = Portsmouth Gaseous Diffusion Plant

After reviewing the geology of the background study areas and the statistical results of the evaluations listed in Table ES.1, final data groupings were established, as listed in Table ES.2. All data sets have 12 or more samples, which meets EPA recommended minimum number of samples per data set used for statistical evaluation.

Table ES.2. Final Background Area Data Groupings

Soil Sampling Area	Depth (ft bgs)	Description[a]	Number of Soil Samples
Areas A and B	0 to 1	Surface soil, Scioto River Valley	25
Areas A and B	1 to 10	Subsurface soil, Scioto River Valley	25
Areas D, E, F, and G	0 to 1	Surface soil, PORTS site	30
Areas D, E, F, and G	1 to 16	Unsaturated Minford, PORTS site	187
Areas E, F, and G	16 to 30	Saturated Minford, PORTS site	12
Areas D, E, F, and G	14 to 90	Gallia, PORTS site	34
Areas H, I, and J	0 to 1	Surface soil, PORTS upland area	58

[a] PORTS site = off-site areas representative of lithology observed on site at PORTS.

bgs = below ground surface
PORTS = Portsmouth Gaseous Diffusion Plant

Per the approved SAP, surface and subsurface soil samples were collected in Area C to obtain soils representative of the Scioto River Valley; however, statistical tests and review of the lithologic data from the background study areas indicate that soil from Area C is not fully representative of the same depositional conditions as observed in other background areas (i.e., Areas A and B). Therefore, surface and subsurface soil samples from five locations in Area C were excluded from the PORTS data set used to determine background soil concentrations.

Soil data collected from sampling areas listed in Table ES.2 were used to calculate background concentrations for PORTS. Soil background concentrations represent one of the following three statistics:

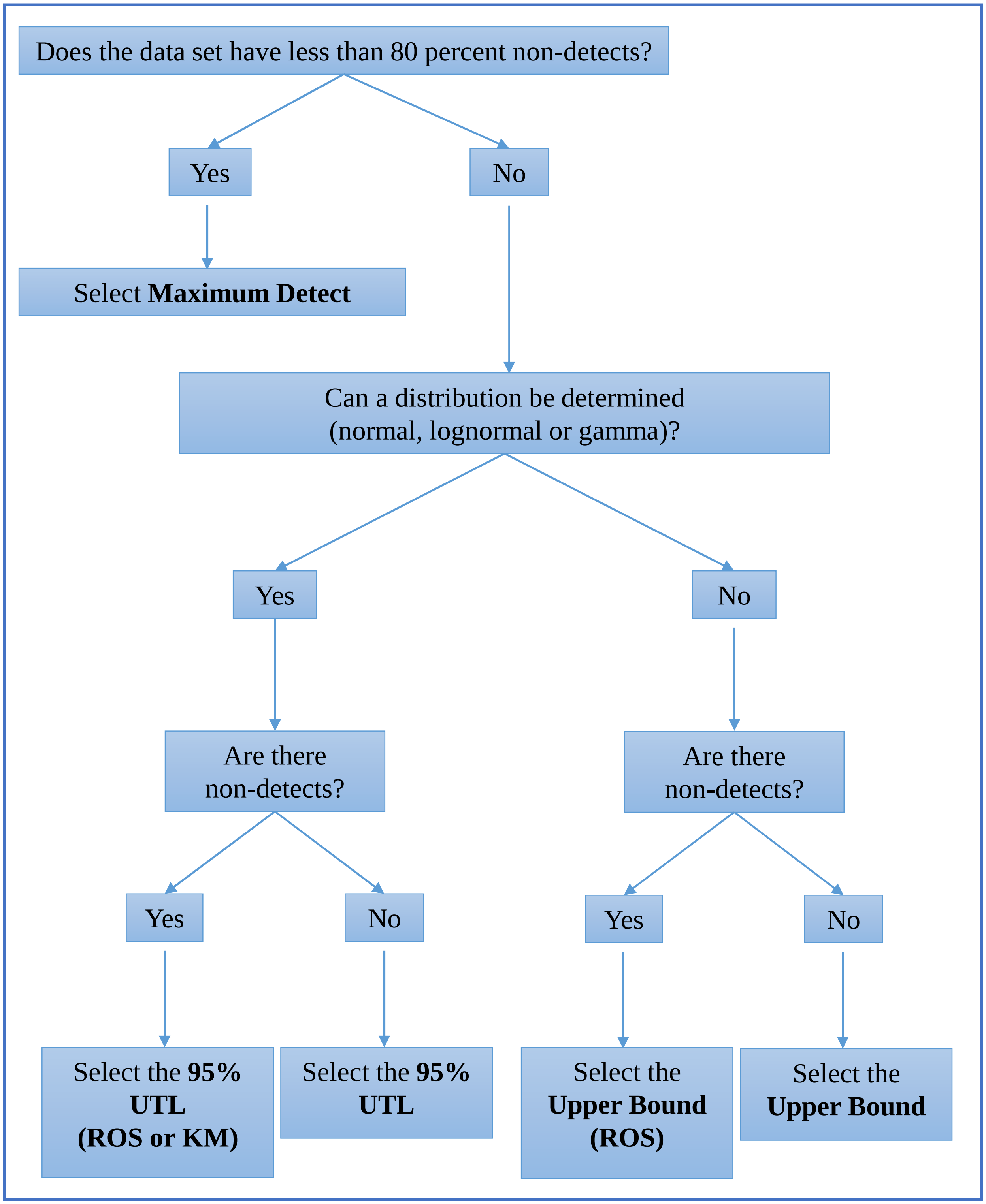
- 95% Upper Tolerance Limit (UTL)
- Upper Bound (per 2004 Ohio EPA guidance)
- Maximum detected value of the data set.

A 95% UTL represents a statistic such that 95 percent of observations (current and future) from the target population (i.e., background) will be less than or equal to the 95% UTL. An upper bound concentration is a data limit calculated using data percentiles, and this data limit can be used as the background concentration per Ohio EPA guidance.

The final selection of a background concentration is dependent on the detection frequency of the constituent and the distribution of the data. The distribution of the data was determined using tests and methods provided in ProUCL. A decision tree for selection of background concentrations at PORTS is shown in Figure ES.2. A brief explanation of the background value decision process is as follows:

- If greater than 80 percent of the data are non-detected results, the maximum detected value is selected as the background concentration. If 80 percent or less of the data are non-detected results, the distribution of the data is determined.

- If the data distribution is determined to be normal, lognormal, or gamma and there are no non-detected results in the data set, the 95% UTL that best fits the data distribution is selected as the background concentration.



UTL = Upper Tolerance Limit ROS = Regression on Order Statistics KM = Kaplan-Meier

Figure ES.2. Background Value Tree

- If the data distribution is determined to be normal, lognormal, or gamma and there are non-detected results in the data set, the data is imputed to include regression on order statistics (ROS) or Kaplan-Meier estimates to account for the non-detected values, and then the 95% UTL that best fits the data distribution is selected as the background concentration.

- If no data distribution can be determined and there are no non-detected results in the data set, the upper bound is selected as the background concentration. If no data distribution can be determined and there are non-detected results in the data set, the upper bound calculated using ROS methodology to account for the non-detected results is selected as the background concentration.

Table ES.3 summarizes the calculated background concentrations for metals and radionuclides in the background sampling areas and soil units listed in Table ES.2. The majority of the background concentrations represent upper bound or 95% UTL calculations; two results represent maximum detected values (mercury in Areas A and B subsurface soil, and silver in Areas H, I, and J surface soil).

Table ES.3. Dry Weight Background Values for Metals and Radionuclides
Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Parameter	**Scioto Valley**		**PORTS Site**				**PORTS Upland Area**
	Surface Soil (0-1 ft) Areas AB	**Subsurface Soil (1-10 ft) Areas AB**	**Surface Soil (0-1 ft) Areas DEFG**	**Unsaturated Minford (1-16 ft) Areas DEFG**	**Saturated Minford (16-30 ft) Areas EFG**	**Gallia Areas DEFG**	**Surface Soil (0-1 ft) Areas HIJ**
Metals (mg/kg Dry)							
Aluminum	16,100	11,800	24,500	20,700	12,700	13,400	18,000
Antimony	1.88	1.29	2.05	1.83	3.51	8.43	4.06
Arsenic	14.4	11.8	30.8	29.0	85.6	129	19.8
Barium	165	92.8	114	136	72.1	99.9	182
Beryllium	0.995	0.858	1.25	1.60	1.17	1.51	1.70
Cadmium	0.527	0.328	0.241	0.282	0.688	2.00	0.858
Chromium	19.4	17.7	32.4	29.4	24.6	28.9	23.4
Cobalt	13.1	10.1	28.5	37.4	18.6	26.5	37.4
Copper	25.5	22.2	18.5	26.2	23.1	27.5	15.9
Iron	27,200	22,700	86,100	62,800	56,400	155,000	29,000
Lead	18.1	13.1	33.0	22.6	12.7	37.5	44.2
Lithium	56.9	59.6	113	123	120	97.3	116
Manganese	1,130	760	1,860	1,490	465	2,560	1,920
Mercury	0.0400	0.0470	0.0600	0.0520	0.0410	0.0674	0.0938
Nickel	30.3	25.0	22.6	50.3	52.7	78.2	29.1
Selenium	1.13	2.49	1.79	0.639	0.637	0.564	2.39
Silver	2.06	6.44	11.0	7.48	3.66	14.1	3.84
Thallium	1.31	0.964	0.327	0.359	0.821	0.501	2.93
Total Uranium	5.50	3.52	4.05	4.73	7.19	7.30	4.26

Table ES.3. Dry Weight Background Values for Metals and Radionuclides Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Parameter	Scioto Valley		PORTS Site				PORTS Upland Area
	Surface Soil (0-1 ft) Areas AB	Subsurface Soil (1-10 ft) Areas AB	Surface Soil (0-1 ft) Areas DEFG	Unsaturated Minford (1-16 ft) Areas DEFG	Saturated Minford (16-30 ft) Areas EFG	Gallia Areas DEFG	Surface Soil (0-1 ft) Areas HIJ
Metals (mg/kg Dry) (continued)							
Vanadium	43.7	39.5	78.0	58.0	65.1	87.6	52.0
Zinc	111	80.2	93.1	117	148	244	85.7
Radionuclides (pCi/g Dry)							
Thorium-228	1.31	1.08	1.64	1.88	1.56	1.73	1.52
Thorium-230	2.59	1.81	1.59	1.74	2.42	2.52	1.70
Thorium-232	1.37	1.21	1.56	1.91	1.63	1.73	1.46
Uranium-233/234	1.76	1.23	1.30	1.57	2.36	2.34	1.37
Uranium-235/236	0.142	0.0558	0.0987	0.119	0.170	0.171	0.115
Uranium-238	1.85	1.18	1.36	1.59	2.41	2.45	1.40

--- all non-detects
Maximum Detect
95% UTL
Upper Bound

PORTS = Portsmouth Gaseous Diffusion Plant
UTL = upper tolerance limit

Specific conclusions developed in this soil background report are summarized as follows:

- The quality and coverage of the samples collected in each background sampling area are adequate for use in this background investigation. A sufficient number of samples were collected from these locations to adequately characterize the background concentrations of naturally occurring and anthropogenic constituents in soil.

- Soil samples collected in Areas A and B provide data representative of soil background conditions for property in the Scioto Valley floodplain, including easements and DOE-leased property, as of April 2015.

- Soil samples collected in Areas D, E, F, and G provide data representative of surface, unsaturated, and saturated subsurface soil background conditions similar to those observed in on-site Minford and Gallia soils.

- Statistical testing and data evaluation indicated that soil samples collected in Areas H, I, and J exhibited weak correlation within themselves and identified outliers in the data set. Based on these findings, it is concluded that the data set may not be fully representative of on-site surface soil background conditions in upland areas undisturbed by present and historic site operations.

- A comparison to the results from similar background investigations of soils in Ohio, including the 1996 PORTS background investigation, indicates inorganic and radionuclide constituents detected in this study are comparable to concentrations reported for similar Ohio soils.

1. INTRODUCTION

A soil background investigation was completed at the Portsmouth Gaseous Diffusion Plant (PORTS), Piketon, Ohio, to provide, in accordance with an approved sampling and analysis plan (SAP), representative background data for each major soil formation on the U.S. Department of Energy (DOE) reservation, on property easements, and DOE-leased property off the DOE reservation, as of April 2015. This investigation builds on background studies completed earlier and addresses limitations of those earlier studies. This introductory chapter presents the purpose and rationale of the investigation, a brief explanation of previous background studies at PORTS, and the organization for this report, which presents the evaluation and final results of the soil background investigation initiated in 2012.

1.1 PURPOSE AND RATIONALE OF INVESTIGATION

"Background" refers to substances or locations that are not influenced by the releases from a site, and are usually described as naturally occurring or anthropogenic (U.S. Environmental Protection Agency [EPA] 2002).

- Naturally occurring – substances present in the environment in forms that have not been influenced by human activity.

- Anthropogenic – natural and human-made substances present in the environment as a result of human activities, not specifically related to the site in question (in this case, PORTS).

The ideal background area would have the same distribution of concentrations for chemicals of concern as those which would be expected on the site if the site had never been impacted. Some chemicals may be present in background as a result of both natural and man-made conditions (EPA 2002). Background sampling is often conducted to help distinguish site-related contamination from naturally occurring or other non-site-related chemicals. This information is useful in evaluating whether a site has impacted various media (e.g., soil, groundwater, surface water, sediment, etc.) and in evaluating and selecting a remedy for the site.

The background study for PORTS was designed to characterize concentrations of naturally occurring or ubiquitous anthropogenic constituents in surface and subsurface soils in and around PORTS. Soil background samples were submitted for laboratory analysis of radionuclides, metals, semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and herbicides; however, during meetings with the Ohio Environmental Protection Agency (Ohio EPA), it was decided that this report will not contain analysis of constituents not ubiquitously anthropogenic or not naturally occurring, such as PCBs and PAHs. Only metals and radionuclides, which are naturally occurring, were retained for evaluation and subsequent calculation of background concentrations in soil.

This final soil background report presents the soil background data sets used to define the naturally occurring and ubiquitous anthropogenic soil background constituent concentrations for PORTS. The soil background data sets were developed using soil samples collected in accordance with the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (referred to hereafter as the SAP) (DOE 2012a) that was approved by the Ohio EPA on March 1, 2012 and implemented at PORTS in the spring and summer of 2012. Sampling data collected from selected background locations were used to calculate concentrations for naturally occurring or ubiquitous anthropogenic constituents in background soils. The purpose of the report is to provide, in accordance with the approved SAP, representative background data for each major soil formation on the DOE reservation, and on property easements and DOE-leased property off the DOE reservation.

There are many ways to establish background, including using the Ohio EPA recommended method of calculating an upper bound (Ohio EPA 2004), or by using the mean, median, upper control limit, or upper tolerance limit (UTL). Determination of a UTL was the selected method for a 1996 background investigation at PORTS (DOE 1996). A combination of methods may be used to establish site background concentrations. It may be appropriate in some cases to perform hypothesis testing of the population of the background data set compared to the population of the investigation data to determine if they are the same or different. Regional literature sources may also be used, although this method is not recommended (EPA 2002, Ohio EPA 2009).

Characterization of naturally occurring and/or ubiquitous anthropogenic soil background concentrations of constituents from this study will provide reference data for a determination of the extent of soil contamination, support development of risk-based soil preliminary remediation goals (PRGs) under the 1989 Ohio Consent Decree and EPA Administrative Consent Order, and support real property transfer under Section 120 (h) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The SAP provided the technical approach to sampling soils, approximate locations of the samples to be collected, type of samples to be collected, sampling regimen, and laboratory analytical methods. The results of this study are specific to the laboratory analytical methods used to analyze the collected samples.

In addition to the results presented here for naturally-occurring metals, including uranium, the background data set includes detected results for radioactive isotopes (e.g., americium, plutonium, technetium) and some organic constituents that are considered ubiquitous (e.g., PAHs, PCBs, pesticides). Because neither the radioactive isotopes nor the organic constituents are naturally-occurring, data of these anthropogenic constituents are not evaluated in this report. A preliminary analysis of these data is provided in the *Preliminary Soil Background Study Sampling and Analysis Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 2012b). The analysis in that report found that the detected concentrations are low and generally fall below risk-based soil screening levels derived considering the industrial or residential scenarios. Additional statistical analyses of these data may be completed in the future, if necessary, to support risk management decisions.

This final soil background report builds on the previous preliminary report referenced above, which was submitted to Ohio EPA in November 2012; comments were received from Ohio EPA in January 2013. The Ohio EPA comments were incorporated into this final report, as appropriate.

This report incorporates goals and objectives discussed during the data quality objectives (DQO) workshop and technical meetings with the Ohio EPA from June through September 2011. In addition to these meetings, several other meetings were held with Ohio EPA in 2013 and 2014 as soil data groupings and statistical evaluations were developed. Approaches and preliminary results were also discussed with Ohio EPA during this timeframe, thus providing an opportunity to participate in a team environment when developing the final soil background data sets. Results of the soil background investigation will be used during development of the Deferred Units (DU) Resource Conservation and Recovery Act of 1976, as amended, Facility Investigation (RFI)/Corrective Measures Study (CMS) report and during development of other projects where the results of this investigation are useful. The DU RFI/CMS report will present the results of the background evaluation, including the final soil background data sets.

This final report presents a description of the depositional environment for geologic formations at and around the DOE reservation and provides a discussion of more than 152,000 analytical results from 120 sampling locations. Sample locations/areas identified as on-site reference locations/areas are within the DOE-owned property, as of April 2015. Sample locations/areas identified as off-site reference locations/areas are off DOE-owned property, as of April 2015, and are equivalent to the background reference location as identified in Ohio EPA guidance.

1.2 PREVIOUS BACKGROUND STUDIES

An initial background field sampling investigation was conducted at PORTS in 1991 as part of the Quadrant I/Quadrant II Phase I RFI. During this investigation, 12 surface soil samples (0 to 2 ft below ground surface [bgs]) and 14 subsurface soil samples (greater than 2 ft in depth) were collected and analyzed to determine the concentrations of naturally occurring constituents in soils. Surface soil samples were collected near the property boundary of the reservation. These hand-auger surface soil samples, designated as perimeter samples, were collected from bluffs overlooking PORTS. These bluffs are underlain by the Cuyahoga shale (bedrock).

The results of the initial background study were submitted to EPA (Region V) and Ohio EPA in February 1992. During a background study comment and response meeting, EPA and Ohio EPA requested the collection of additional background samples from locations outside of the DOE reservation. The final work plan for collecting additional samples was approved by both agencies in January 1994. The work plan specified that background samples were to be collected from areas where geologic deposits exhibited physical and geological characteristics similar to those of the geologic deposits at PORTS. Soil samples were therefore collected from areas where the silt and clay of the Minford silt member of the Teays Formation was present and had characteristics similar to the Minford deposits on site. Sixteen surface soil samples (0 to 2 ft bgs) and 16 subsurface soil samples (8 to 10 ft bgs) were collected during the study (DOE 1996). Soils were analyzed for the following constituents:

- Target compound list/target analyte list compounds
- Gross alpha/gross beta
- Isotopic uranium (uranium-234, uranium-235, and uranium-238)
- Transuranics (neptunium and plutonium)
- Total uranium
- Technetium
- Sulfate
- Nitrate.

After data validation and data set evaluation were completed, a statistical evaluation of the background data to determine background concentrations of naturally occurring constituents was initiated. This process required the completion of multiple data evaluation and statistical operations, including combining and normalizing the off-site and previously established on-site background data sets, determining the number of populations present within the data, determining adequate sample size for sampling areas, and calculating 95% UTLs.

UTLs for the Minford in the PORTS area were established in the 1996 investigation and represent the maximum concentrations of naturally occurring constituents that would be expected. More specifically, the limits contain a specified proportion of the population (i.e., 95 percent of all possible sample measurements) at a confidence level of 95 percent. UTLs were not necessarily synonymous with cleanup levels or remediation goals and were not used as such. Upper cutoff values calculated for soil with data from this investigation were specific to the geologic formations from which the samples were collected.

A comparison of the results from similar background investigations of soils in the contiguous United States with the UTLs determined during the 1996 investigation indicates that the PORTS UTLs are similar to and well within concentration ranges established during similar investigations referenced in scientific literature. These investigations comprise studies in the United States and the state of Ohio, including the Fernald Environmental Management Project in Fernald, Ohio (DOE 1996).

The background concentrations of uranium in the Minford analyzed during the 1996 study were significantly lower than background concentrations of uranium in local area soil derived from black shales (Sunbury shale and Ohio shale) in the area. Analyses of Gallia soil samples, which possibly contained fragments of eroded Sunbury shale, showed results for uranium that were higher than those for any samples collected from the Minford.

The 1996 study had several limitations which necessitated implementation of the new background study presented in this report. Application of the 1996 background data was limited due to the following reasons:

- Use of small sampling populations

- Collection of samples from locations and depths that were not horizon specific within the Minford lithology and could not be correlated to similar deposits at PORTS

- Collection of samples that are not formation specific (primarily, the Minford was sampled)

- Use of inconsistent sampling methodologies

- Generation of an extensive non-detect data set with a large variation in detection limits.

A 1995 study (Korte et al. 1995) examined the calculation of background concentrations for both Minford and Gallia soils using existing PORTS environmental data collected from contaminated sites (i.e., pre-1995 soil data). Using the method described in the report, the background data population was separated from the contaminant data population. The report concluded that there were insufficient data to determine background concentrations for Gallia soils; however, background concentrations were reported for metals in Minford soils. The Minford soil background concentrations from the 1995 study are not presented in this background report because the results of the 1995 study did not receive final review or publication. However, analytical results for iron concentrations in the Gallia deposits, as reported in the 1995 report, are used to support conclusions in this background report.

1.3 REPORT ORGANIZATION

A discussion of the environmental setting on and off site at PORTS is provided in Section 2. The rationale for the definition and selection of the background sampling areas is provided in Section 3. The investigative approach used in completing this soil background study is presented in detail in Section 4. The data evaluation for the formation of the data sets and the methodology for background statistics are discussed in Section 5. A general discussion of the results is presented in Section 6, and conclusions are provided in Section 7.

2. ENVIRONMENTAL SETTING

PORTS is located on a 3,777-acre federal reservation in a rural area of Pike County, Ohio, approximately 20 miles north of Portsmouth, Ohio. The gaseous diffusion plant and the surrounding federal reservation are owned by DOE. From 1954 until 2001, the PORTS gaseous diffusion process plant enriched uranium for DOE and predecessor agencies, the Naval Nuclear Propulsion Program, and commercial customers. In May 2001 the production facilities were placed into a cold standby mode. During cold standby, the process buildings were maintained with a restart capability as a strategic hedge against a disruption in the nation’s supply of enriched uranium. DOE terminated the cold standby program in September 2005 and replaced it with a cold shutdown program, no longer maintaining the gaseous diffusion restart capability.

DOE is currently preparing for decontamination and decommissioning (D&D) of the contaminated process buildings and related infrastructure. Some structures have already been demolished during pre-D&D activities.

2.1 PHYSIOGRAPHIC SETTING

PORTS is located within the Appalachian Plateau physiographic province, approximately 20 miles south of the limit of glaciations in Ohio. As a result, the geologic setting of the site has been heavily influenced by drainage associated with glacial events. PORTS occupies an upland area of southern Ohio with an average land surface elevation of 670 ft above mean sea level (AMSL). The terrain surrounding the plant site consists of marginal farmland and wooded hills, generally with less than 100 ft of relief. PORTS is located within a mile-wide ancient river valley situated 130 ft above the level of the Scioto River (elevation 540 ft AMSL), which lies approximately 1 mile to the west.

2.2 METEOROLOGY

The climate of the PORTS area is humid-continental and is characterized by warm, humid summers and cold, humid winters. Precipitation is distributed relatively evenly throughout the year and averages approximately 40 in. per year. The month with the highest average precipitation for the period of record is August, followed by May. Groundwater recharge and flood potential are greatest during the spring. October is the driest month. Snowfall averages approximately 19 in. per year (Western Regional Climate Center 2009).

Prevailing winds are from the south-southwest at approximately 5 mph. The highest average monthly wind speed of 11 mph typically occurs during the spring. Figure 1 shows a wind rose from 1995-2001 at the 30-m level.

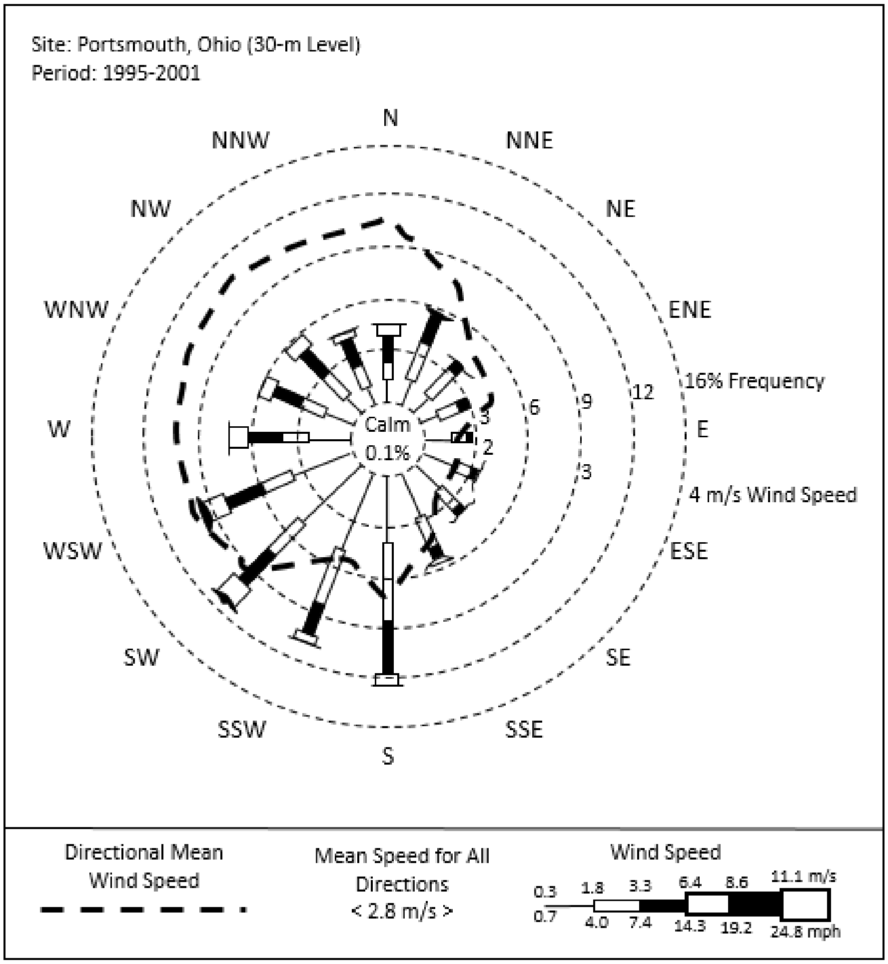


Figure 1. Wind Rose from 1995-2001

2.3 SURFACE FEATURES

PORTS sits in a 1-mile-wide abandoned river valley situated approximately 130 ft above the Scioto River floodplain, which lies to the west. In much of the industrialized area of PORTS, the original topography has been modified and graded for construction of buildings and other facility components. Much of the material that was removed from higher elevations of the plant site was placed in existing drainage valleys and depressions.

The local topography at PORTS is dominated by ancient and recent streams. The predominant landform in the site area is an undulating, broad, sediment-filled, ancient river valley. This valley is oriented north-south and is bounded on the east and west by deeply dissected ridges and low-lying hills. The surface of the ancient river valley is modified by recent streams. A small valley is formed by Little Beaver Creek, which flows in a northwesterly direction across the middle of the site, just north and east of the main industrialized area. Other small valleys formed by streams have cut into the flat-lying unconsolidated deposits on which PORTS is located. One of these valleys is that of a westward-flowing stream, the West Drainage Ditch, which is near the west-central area of the plant site. Two more streams are located in the southern portion of the industrialized area. In the southeast portion of the site, the southerly flowing stream, Big Run Creek, is situated in a relatively broad, gently sloping valley.
The Southwestern Drainage Ditch has formed a narrow, steep-walled valley.

2.4 SURFACE WATER HYDROLOGY

PORTS is drained by several small tributaries of the Scioto River (Figure 2). Sources of surface water drainage include storm water runoff, groundwater discharge, and releases from plant processes. The largest stream on the site is Little Beaver Creek, which drains the eastern and northern portions of the site before discharging into Big Beaver Creek. Little Beaver Creek is a small, high-gradient, unmodified stream that receives the majority of its flow from the X-230J7 East Holding Pond discharge through the East Drainage Ditch. Little Beaver Creek also receives effluent via the Northeast Drainage Ditch through the outfall from the X-230J6 Northeast Holding Pond and via the North Drainage Ditch through the outfall from the X-230L North Holding Pond. Substrates are predominantly slab boulders and bedrock at the upper reach to gravel and sand near the mouth of the stream. During parts of the year, intermittent flow conditions exist upstream from the X-230J7 discharge. During the summer/fall low-flow time of the year, the upstream section is composed of shallow, isolated pools with intermittent flow (Ohio EPA 2006). The Northwest Tributary stream corridor begins just southwest of the Don Marquis Substation and flows approximately 3,200 ft before leaving the facility boundary and prior to its confluence with Little Beaver Creek.

2.5 GEOLOGY OF PORTS AND STUDY AREA

The geology of PORTS has been characterized over the years through the installation of more than 1,600 soil borings and wells across the site. Some of the information about the geology of PORTS was summarized from previous PORTS quadrant RFI final reports, and some was provided by PORTS Geographic Information System (GIS) and geologic analysis of PORTS borings and supplementary geological data.

The subsurface in the PORTS area consists of approximately 5 to 45 ft of unconsolidated Pleistocene clastic sediments unconformably overlying Paleozoic bedrock that dips gently toward the east-southeast (Figure 3). As explained in the description of Gallia sediments, the unconsolidated Pleistocene clastic sediments extend to a depth of 90 ft bgs in some areas, which may represent areas of former channel migration and erosion of the underlying bedrock. In stratigraphic order, from oldest to youngest, bedrock is overlain by the fluvial Gallia sand and gravel (Gallia sand member) and by the lacustrine Minford clay and silt (Minford silt member) of the Teays Formation (Figure 4). The erosion and subsequent fill of the Portsmouth River Valley during the Pleistocene was a primary control for the distribution of the shallow geologic units beneath PORTS. A portion of the former Portsmouth River Valley underlies the site, and it is bounded on the east and west by deeply dissected ridges and low-lying hills. Additionally, the surface of the ancestral river valley has been modified by recent streams.

Bedrock beneath PORTS mainly consists of shale, sandstone, and minor siltstone deposited in and along an epeiric (inland) sea during the Late Devonian and Early Mississippian periods (approximately 380 to 345 million years ago) (Coogan 1996). The area was subsequently uplifted and gently folded, and subsequent erosion produced the deeply dissected, knobby terrain that characterizes southern Ohio.

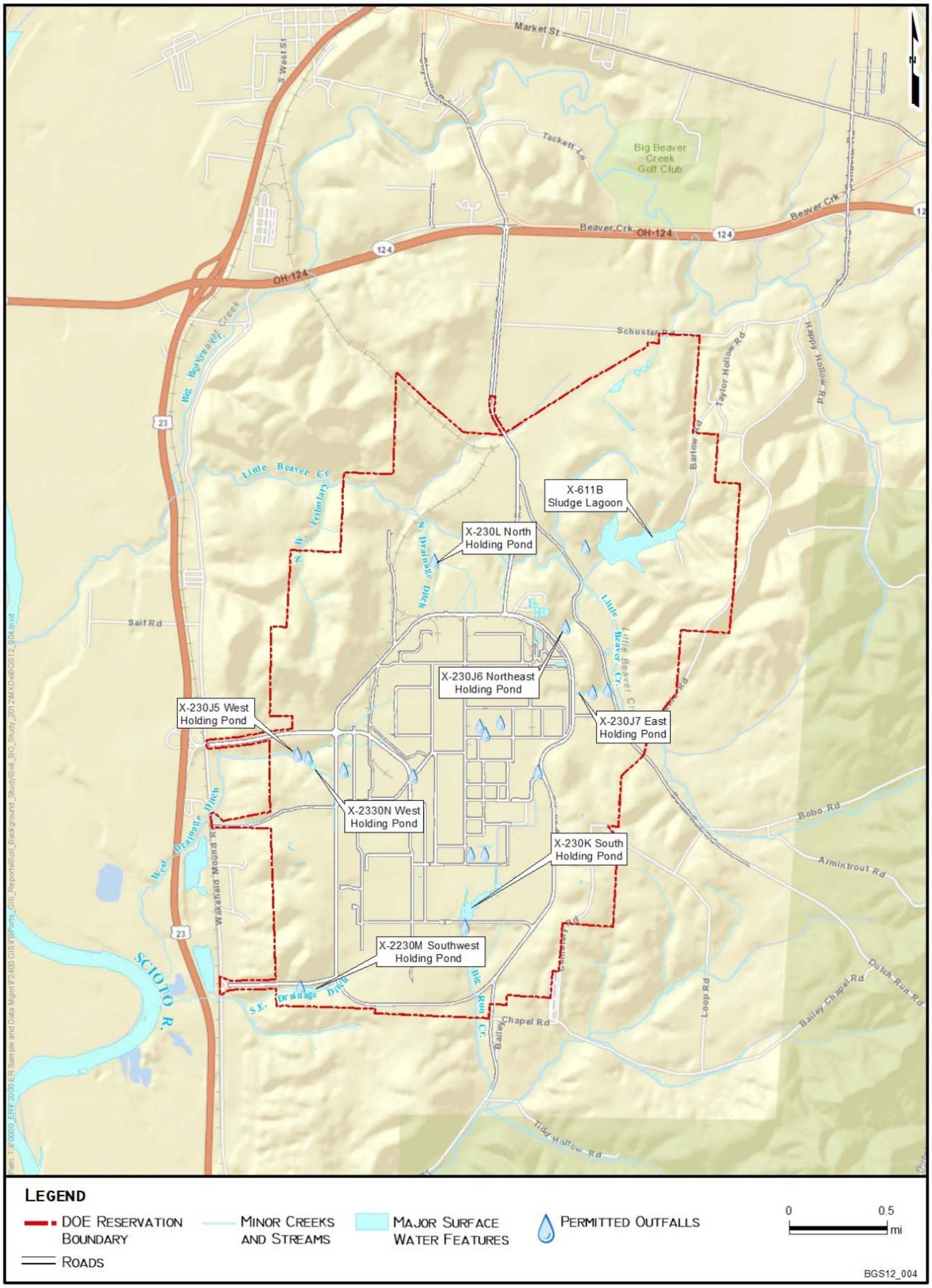


Figure 2. Surface Water Features at PORTS

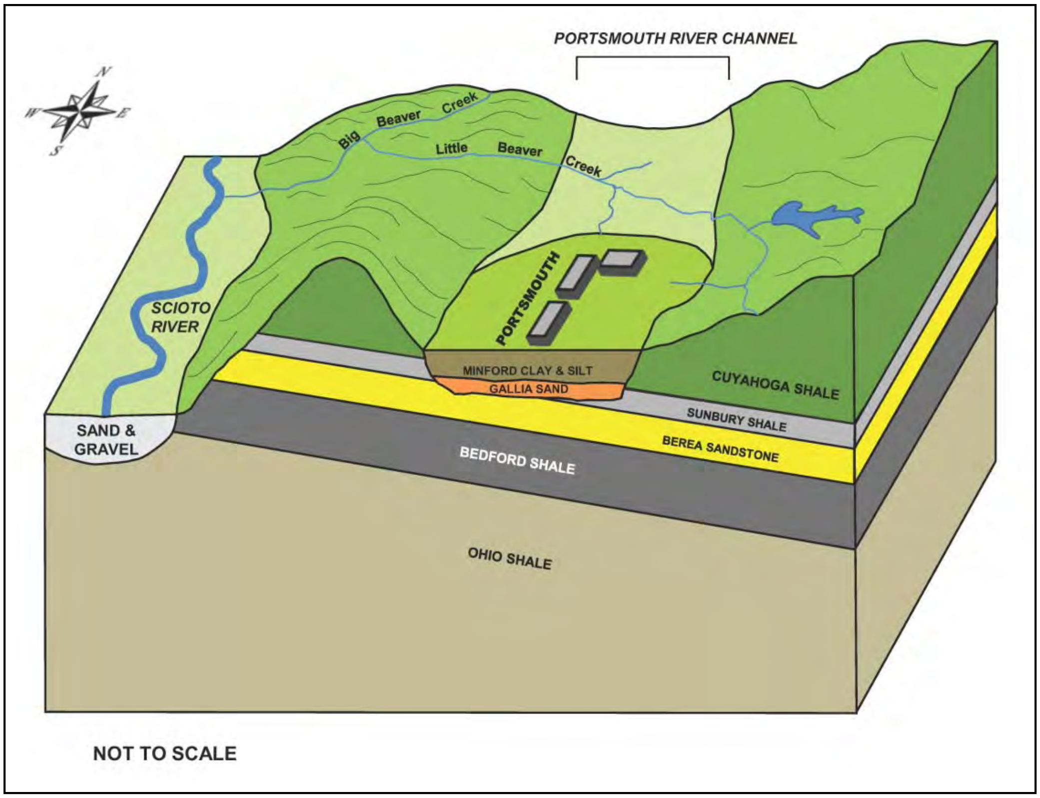
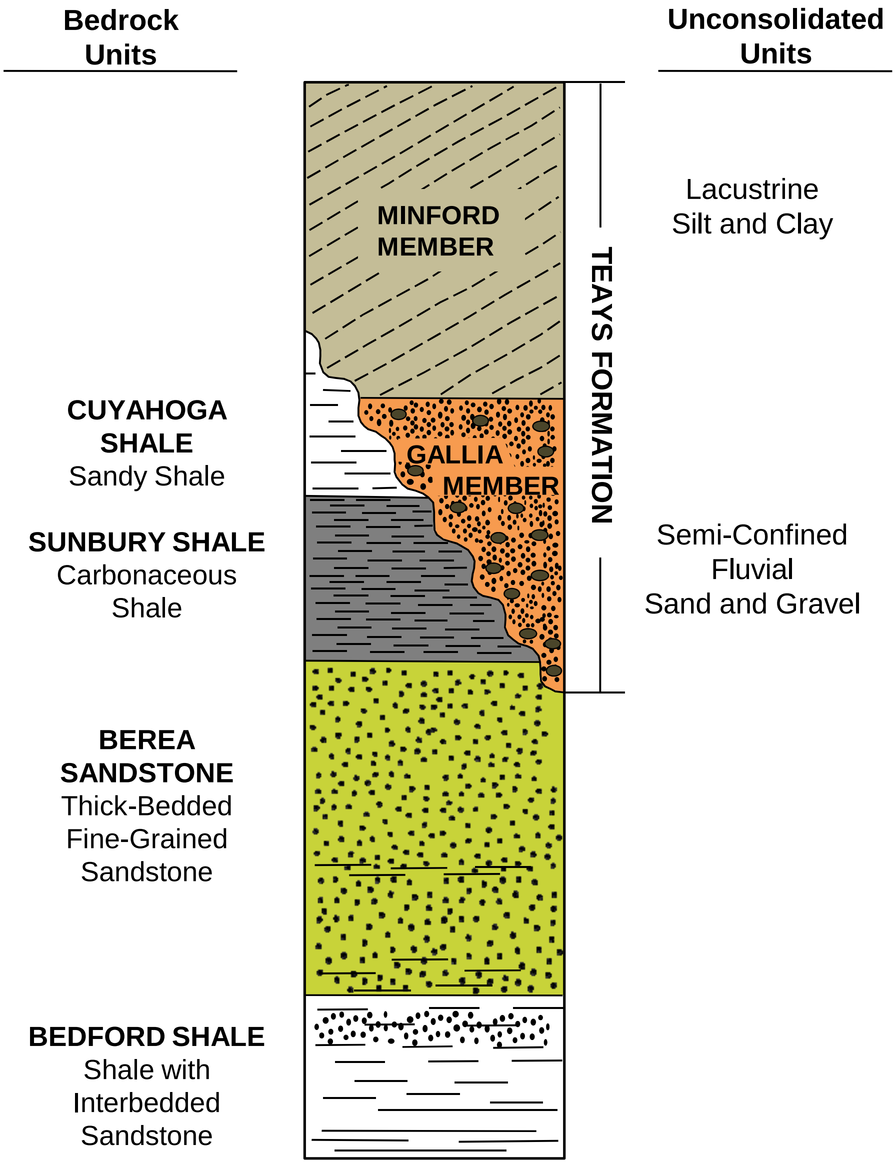


Figure 3. Schematic Block Diagram Showing Geological Relationships at PORTS

Bedrock formations at PORTS (from oldest to youngest) are the Ohio shale, Bedford shale, Berea sandstone, Sunbury shale, and Cuyahoga Formation (Upper Devonian and Lower Mississippian strata). These formations dip gently to the east-southeast at approximately 30 ft/mile. No known geologic faults are located in the immediate area. Two distinct joint sets (fractures) are present in the bedrock, and they are particularly evident in coarse-grained outcrops of the Cuyahoga Formation. The joint sets in the bedrock are regional; rock sections within 1,600 ft of the surface are most affected by progressive unroofing (Engelder 1993).

The Bedford shale is the lowest stratigraphic unit that has been encountered during environmental investigation activities at the site since 1980. The Bedford shale, continuous beneath PORTS, consists of gray to reddish-gray, thinly-bedded shale that often contains abundant sedimentary structures, such as oscillation ripple marks, load casts, and ball-and-pillow structures. The Bedford also contains thin grayish-brown to gray interbeds of hard, fine-grained sandstone and siltstone. In the area of PORTS, the contact between the overlying Berea sandstone and Bedford shale is often difficult to identify because of the similarities in lithologies in the two formations at the contact boundary. The typical depth to the top of the Bedford shale at PORTS is 70 ft bgs in areas in which both the Sunbury shale and Berea sandstone exhibit stratigraphically complete sections. Surface exposures of the Bedford shale are common in the area of Little Beaver Creek in Quadrant IV, within the northwest section of the site boundary. The formation also outcrops in deeply incised streams and valleys within PORTS. The typical section for the Bedford shale at PORTS averages approximately 100 ft in thickness, as shown by Boring 848, which was drilled to a depth of 483.5 ft AMSL on the eastern side of the site in 1977 as part of the Gaseous Diffusion Add-On Plant Study (Law Engineering 1978). The thickness of the Bedford shale in boring 848 was 97.7 ft.

The Berea sandstone is composed of light gray, hard, thick-bedded, sometimes cross-bedded, fine-grained sandstones with thin shale interbeds. The upper 10 to 15 ft of the formation consists of a massive sandstone that generally lacks joints and shale interbeds. The Berea is generally continuous beneath the industrial portion of PORTS, underlying the Sunbury shale on the eastern side of the site and the unconsolidated Minford and Gallia members (Teays Formation) on the western side of the site.



Source: DOE 2009a

Figure 4. Generalized Stratigraphy at PORTS

On the western side of PORTS, the Berea has experienced various degrees of erosion, and in the area of Little Beaver Creek in Quadrant IV, within the northwest section of the site boundary, the Berea has been completely removed by erosion. The Berea sandstone is inferred to average 30 ft thick in areas in which a PORTS-type section of the Berea is present. The lower 10 ft of the Berea contains numerous shale interbeds similar to those in the underlying Bedford shale. Because of the gradational contact between the Berea sandstone and Bedford shale, it is difficult to determine a precise thickness of the Berea sandstone at PORTS. Regionally, the formation contains naturally occurring hydrocarbons (petroleum) in quantities sufficient for commercial production.

The Sunbury shale is a highly-carbonaceous, competent, fissile, black shale that often contains scattered grains and small nodules of pyrite, suggesting a reducing environment of deposition. Using data analyzed in the GIS for 101 borings at PORTS in which a Sunbury isopach value can be obtained, the Sunbury averages about 11 ft in thickness and ranges from less than a foot to about 30 ft thick. The PORTS type section of the Sunbury, calculated from borings used to investigate locations for the proposed on-site disposal cell, indicates the Sunbury is around 21 ft thick for the type section. The Sunbury is typically the uppermost bedrock unit beneath PORTS, but it thins westward as a result of erosion by the ancient Portsmouth River. The Sunbury shale is absent beneath the western half of the reservation, with the exception of an area west and northwest of the American Centrifuge Project, in which the Sunbury is eroded but is laterally continuous to the hills on the southwestern side of PORTS. The Sunbury is absent due to erosion in the drainage basin of Little Beaver Creek downstream from the X-611A Old Lime Sludge Lagoons and along most of Big Run Creek, where it has also been removed by erosion. The Sunbury shale underlies the unconsolidated Gallia of the Teays Formation beneath the industrialized, eastern portion of PORTS, and underlies the Cuyahoga Formation outside of the Portsmouth River Valley.

The Cuyahoga Formation, the youngest and uppermost bedrock formation in the geographic area, forms the hills surrounding PORTS; the Cuyahoga is not found beneath the industrial portion of PORTS. It is a moderately-hard, laminated shale that regionally reaches a thickness of approximately 160 ft and has numerous sandstone and siltstone interbeds, some of which have significant lateral extent. The Cuyahoga Formation was deposited during a series of regressive and transgressive marine events in the Early Mississippian, approximately 350 million years ago (Bork and Malcuit 1979a, 1979b). During that time, this area of Ohio was on the coastline of an epeiric sea. To the east were the Acadian Highlands, which were shedding sediment that was transported westward and deposited by a series of fluvial systems. The Cuyahoga Formation is composed of sequences of marine shales and interbedded lobate terrestrial sandstones, the sediment vertical profile resembling modern sediments deposited along prograding shorelines or in deltas (Coleman 1976; Horne and Ferm 1978).

Most of the sandstone layers within the Cuyahoga are very thin (less than 3 in. thick), but occasionally a thicker layer (1 to 5 ft thick) has been encountered in the region. As one moves stratigraphically higher in the Cuyahoga, the rocks are characterized by more frequent sandstone beds and lenses, representing the advancing nearshore environment.

Prior to glaciation, the major drainage system in southern Ohio was the Teays River System. The river flowed northwest and passed about 3 miles north of PORTS. Glacial advances, which occurred periodically between 25,000 to 2 million years ago, eventually dammed the Teays River and caused a huge proglacial lake to form south and southeast of the glacial front, called Proglacial Lake Tight. Lake Tight covered areas of Ohio, Kentucky, and West Virginia, and during the events that formed it, many valleys in southern Ohio were filled with lake and river sediments.

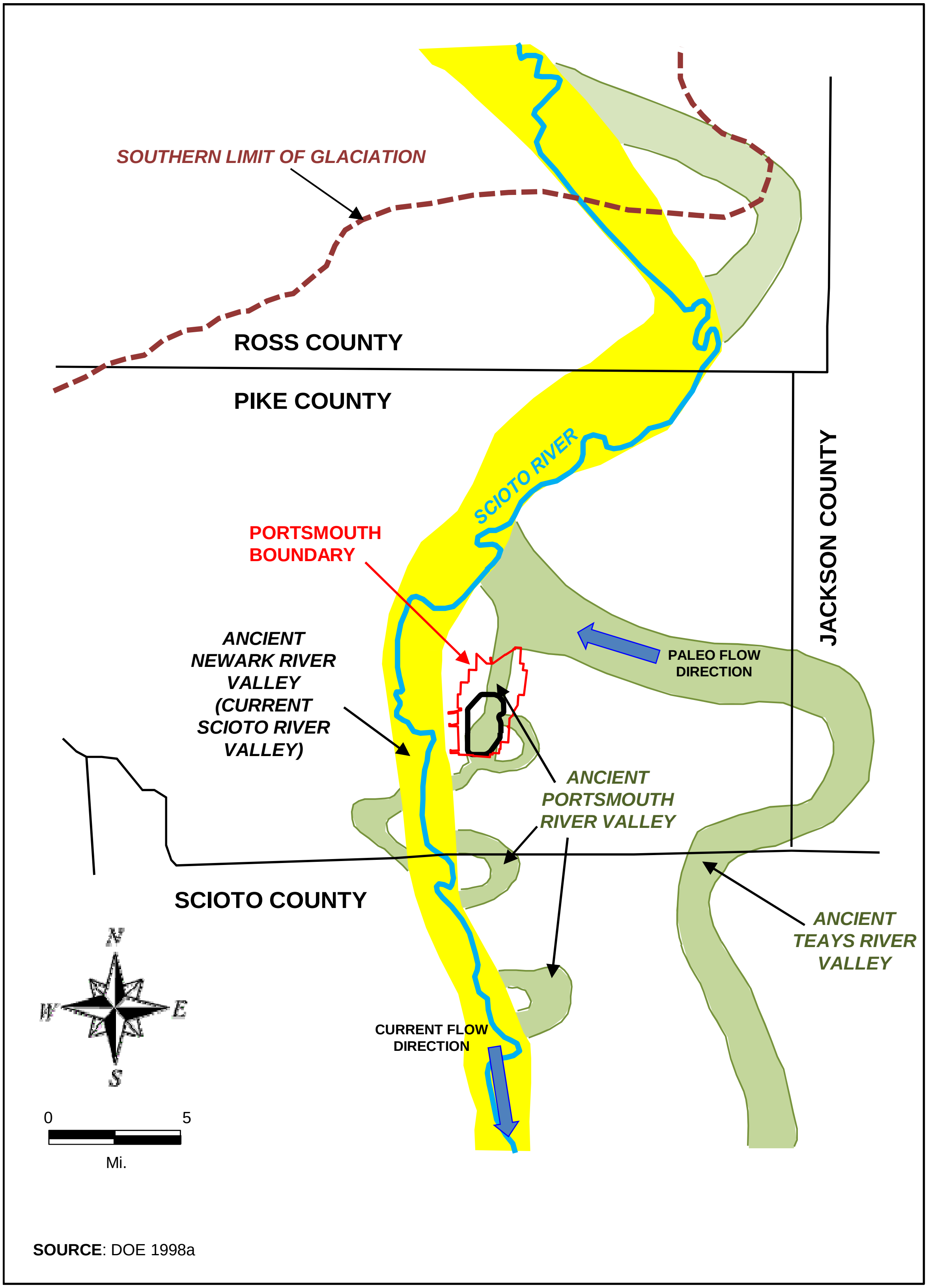
The Portsmouth River, a north-flowing tributary of the Teays, flowed across the area that is now occupied by PORTS (Figure 5). The Portsmouth River caused significant erosion of the bedrock beneath PORTS; the Sunbury was eroded into a wedge that pinched out to the west, exposing the Berea sandstone along a sizeable portion of the western third of the facility. The Portsmouth River also caused some erosion of the Berea sandstone.

As the Portsmouth River meandered across the valley, it deposited quantities of silt, sand, and, gravel. These unconsolidated fluvial deposits formed the Gallia sand member (Gallia) of the Teays Formation. The Gallia averages 5.4 ft in thickness at the site and is characterized as reddish-brown, clayey, medium-to-coarse sand and gravel (the sand and gravel are typically poorly sorted).

Channel migration and variation in depositional environments resulted in the variable thickness and hydraulic properties of the Gallia, which extends to a depth of 90 ft bgs in some areas. The areas of thickest accumulation of Gallia sediments (exceeding 10 ft thick in some places) may represent former channel locations and includes areas south of Perimeter Road, west of the XT-847, northeast of the XT-801, a wide section along the west side of Perimeter Road east of the X-326 and X-330 buildings, southeast and adjacent to the X-326, in and around the X-701B plume, and a broad section of sediments northeast of the X-744W. Gallia deposits in the area of PORTS are generally absent above an elevation of 660 ft AMSL. The valley walls of the ancient Portsmouth River likely formed a natural barrier that limited the deposition of Gallia sediments. In addition, Gallia sediments have since been eroded during the Late Pleistocene and Holocene.

Somewhere between 2 million years to 1 million years ago, depending on sources, an advancing glacier north of PORTS blocked the northwestward flow of the Teays River. Proglacial Lake Tight, filled the valleys of the Teays River and its tributaries, including the Portsmouth River. Lake Tight has been dated to 780,000 years ago, during the Matuyama Reversed Polarity Epoch (Bonnett, Noltimier, and Sanderson, 1991). The Minford Silt member (Minford) of the Teays Formation, consists of lacustrine clays and silts that accumulated in the lake. The Minford, which represents the uppermost stratigraphic unit beneath PORTS, consists of two locally interpreted units with a generally gradational contact. The upper unit, called the Minford clay, is predominantly composed of silty clay with some zones of fat (high plasticity) clay, silt, and very fine-grained sand. The lower unit, called the Minford silt, is chiefly composed of clayey silt with some zones of clay, silty clay, and very fine to fine-grained sand. Typically, the grain size of the Minford silt increases with depth.

Geologic studies conducted to determine the potential seismic hazard for PORTS have determined that only one fault is located within 25 miles of the site (the nearest known fault is the Plum Run Quarry Fault, located approximately 18 miles west of PORTS in northeast Adams County). No seismicity has been recorded on this fault, and no seismic events have occurred within 25 miles of PORTS during the historic period (past 100 years). Based on a 1978 report (Law Engineering 1978), eight earthquakes have occurred within 50 miles of the site, and only one of those was likely felt in the vicinity of PORTS. This event occurred on May 17, 1901, with an epicenter approximately 20 miles from the site and with an estimated magnitude of 4.0 to 4.9. Since 1978, two Ohio earthquakes with a magnitude greater than 3.0 occurred within 50 miles of the site. Also since 1978, three Kentucky earthquakes with a magnitude greater than 3.0 occurred within 50 miles of the site (Hansen 2007). It should be noted that all of the earthquakes in the area since 1978 were less than magnitude 4.0. On August 23, 2011, an earthquake with a magnitude of 5.8 occurred in east-central Virginia (approximately 285 miles from PORTS) and was felt throughout Ohio. In 2013, there were three earthquakes with epicenters within 50 miles of PORTS; only one of those was large enough to be felt (a 3.5 magnitude earthquake occurred on November 20, 2013 approximately 50 miles northeast of PORTS).



SOURCE: DOE 1998a

Figure 5. Location of Ancestral River Systems in Relation to PORTS

The Kentucky River Fault Zone and the Lexington Fault System (formerly the Bryant Station-Hickman Creek Fault) are located farther away from PORTS, the latter fault being approximately 60 miles southwest. These faults bound the southern part of a north-northeast trending area of seismicity in central and eastern Ohio. Soil testing for PORTS indicated that the potential for earthquake-induced soil liquefaction at PORTS is relatively low (Law Engineering 1978). The potential for soil-structure interaction (ground motion magnification) is also slight.

2.6 PORTS AND AREA GROUNDWATER HYDROLOGY

The groundwater flow system at PORTS includes the water-bearing units of Berea sandstone and unconsolidated Gallia sand and gravel, along with the aquitards of Sunbury shale and unconsolidated Minford clay and silt. The basal portion of the Minford is generally grouped with the Gallia to form the uppermost and primary water-bearing unit at the facility.

Groundwater recharge and discharge areas at PORTS include both natural and man-made recharge and discharge areas. Natural recharge to the groundwater flow system comes mainly from precipitation, although land use and the presence of the thick upper Minford clay deposits and the Sunbury shale effectively reduce recharge to underlying units. Discharge of groundwater to the surface occurs primarily along streams that transect PORTS. Groundwater recharge and discharge areas also are influenced by man-made features, including the storm sewer system, sanitary sewer system, recirculating cooling water system, water lines, and building sumps. Groundwater flow at the site is significantly affected by the X-700 Chemical Cleaning Facility and X-705 Decontamination Building basement dewatering, extraction wells in the vicinity of X-231B and X-701B, and the groundwater interceptor trenches at X-749 and X-701B.

Four creeks, or drainage channels, drain the facility: Little Beaver Creek drains the eastern and northern portion, Big Run Creek and the Southwestern Drainage Ditch drain the southeastern and southwestern portions, and the West Drainage Ditch drains the western portion. The four creeks and drainage ditches dissect the unconsolidated Minford and Gallia members, bedrock-forming Sunbury shale (where present), and Berea sandstone, resulting in the discharge of groundwater to them. Groundwater flow beneath PORTS is generally toward one of these discharge locations, and groundwater divides form between the discharge locations along areas of highest groundwater elevation.

Groundwater flow at PORTS, at least within the Gallia, can generally be divided into four separate flow regions, or quadrants. Groundwater divides provide the basis for separation of PORTS into quadrants. The groundwater flow divides and general directions of groundwater flow for the Gallia and Berea aquifers are illustrated in Figures 6 and 7, respectively. The groundwater divides generally coincide with topographic highs along the center of the industrial complex (from south to north) and subtle topographic highs radiating outward and separating the predominant surface water features draining the facility. Locations of the flow divides may migrate because of small differences in response to seasonal changes in precipitation and groundwater recharge. In general, groundwater gradients are flatter in the upland areas in the center of the industrial complex and become steeper as groundwater approaches the streams or creeks. Vertical movement of groundwater between the Gallia and Berea is, in general, downward in upland areas of recharge and upward in areas of discharge near streams.

The site-wide median depth to water in the Gallia was approximately 15 ft in 2009. Many factors can affect water table depth at a particular location, including seasonal variations from increased or decreased precipitation, surface coverings such as buildings and parking lots, topography at the location, land use, thickness of the upper clay portion of the Minford member, presence of storm drains, and operation of groundwater remediation processes (e.g., phytoremediation, extraction wells, sumps, and French drains).

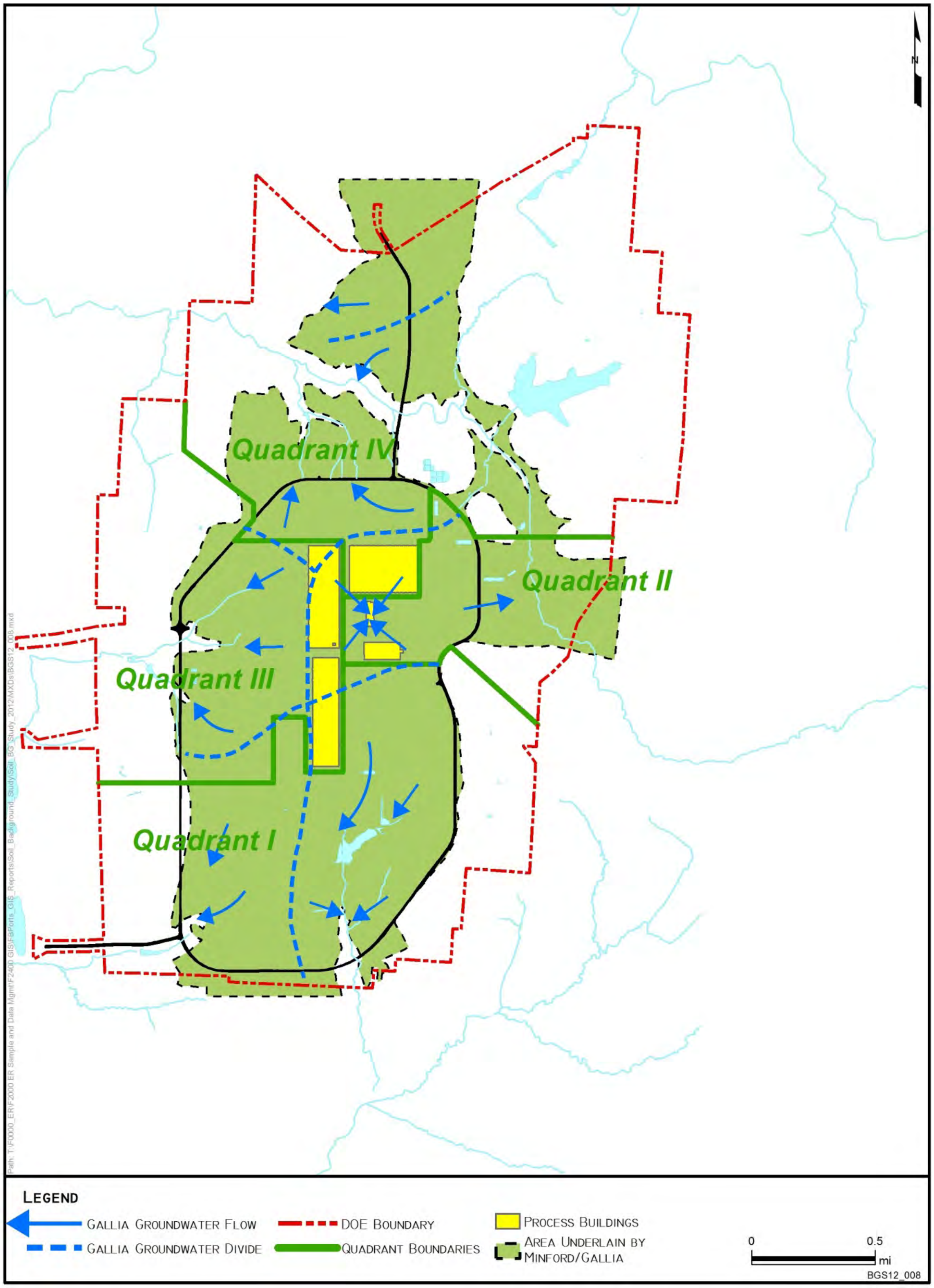


Figure 6. Generalized Groundwater Divides and Flow Directions for the Gallia

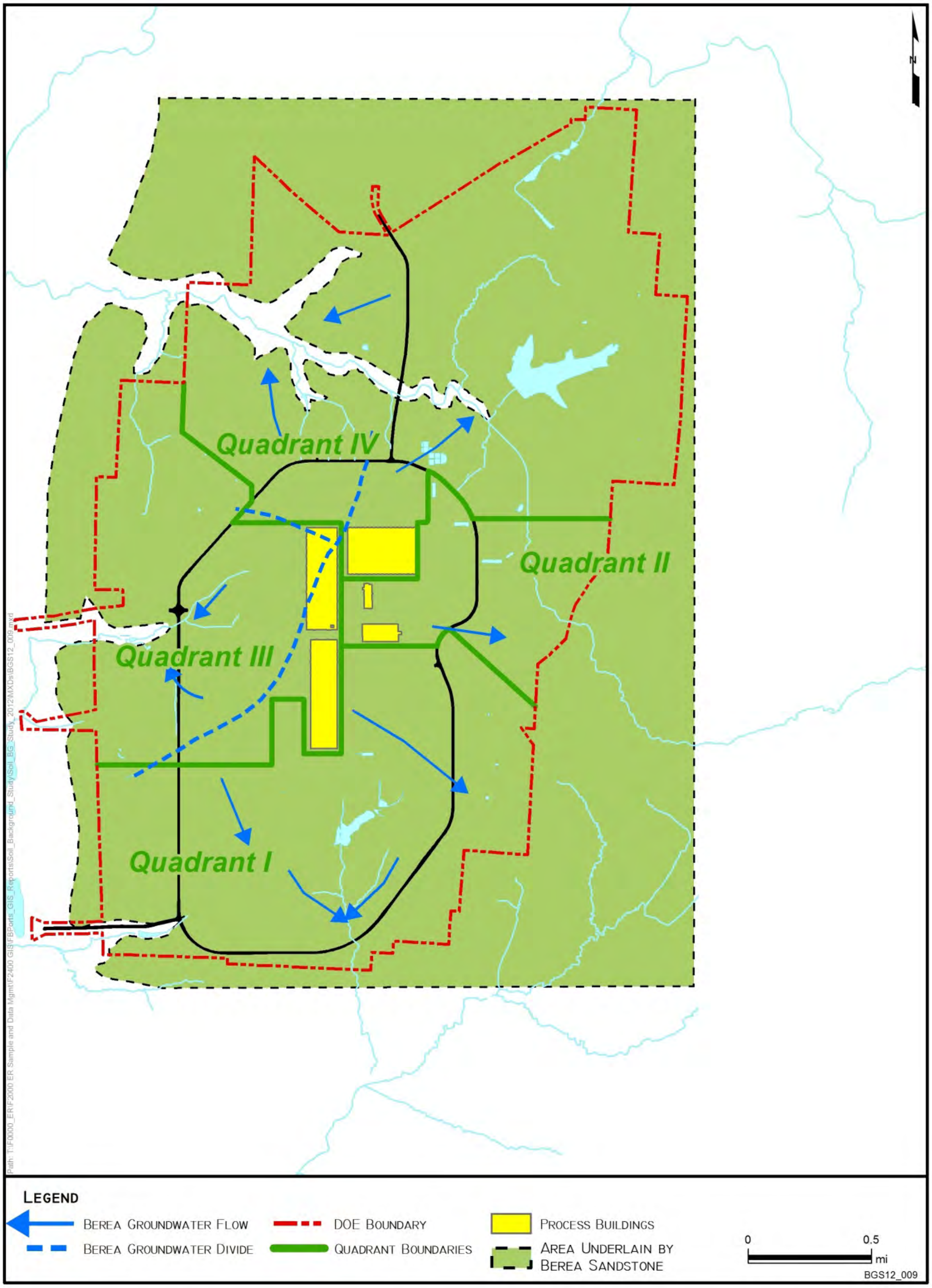


Figure 7. Generalized Groundwater Divides and Flow Directions for the Berea Sandstone

Based on water levels reported in the 2009 groundwater monitoring report (DOE 2010), the water table in the Minford is usually slightly higher than the potentiometric level of the Gallia aquifer.

Groundwater is a supply source for domestic, municipal, and industrial water uses in the vicinity of PORTS. Most municipal and industrial water supplies in Pike County are developed from the Scioto River Valley buried aquifer. Groundwater directly beneath PORTS is not used as a domestic, municipal, or industrial water supply. Domestic water supplies are obtained from unconsolidated deposits in the preglacial buried valley aquifer, major tributaries of the Scioto River, or fractured bedrock encountered during drilling. Domestic wells in the immediate vicinity of PORTS obtain groundwater from the Berea sandstone (Bechtel Jacobs Company LLC 2003).

3. DEFINITION AND SELECTION OF BACKGROUND SAMPLING AREAS

Ten study areas (Figure 8 and Plate 1, Appendix A) were identified as potential soil background sampling locations. The background areas in this study were selected and sampled using the following fundamental criteria:

- Similar environment of deposition and geologic source material as found at PORTS
- Unimpacted by site operations where the geologic formations of interest are present
- In reasonable proximity to PORTS.

The selection of soil background sampling locations included locations in the Scioto River Valley that are in the same depositional environment as the DOE pump houses and pipe lines. Other selected soil background sampling locations included additional off-site areas that have similar geologic source areas as PORTS and are unaffected by PORTS or other significant sources of contamination. These additional off-site areas were selected for the sampling of upwind, upland deposits as well as deposits representative of soils observed at PORTS, including the Minford silt and clay and the Gallia sand and gravel. The upland areas on the western side of the DOE reservation were selected for soil background sample collection because prevailing winds from the west (see Figure 1) may have contributed to the deposition of radiological constituents originating from historical nuclear testing in the western United States. Boundary conditions specific to the soil background study include the consideration that some sampling locations may be limited by access to private properties.

The background sample populations targeted in this study include: (1) upwind, upland surface soils, (2) non-site-impacted Minford soils, (3) non-site-impacted Gallia deposits, and (4) Scioto River Valley soils. To obtain representative samples of upwind, upland surface soils, sample locations were selected in Areas H, I, and J (as shown on Plate 1, Appendix A). To obtain representative samples of off-site Minford soils and Gallia deposits, sample locations were selected in Areas D, E, F, and G; and to obtain representative samples of Scioto River Valley soils, sample locations were selected in Areas A, B, and C.

According to the soil survey of Pike County, 22 soil types occur within the PORTS property boundary. The predominant soil type at the site is Omulga Silt Loam (U.S. Department of Agriculture 1990). Most of the area within the vicinity of PORTS is classified as Urbanland-Omulga complex, which consists of urban land and a deep, nearly level, gently sloping, moderately well-drained Omulga soil in preglacial valleys. The urban land is covered by roads, parking lots, buildings, and railroads. Detailed pedologic descriptions of the varying soil types in the background study areas can be found in the *Preliminary Soil Background Study Sampling and Analysis Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*.

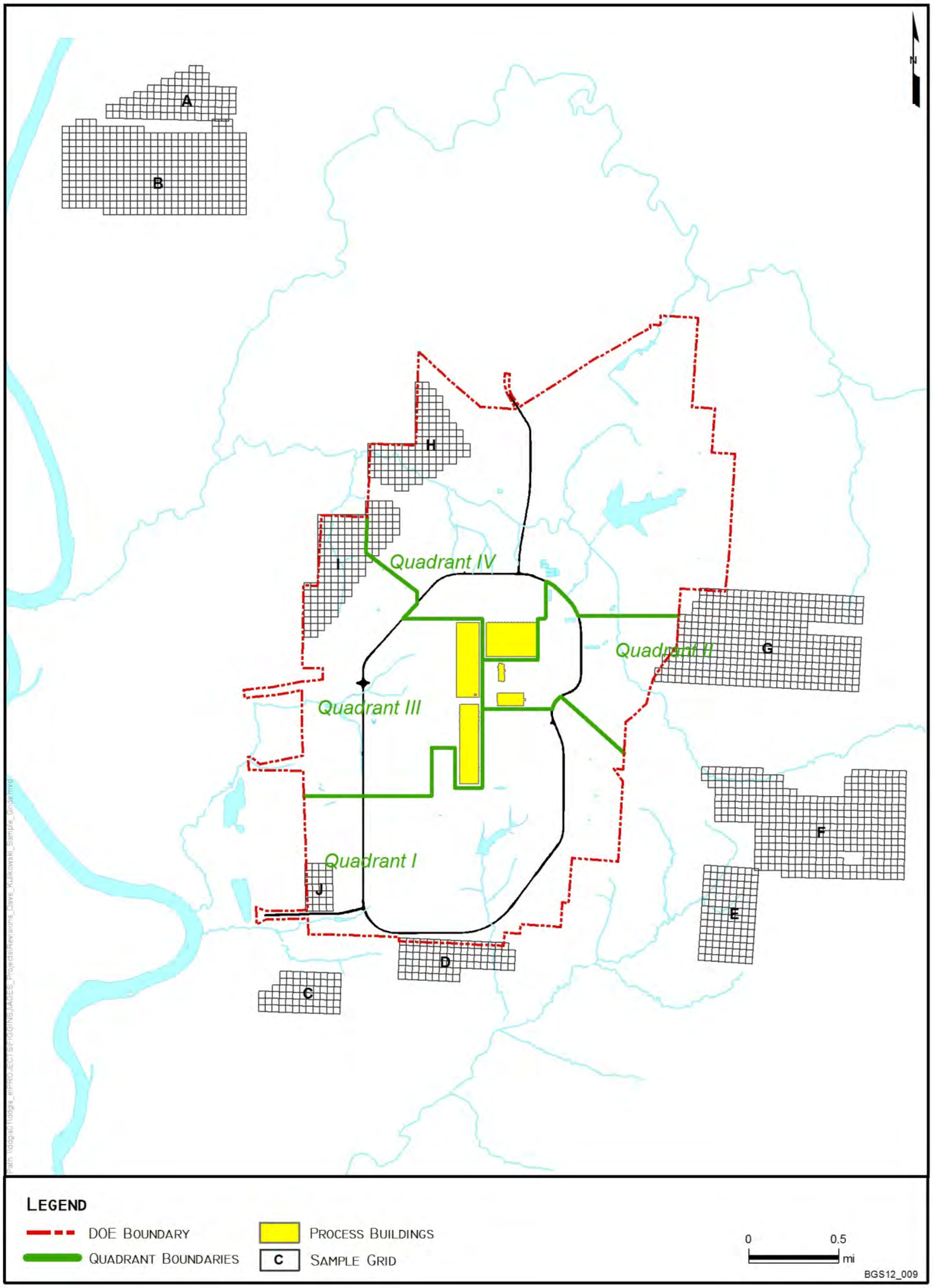


Figure 8. Background Study Areas, A through J

4. INVESTIGATION APPROACH

The investigative approach utilized during this background investigation followed the approved SAP. The SAP specified that the investigation would entail sampling designed to characterize concentrations of naturally occurring or ubiquitous anthropogenic constituents in surface and subsurface soils in and around PORTS. To ensure that these requirements were met, the background areas in this study were selected using criteria described in Section 3, and sampled for radionuclides, metals, SVOCs, PAHs, PCBs, pesticides, and herbicides at various target depths.

4.1 FIELD DETERMINATION OF BACKGROUND SAMPLING LOCATIONS

The previous soil background studies and PORTS site-specific soil and groundwater contaminant data were reviewed and analyzed to help guide selection of new background sampling areas/locations. Published regional geology and hydrogeology source books (U.S. Geological Survey and Ohio Geologic Survey bulletins and soil surveys) were reviewed to assist with identifying background sampling locations in areas of similar geologic material deposition. Currently, DOE has Land Owner Parcel Agreements (parcels) that allow DOE permission to collect samples from a parcel of land for analytical characterization. A number of these off-site parcels met the criteria for inclusion in the soil background study. Plate 1 in Appendix A shows the approved background sampling areas/locations on and around the DOE reservation.

The western boundary of the DOE reservation was chosen for on-site soil background data collection because it is representative of the soil types on the ridges overlooking the facilities within Perimeter Road and has not been disturbed by site activities. As this area is undisturbed, it is also the best opportunity to collect samples to evaluate radiological fallout from historical atmospheric nuclear testing.

4.2 DATA COLLECTION, REVIEW, ANALYSIS AND QUALITY ASSURANCE

During the field sampling program, soil samples were collected for chemical analysis to meet the goals identified during the DQO workshop in July 2011. The methodology for collecting a representative number of soil samples in a specific area was discussed during the DQO workshop with Ohio EPA and was based on guidance from EPA and Ohio EPA. The SAP provided the methodology for determining the number of samples collected. The targeted soil populations listed in the Ohio EPA-approved SAP were a guide for sample collection during the field sampling program. The “cemented” Gallia proposed for sampling in the SAP was not encountered during the field sampling program. Soil samples were collected from the following formations and depths:

- Unsaturated Minford clay surface soils (0 to 1 ft bgs)

- Unsaturated Minford clay (1 to 16 ft bgs)

- Saturated Minford clay/silt (16 to 30 ft bgs, immediately above the Minford/Gallia interface)

- Saturated Gallia deposits (variable from 14 to 90 ft bgs, immediately below the Minford clay/silt)

- Surface and subsurface soils in the unconsolidated, unsaturated Scioto River Valley immediately west of the DOE reservation

- Surface soils in upland area along western on-site boundary (0 to 1 ft bgs).

Soils were collected continuously from all borings and described from 0 to 10 ft bgs in Areas A, B, and C. Samples were collected continuously from the ground surface to bedrock in borings from Areas D, E, F, and G. The maximum depth to bedrock was 90 ft bgs. The soil samples were collected using direct-push technology, sometimes in conjunction with standard hollow-stem auger drilling and split-spoon sampling techniques, and in accordance with the approved SAP. During drilling, all soil samples were described and logged in the field by an experienced on-site geologist at PORTS. Soils were collected from 0 to 1 ft bgs in Areas H, I, and J. No bedrock samples were submitted for laboratory analysis. Tables detailing each sampled soil interval in each background area are presented in Appendix B. Geologic cross-sections and soil boring lithologic logs are included in Appendix C. Soil boring locations at each sample area are shown in Appendix D.

4.2.1 Areas A, B, and C Soil Sampling

Soils encountered in Areas A and B are well-drained soils formed in alluvium on floodplains and in glacial outwash on terraces. The soils are well suited for woodlands, but have typically been cleared of trees and are used as croplands. Flooding in these areas is common, particularly in late winter and early spring. Representative surface and subsurface soil samples of the Scioto River Valley floodplain were collected in Areas A and B west of PORTS (Figures D.1, D.2 and D.3 in Appendix D) to evaluate conditions in the area of the floodplain including property easements or leased property where utility lines that transfer water from the Scioto River to the plant site are present. The *Preliminary Soil Background Study Sampling and Analysis Report* concluded that soil samples in Areas A and B provide data representative of soil background conditions for property in the Scioto Valley floodplain, including easements and DOE-leased property.

Five soil borings were advanced to 10 ft bgs in Area A (BKGDPT-01 through BKGDPT-05), and 20 soil borings were advanced to 10 ft bgs in Area B (BKGDPT-06 through BKGDPT-25). Five surface soil samples and five subsurface samples were collected from the five borings in Area A, and 21 surface soil samples and 20 subsurface samples were collected from the 20 borings in Area B.

Soils encountered in Area C are characterized as well-drained soils that formed on glacial outwash terraces. This area has been mainly cleared of trees and is used for cultivated crops and pasture land. Five soil borings were advanced to 10 ft bgs in Area C, and five surface soil and subsurface samples were collected from these borings.

A summary of the sampling intervals for the borings in Areas A, B, and C is provided in Appendix B.

4.2.2 Areas D, E, F, and G Soil Sampling

Soils encountered in Areas D, E, and F are primarily characterized as well-drained soils that formed in loess, colluviums, and old alluvium in preglacial valleys. These areas are mainly used as cropland and pastureland. Representative samples of surface soil, the unsaturated Minford, and the Gallia were collected in Areas D, E, and F. Representative samples of the saturated Minford were collected in Areas E and F. Soils encountered in Area G are characterized as well-drained to moderately well-drained soil that forms on floodplains in narrow valleys or is present on knolls and side slopes adjacent to drainage ways in pre-glacial valleys. Area G is mainly used as cropland and pasture land. Representative samples of surface soil, the unsaturated Minford, the saturated Minford, and the Gallia were collected in Area G.

Three soil borings (BKGDPT-31 through BKGDPT-33) were advanced to bedrock in Area D, south of PORTS (Figures D.4 and D.5 in Appendix D). The depth to bedrock in these borings ranged from 6 to 16.5 ft bgs. A surface soil sample and an unsaturated Minford soil sample were sampled from each of the three borings. A sample of the Gallia was collected from one of the borings, but the Gallia was not encountered in the other two borings. A summary of the sampling intervals for the borings is presented in Appendix B, and a geologic cross-section of the subsurface is presented on Figure C.1.2 of Appendix C.

Four soil borings (BKGDPT-34 through BKGDPT-37) were advanced to bedrock in Area E, east of PORTS (Figure D.6 in Appendix D). The depth to bedrock in these borings ranged from 32 to 52.5 ft bgs. Surface soil, unsaturated and saturated Minford and Gallia samples were collected in all four borings. The depths of the Minford and Gallia sampling intervals are summarized in Appendix B, and a geologic cross-section of the subsurface is presented in Figure C.1.3 of Appendix C.

Ten soil borings (BKGDPT-38 through BKGDPT-47) were advanced to bedrock in Area F, east of PORTS (Figures D.7, D.8, and D.9 in Appendix D). Depths of the borings ranged from 16.5 to 89 ft bgs. Soil samples collected from the surface soil, unsaturated and saturated Minford and Gallia were submitted for analysis. The Gallia was not encountered in three borings. A summary of the sampling intervals for Area F borings is presented in Appendix B and a geologic cross-section of the subsurface is presented on Figures C.1.4 and C.1.5 of Appendix C.

Thirteen soil borings (BKGDPT-48 through BKGDPT-60) were advanced in Area G, east of PORTS (Figure D.10 in Appendix D). Bedrock was encountered at depths ranging from 17.5 to 83.5 ft bgs. Soil samples collected from the surface soil, unsaturated and saturated Minford and Gallia were submitted for analysis. The Gallia was not encountered in boring BKGDPT-52. A summary of the sampling intervals for each encountered unit is presented in Appendix B, and a geologic cross-section of the subsurface is presented on Figures C.1.6, C.1.7, and C.1.8 of Appendix C.

Like the PORTS site, background study areas D, E, F, and G are located within the valley footprint of the ancient Portsmouth River. The *Preliminary Soil Background Study Sampling and Analysis Report* concluded that soil samples from Areas D, E, F, and G provide background data representative of surface, and unsaturated and saturated Minford and Gallia deposits observed on site at PORTS. Cross-sections created using lithologic data collected from Areas D, E, F, and G, and presented in Appendix C, display profiles of the Minford and Gallia deposits that are similar to profiles of subsurface materials at PORTS. On these cross-sections, the Gallia sand and gravel deposits are shown to lay directly above the shale bedrock, and the Gallia is overlain by Minford clays and silts. This stratigraphy is the same as observed on site at PORTS. Similarity of the soil profiles developed for Areas D, E, F, and G to those observed at PORTS supports the conclusion that similar depositional environments existed at PORTS and in Areas D, E, F, and G.

4.2.3 Areas H, I, and J Soil Sampling

Soils encountered in Areas H and I are moderately well-drained and are associated with upland areas and elevated slopes, including hillsides, shoulder slopes and higher parts of ridge-tops. Areas H and I are mainly wooded. Soils encountered in Area J are moderately well-drained and were formed on slightly dissected bluffs that are pre-glacial valley remnants along the Scioto River. Area J is partly wooded with areas used for cropland or pasture land.

According to the SAP, background soil samples were collected in the western area of the DOE reservation (Areas H, I, and J) because it is representative of the soil types on the ridges overlooking the facilities within Perimeter Road and has not been disturbed by site activities. Additionally, this area was selected for background sample collection to evaluate any radiological contribution from historical nuclear testing in the western United States as determined by evaluation of recent and historical wind rose diagrams (DOE 2012a).

To evaluate undisturbed surface conditions in upland areas, as well as potential impact from radiological fallout, surface soil samples were collected in Areas H, I, and J (Figures D.10, D.11, and D.12, respectively, in Appendix D). A total of 60 on-site samples (25 in Area H, 30 in Area I, and five in Area J) were collected with a stainless-steel hand auger from 0 to 1 ft bgs. Because surface soil deposits from Areas H, I, and J are from upland areas, they are not expected to be fully comparable to the surface soils that are found beneath the main PORTS Facility.

Table 1 summarizes the representative soil deposits at each background area as well as the number of soil sampling locations selected at each area.

Table 1. Soil Background Areas

Soil Area	Description	Number of Soil Sampling Locations
A	Scioto River floodplain deposits west of PORTS	5
B	Scioto River floodplain deposits west of PORTS	20
C	Scioto River floodplain deposits west of PORTS	5
D	Lacustrine and fluvial deposits south of PORTS	3
E	Lacustrine and fluvial deposits southeast of PORTS	4
F	Lacustrine and fluvial deposits southeast of PORTS	10
G	Lacustrine and fluvial deposits east of PORTS	13
H	Lacustrine and fluvial deposits along western on-site boundary of PORTS (uplands)	25
I	Lacustrine and fluvial deposits along western on-site boundary of PORTS (uplands)	30
J	Lacustrine and fluvial deposits along western on-site boundary of PORTS (uplands)	5

PORTS = Portsmouth Gaseous Diffusion Plant

4.3 AUDITS OF FIELD ACTIVITIES

On May 30, 2012, a field audit was conducted to evaluate the soil sampling activities per the procedures referenced in the approved SAP (Table 1 of the SAP). This audit was performed by an independent Quality Assurance Officer auditor, and the results of this audit are presented in Appendix E. The field supervisor also performed daily surveillances of field activities and reviewed all documentation to ensure completeness and defensibility of the sampling data. Routine surveillances were conducted for all sampling, drilling, chain-of-custody, rinsate blank collection, instrument calibration, and sample bottle-handling activities, and observations were recorded in the project field log books. There were no issues identified during the audit and surveillance activities.

4.4 DATA VERIFICATION AND VALIDATION

The data validation process is an independent, systematic process for evaluating data against previously established criteria to provide confirmation that the data are of sufficient technical quality to support a decision-making process. Validation processes review field measurements, sampling and handling procedures, laboratory analyses and reporting limits, and other quality indicators associated with the data to determine whether the analytical results meet the precision, accuracy, completeness, and comparability requirements established in the DQOs. Data qualifiers are assigned to the analytical data to alert the user to deviations from quality assurance/quality control requirements. The level of quality required depends upon the intended use of the data. The data for this study were collected, analyzed, and reported at the highest possible analytical support level (ASL), as indicated in the SAP.

The analytical requirements for the soil background study are identified in Table 2 of the SAP. The following subsections (data verification, data validation, and data observations) describe the processes and methodology employed to prepare the soil background study data for statistical evaluation.

4.4.1 Data Verification

All data associated with the soil background study went through a verification process, as specified in Section 5.4 of the SAP. This verification process was performed to ensure that the laboratories analyzed samples and provided data per project requirements identified in the SAP and laboratory statements of work. All data were analyzed at ASL 4 (i.e., full data deliverable and full analytical quality control, 1/20 or 1/batch) as required by the SAP.

4.4.2 Data Validation

Per the SAP, a minimum of 10 percent validation was performed on a randomly selected data set at Validation Support Level D. Because radiological constituents are primary constituents of concern at PORTS, all radiological data (100 percent) were validated. Validation qualifiers have been assigned to all soil background study data that have been validated. Data that have not been validated have been assigned a qualifier of XV.

4.4.3 Data Observations

Analyses for the background samples were performed at the Portsmouth Analytical Laboratory (PAL) and General Engineering Laboratories (GEL). The majority of the analyses were performed at GEL; however, a subset of the metals analyses was performed at PAL (on site). The following observations were identified during the data verification, validation, or reduction process:

- A total of 120 locations for the soil background study were sampled, yielding approximately 152,000 analytical results. Documented field changes of field locations are presented in Appendix F.

- Uranium analysis by inductively-coupled plasma/mass spectrometry (ICP/MS) was performed at PAL and GEL. Both laboratories used the appropriate analytical method (as per the SAP); however, PAL used hydrofluoric acid and nitric acid to digest the sample, and GEL used only nitric acid. The method used by PAL digests more of the silicate minerals to yield higher uranium values than the method used by GEL. Because two digestion methods were used by the laboratories, the method used by GEL (SW-846 Method 3050B) was selected for use in the background data evaluation. The method selection and justification is discussed in Section 5.1.3.

This page is intentionally left blank.

5. DATA EVALUATION

A multi-step data evaluation process used for determining background concentrations for soils at PORTS is detailed in this section. Initial formulation of the background data set is discussed followed by an explanation of the grouping of the background soil data from different sampling areas and depths to create data sets that are comparable. The statistical methodology for calculating background concentrations is then presented.

5.1 FORMULATION OF A COMPREHENSIVE SOIL BACKGROUND DATA SET

Prior to performing statistical and graphical analysis of the soil background data, a soil background data set was created to address the following data issues and concerns. Detailed discussions of these items are presented in the following sections of this report.

- Selection of background data retained for use in statistical analysis
- Selection of duplicate sample results
- Review of uranium digestion methodologies
- Calculation of dry weight concentrations
- Total uranium concentrations unit conversion
- Preliminary data reduction.

Resolution of these items resulted in the compilation of a soil background data set for calculating background concentrations for naturally occurring radionuclides and metals at PORTS.

5.1.1 Soil Background Constituents

Soil background samples were submitted for laboratory analysis of radionuclides, metals, SVOCs, PAHs, PCBs, pesticides, and herbicides. As previously stated, it was decided during meetings with Ohio EPA that this report will only present background concentrations for metals and radionuclides. Metals and radionuclides occur naturally in the environment and are present at background levels, allowing comparison of PORTS site conditions to background conditions in areas that are unimpacted by facility operations.

Although background concentrations are not established for organic chemicals, the results for these constituents were considered during the assessment of the validity of the proposed background locations to confirm that locations are unaffected by anthropogenic sources. Two background sampling locations in Area H, BKG-HA12 and BKG-HA13, exhibited high levels of PAHs, indicating that these two locations are likely not representative of surface soil background conditions. Thus, sample results from these two locations were excluded from soil background evaluations.

In the unsaturated Minford, technetium-99 was detected at one sample location, BKG-DPT57, in Area G at a concentration of 0.428 pCi/g dry weight. Technetium-99 is an anthropogenic compound and was only detected in one sample; therefore, a background value was not established for this constituent.

5.1.2 Selection of Duplicate Sample Results

Per the SAP, field duplicate samples were collected at the soil background areas. During formulation of the background data sets, a review of duplicate sample results was performed to select only one result for each constituent at a single sample location and depth. Duplicate analysis selection for the final data set adhered to the following criteria:

- If the constituent was detected in both the original and duplicate samples, the greater of the two values was selected.

- If the constituent was detected in either the original or duplicate sample, the detected value was selected.

- If the constituent was not detected in either the original or duplicate sample, the sample result with the lowest reporting limit was selected.

Following data evaluation using these criteria, the final background area soil data set contains almost 90 duplicate sample results.

5.1.3 Evaluation of Digestion Method for Metal Samples

During soil analysis for uranium metal, two different laboratories were used, and while both laboratories used ICP/MS, they used two different digestion methods (both EPA-approved methods). Ohio EPA suggested that a single digestion method be selected to represent site background for uranium during the comment period on the preliminary draft results report. The PORTS digestion method selected to represent site background for uranium metal is SW-846 Method 3050B. Method 3050B primarily uses a nitric acid digestion, consistent with the DOE Environmental Measurements Laboratory HASL-300 methodology for digestion of environmental samples for isotopic uranium analysis. Method 3050B states: “While this method is not a total digestion technique for most samples, it is a very strong acid digestion that will dissolve almost all elements that could become ‘environmentally available.” Based on the fact that this digestion releases uranium that would be environmentally available, it best represents what a receptor would be exposed to from contaminated soils, sediments or solids. For these reasons, this method will produce analytical results which are more appropriate and representative for use in decision-making (risk assessments, etc.) for environmental cleanup. DOE has therefore selected the nitric acid digestion method to represent both uranium metal and isotopic uranium for site background and will utilize this method for data generated in support of the Environmental Remediation Program.

5.1.4 Calculation of Dry Weight Concentrations

Sampling data for this background study were analyzed and reported by the laboratory as wet weight concentrations. To be comparable to historic and planned RFI sampling and to results of future remediation and exposure assessment data, all background data collected for this study were converted to dry weight concentrations. This is consistent with Ohio EPA guidance (Ohio EPA 2012a) concerning wet weight versus dry weight sample analysis that states: “Reporting of soil and or sediment data for use in a human health risk assessment in dry weight is necessary to ensure consistency between the reporting units for the contaminant levels in the environmental medium of concern (soil or sediment) and the exposure factor intake rates.” To perform the conversion from wet weight to dry weight concentration, the wet weight concentration and the percent moisture in the sample as provided by the analytical laboratory report were used in the following equation:

$$C_D = C_W/(100 - \%\ \text{Moisture}) \times 100$$

Where: C_D = concentration corrected for dry weight
C_W = wet weight concentration.

All of the soil background sample analytical results and detection limits were converted from wet weight concentrations to dry weight concentrations. The percent moisture values for the samples ranged from 3.7 percent to 37.3 percent, with an average of 16.7 percent. Calculated dry weight concentrations are greater than the wet weight concentrations as seen in the example plots of dry weight results versus wet weight results for aluminum and barium from Areas A through J (Figure 9). These plots represent the typical relationship observed between dry weight and wet weight concentrations for soil background samples collected at PORTS.

There were no percent moisture measurements available for two Gallia samples, so dry weight concentrations were not determined for these sample results. Analytical results for these two Gallia samples were removed from the final background data set because they are not comparable to converted dry weight concentrations. Removal of these two samples from the data set does not impact the use of the remaining data or the validity of the statistics derived from the remaining data.

5.1.5 Total Uranium Concentration Conversion

As stated previously, DOE has selected the nitric acid digestion method to represent both uranium metal and isotopic uranium for site background and will utilize this method for data generated in support the Environmental Remediation Program. However, a sample preparation of drying and homogenizing was added to this method during the analysis of the isotopic uranium in the background study, but was not used for the uranium metals analyses. To account for this sample preparation step of drying and homogenization, and to be consistent with comparison of site background values for uranium metal with site sample data, the background values for uranium-238 were converted to units of mg/kg and used to determine background values for uranium metal. This conversion is appropriate to establish site background values for uranium metal because it accounts for the fact that at natural background levels (as in the background sampling areas), uranium-238 represents nearly all (99.32 percent) of the total uranium present. Thus, this conversion method provides an accurate means of calculating the concentration of uranium metal in the background soil samples.

Conversion of uranium-238 results to total uranium concentrations (mg/kg) was completed by multiplying the uranium-238 dry weight concentrations (pCi/g) by a conversion factor of 2.98. Derived values using this approach are consistent with previously reported concentrations for total uranium at PORTS. Total uranium concentrations in units of mg/kg are listed with the metals results on the background tables included in this report.

5.1.6 Preliminary Data Reduction

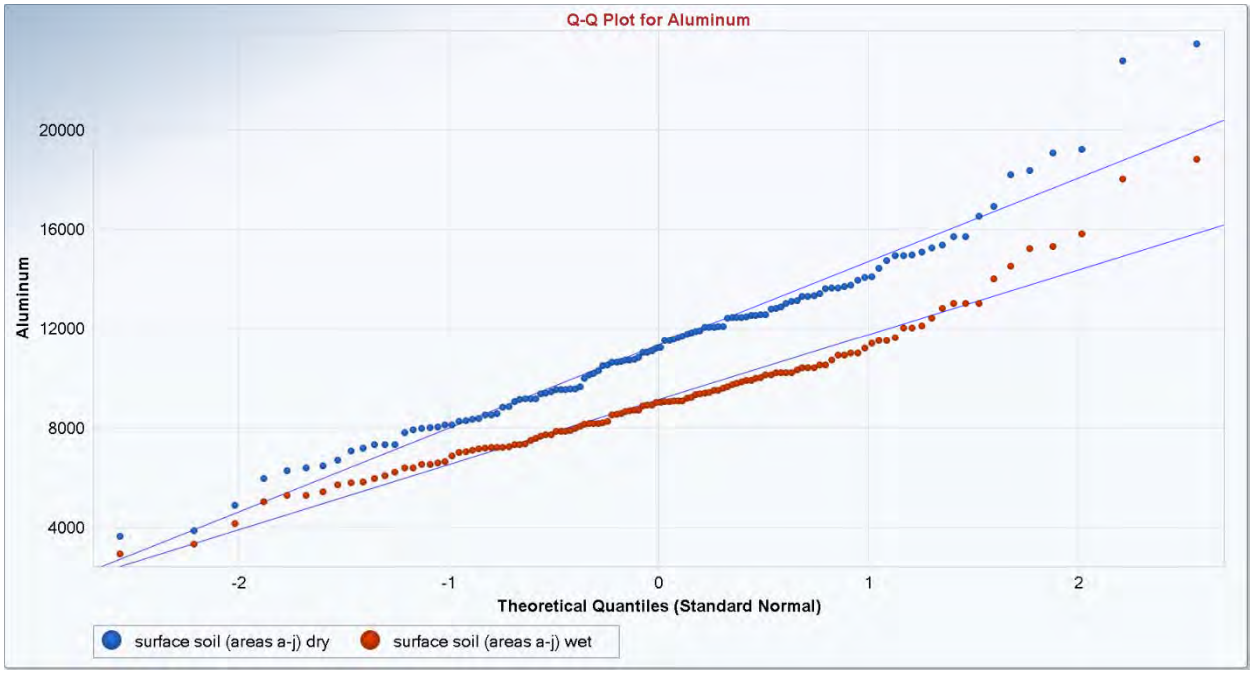
Per standard practice and in-line with data review guidance (EPA 2013a), the following three steps were performed on the compiled background data set prior to statistical analysis:

1. Rejected data (qualified with an “R” during validation) were removed.

2. Non-detected chemical results were replaced with the associated detection limit. (Note: Further discussion on the treatment of non-detected results to determine background values is included in Section 5.3.)

3. Radiochemical results which were reported at less than their sample-specific minimum detectable concentration or flagged "U" were replaced with the sample-specific minimum detectable concentration.

The data set modified by these data reduction steps is included as the ProUCL input data files presented in Appendix G.



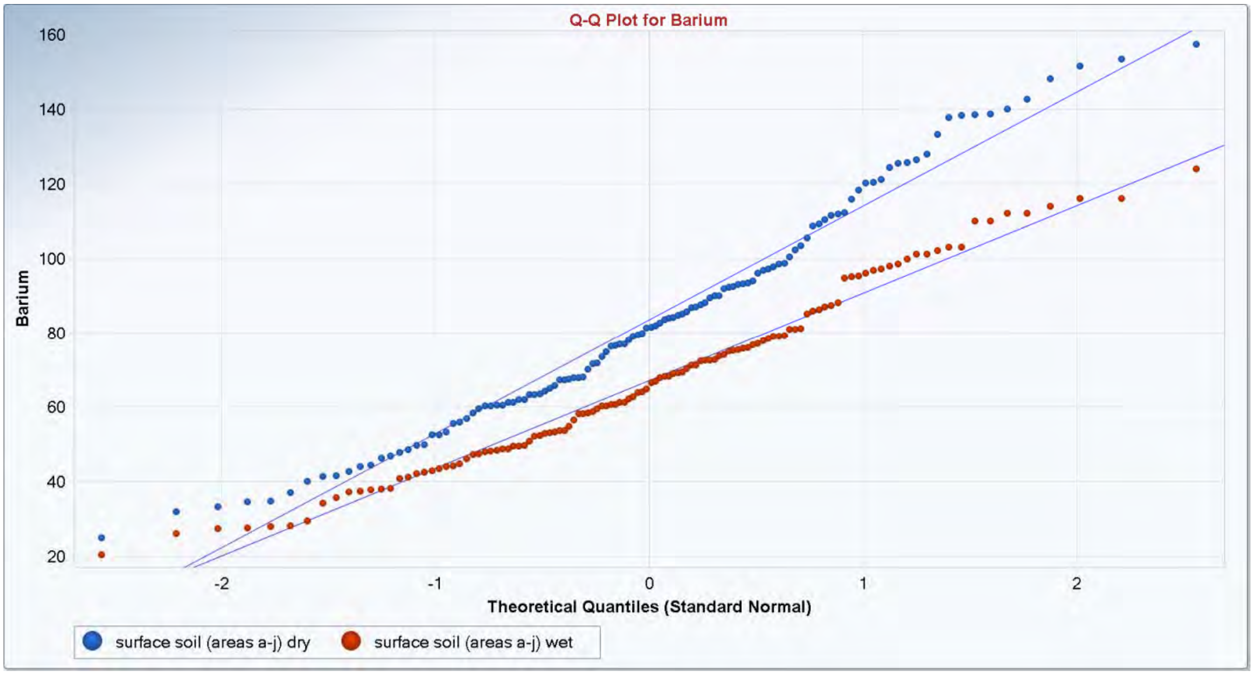


Figure 9. Dry Weight versus Wet Weight Graphs: Surface Soil (0 to 1 ft) Areas A through J Aluminum and Barium

5.2 DATA GROUPING EVALUATION

One objective of the initial review of the background soil data was to establish the grouping of the data from different sampling areas and depths to create data sets that are comparable and representative of the various soil formations observed at PORTS, in nearby upland areas and at locations within the floodplain area of the Scioto River Valley. Data sets comprised of comparable background data were then used to calculate background concentrations for naturally occurring metals and radionuclides at PORTS.

To establish comparable background data sets, multiple lines of evidence were reviewed, including the elements listed in Table 2. These evaluation elements are listed in the order in which they were performed and reviewed. Results of each of the evaluations listed in Table 2 were then used to define the final data groupings.

Table 2. Evaluation of Background Area Data Sets

Evaluation Element	Purpose
Geology at PORTS	• Assess geology to identify comparable lithologic formations within background area data sets
Preliminary Data Statistics	• Aid in the development of further statistical tests
Quantile-Quantile Plots	• Evaluate the normal, linear distribution of detected values • Visually identify potential outliers • Assess the presence of more than a single population within a data set
Outlier Test	• Evaluate the data sets for sampling, laboratory, or reporting error in the data to explain the presence of potential outliers • Identify observations within a data set needing further investigation for being a possible outlier using Rosner and Dixon outlier tests and regression analysis scatter plots • Using the Order of Magnitude test, determine if an observation is an outlier and should be removed from the final PORTS background data set
Goodness of Fit Test	• Determine the most representative distribution (i.e., normal, lognormal, or gamma) of each study area data set by assessing the correlation values for each distribution
Hypothesis Test	• Compare data from different depths within a single background study area to determine if depth intervals are comparable

PORTS = Portsmouth Gaseous Diffusion Plant

Statistical tests were performed primarily by using EPA's ProUCL software (EPA 2013b). The use of ProUCL is first described below followed by an expanded description of the purpose and application of the statistical tests, along with a brief explanation of test results as they apply to the data grouping evaluation.

5.2.1 ProUCL Software

Statistical and graphical evaluation of data for the purpose of determining background soil concentrations was performed using EPA’s ProUCL software. ProUCL was developed to compute estimates of data population parameters (e.g., means, percentiles, etc.) and decision-making statistics (i.e., UTLs) to help ensure that correct decisions are made which are cost-effective and protective of human health and the environment. The background area data sets were formatted for input to ProUCL per the software’s specific requirements.

In accordance with Ohio and EPA guidance (Ohio EPA 2004, EPA 2013b), as well as analysis provided in Gilbert (1987), a minimum of 12 samples per data set were used for statistical evaluations in this background study.

5.2.2 Geologic Justification for Background Soil Groupings

Knowledge about the geology at PORTS, comparable formations, sample areas, and depth, as discussed in Sections 2 and 4.2, were used to establish initial study groups. Statistical tests examined and compared the background data set to test and confirm the initial study areas, as set forth in the work plan, to establish the final data groupings. The following are the initial study areas:

- Unsaturated Minford clay surface soils, Areas D, E, F, and G (0 to 1 ft bgs)
- Surface soils, Areas D, E, F, and G (0 to 1 ft bgs)
- Unsaturated Minford clay, Areas D, E, F, and G (1 to 10 ft bgs)
- Saturated Minford clay/silt, Areas E, F, and G (16 to 30 ft bgs)
- Saturated Gallia deposits, Areas D, E, F, and G (variable from 14 to 90 ft bgs)
- Scioto River Valley surface soils, Areas A, B, and C (0 to 1 ft bgs)
- Scioto River Valley subsurface soils, Areas A, B, and C (1 to 10 ft bgs)
- Upland surface soils, Areas H, I, and J (0 to 1 ft bgs).

Representative surface and subsurface soil samples of the Scioto River Valley were expected to be collected in Area C; however, review of the lithologic data from the background study areas indicates that soil from background Area C is not representative of the same depositional conditions as observed in other background areas (i.e., Areas A and B). Quantile-quantile (Q-Q) plots, as described below, were used to further assess the representativeness of Area C as part of the background data set.

5.2.3 Preliminary Data Statistics

For the initial background soil data grouping evaluation, ProUCL was used to generate general statistics (e.g., frequency of detection, means, minimum and maximum detected values, standard deviations, etc.) to aid in the development of further statistical tests. The statistics were generated both including and excluding non-detected results.

5.2.4 Quantile-quantile Plots

Exploratory Q-Q plots described in this report were used to study the normal, linear distribution of detected values, identify potential outliers and assess a data set for the presence of more than a single population. Q-Q plots were generated by choosing not to display the non-detected results. For each parameter within a study area, a Q-Q plot was generated to evaluate the normal, linear correlation of the data set. An example of a Q-Q plot for aluminum in Areas D, E, F, and G in unsaturated Minford clay surface soils (0 to 1 ft bgs) is shown in Figure 10.

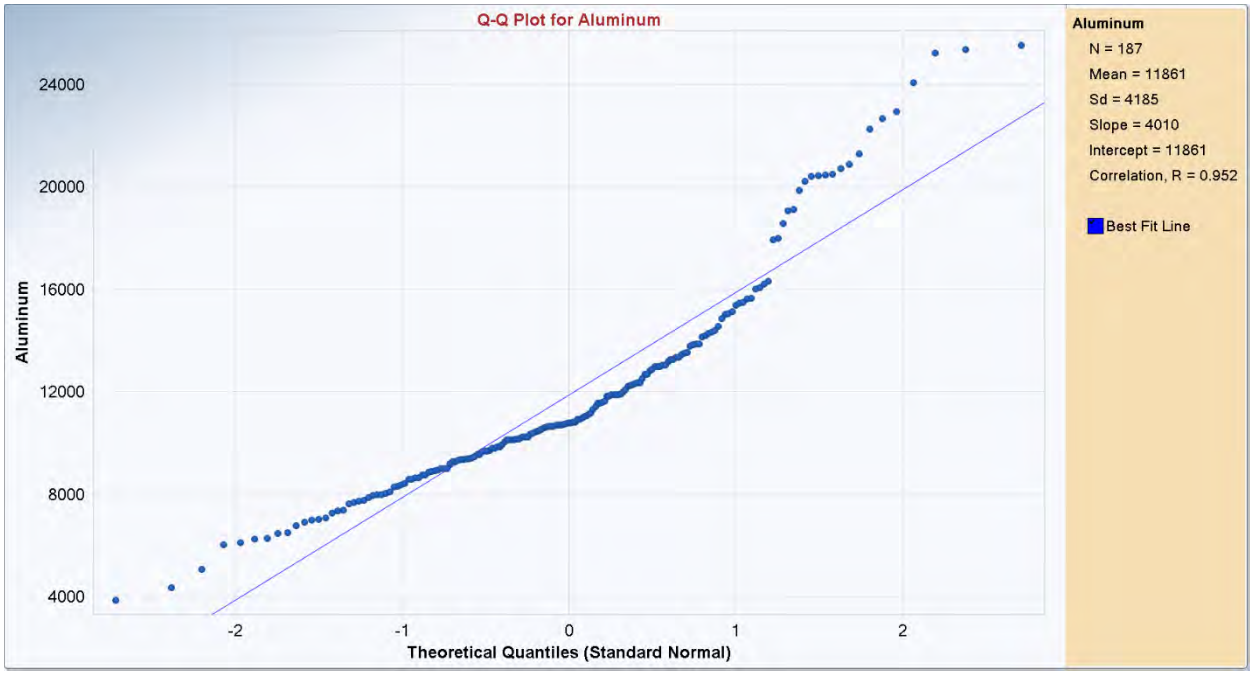


Figure 10. Q-Q Plot Example, Aluminum in Areas D, E, F, and G, Unsaturated Minford Clay Surface Soils (0 to 1 ft bgs)

The correlation value (i.e., R value) listed to the right of the Q-Q plot is reported assuming there is a normal, linear relationship between the data points. Correlation values range from zero to one, with one representing a linear relationship. For each study area tested, the correlation value of the data was recorded in Tables 3 through 7 in the columns identified as normal. The values recorded, which are colorized according to the correlation value range, are not actual sample result values, but the reported correlation value. Average correlation values for the metal and radionuclide parameters are provided for each comparison grouping column as a generalized metric of the overall correlation of the data set.

Additionally, Q-Q plots were used to graphically assess potential outliers. On a normal Q-Q plot, observations that are well separated from the main bulk of the data typically represent a data result needing further investigation for being a possible outlier. Significant shifts and breaks within the data pattern of a normal Q-Q plot are indications of more than a single population of data.

After reviewing the lithologic data from the background study areas, it was determined that soil from background Area C is not representative of the same depositional conditions as observed in other background areas. For surface soils (0 to 1 ft bgs), Q-Q plots were used to compare Area C results to the results from Areas A and B and Areas D, E, F, and G to confirm the conclusion from the lithologic data review. For each metal and radionuclide parameter, a Q-Q plot was generated that displayed each data set as a separate population. An example is provided in Figure 11. Based on the resulting Q-Q plots, it was determined that the three evaluated data groupings, (1) Areas A and B, (2) Area C, and (3) Areas D, E, F, and G, are three separate populations and that Area C is not representative of the same depositional conditions as observed in other background areas.

Table 3. Areas A and B Correlation Values and Hypothesis Test Results

Constituent	Comparison Grouping						Areas AB Hypothesis Test
	Areas AB 0-1 ft bgs (normal)	Areas AB 0-1 ft bgs (adjusted)	Areas AB 1-10 ft bgs (normal)	Areas AB 1-10 ft bgs (adjusted)	Areas AB 0-10 ft bgs (normal)	Areas AB 0-10 ft bgs (adjusted)	0-1 ft bgs = 1-10 ft bgs
Metals							
Aluminum	0.99	0.99	0.88	0.96	0.97	0.97	N
Antimony	0.97	0.98	0.98	0.98	0.99	0.99	N
Arsenic	0.98	0.98	0.99	0.99	0.99	0.99	N
Barium	0.97	0.97	0.91	0.98	0.96	0.96	N
Beryllium	0.97	0.97	0.96	0.99	0.98	0.98	N
Cadmium	0.99	0.98	0.92	0.97	0.99	0.98	N
Calcium	0.73	0.95	0.97	0.97	0.88	0.96	N
Chromium	0.99	0.99	0.95	0.99	0.99	0.99	N
Cobalt	0.98	0.98	0.91	0.97	0.98	0.98	N
Copper	0.97	0.97	0.94	0.98	0.98	0.99	N
Iron	0.98	0.98	0.95	0.98	0.98	0.98	N
Lead	0.97	0.97	0.94	0.98	0.97	0.97	N
Lithium	0.95	0.98	0.95	0.98	0.98	0.99	N
Magnesium	0.81	0.92	0.97	0.97	0.88	0.98	N
Manganese	0.98	0.98	0.87	0.95	0.96	0.98	N
Mercury	0.96	0.96	NA	NA	0.94	0.94	N
Nickel	0.99	0.99	0.93	0.98	0.98	0.98	N
Potassium	0.97	0.98	0.91	0.96	0.97	0.97	N
Selenium	0.98	0.98	0.98	0.99	0.92	0.98	Y
Silver	0.95	0.95	0.97	0.98	0.95	0.95	Y
Sodium	0.96	0.98	0.98	0.98	0.93	0.93	N
Thallium	0.99	0.99	0.93	0.98	0.98	0.99	N
Total Uranium	0.99	0.99	0.95	0.98	0.98	0.98	N
Vanadium	0.99	0.99	0.96	0.99	0.98	0.98	N
Zinc	0.96	0.96	0.93	0.96	0.97	0.97	N
Average Distribution	0.96	0.97	0.94	0.98	0.96	0.97	% Y: 8
Radionuclides							
Thorium-228	0.98	0.98	0.90	0.98	0.969	0.969	N
Thorium-230	0.98	0.98	0.96	0.99	0.98	0.98	N
Thorium-232	0.97	0.97	0.94	0.99	0.98	0.975	N
Uranium-233/234	0.99	0.99	0.94	0.99	0.98	0.98	N
Uranium-235/236	0.98	0.98	0.98	0.99	0.96	0.993	N
Uranium-238	0.99	0.99	0.95	0.98	0.98	0.98	N
Average Distribution	0.98	0.98	0.94	0.99	0.97	0.98	% Y: 0

Notes:

NA - two or fewer detections

(adjusted) - correlation values based on data distribution

Correlation Value Range
1.0 - 0.95
0.949 - 0.90
0.899 - 0.80
0.799 - 0.70
0.699 - 0.0

***Correlation values presented in this table represent the relationship betweeen data sets.**

bgs = below ground surface

Table 4. Areas D, E, F, and G Correlation Values and Hypothesis Test Results

Constituent	Comparison Grouping						Areas DEFG Hypothesis Test
	Areas DEFG 0-1 ft bgs (normal)	Areas DEFG 0-1 ft bgs (adjusted)	Areas DEFG 1-16 ft bgs (normal)	Areas DEFG 1-16 ft bgs (adjusted)	Areas DEFG 0-16 ft bgs (normal)	Areas DEFG 0-16 ft bgs (adjusted)	0-1 ft bgs = 1-16ft bgs
Metals							
Aluminum	0.94	0.97	0.95	0.99	0.96	0.99	Y
Antimony	0.96	0.96	0.86	0.97	0.91	0.91	Y
Arsenic	0.91	0.98	0.85	0.98	0.85	0.98	Y
Barium	0.99	0.99	0.56	0.90	0.55	0.897	Y
Beryllium	0.98	0.997	0.92	0.99	0.92	0.99	N
Cadmium	0.94	0.94	0.71	0.96	0.64	0.948	Y
Calcium	0.95	0.97	0.69	0.97	0.72	0.97	Y
Chromium	0.96	0.99	0.98	0.998	0.98	0.998	Y
Cobalt	0.93	0.98	0.86	0.995	0.85	0.99	N
Copper	0.94	0.98	0.99	0.998	0.98	0.997	Y
Iron	0.81	0.96	0.86	0.98	0.86	0.99	N
Lead	0.80	0.93	0.42	0.92	0.44	0.93	N
Lithium	0.89	0.967	0.94	0.99	0.93	0.93	N
Magnesium	0.91	0.91	0.96	0.96	0.95	0.95	N
Manganese	0.98	0.98	0.61	0.99	0.67	0.996	N
Mercury	0.93	0.93	0.92	0.92	0.94	0.94	N
Nickel	0.94	0.99	0.93	0.999	0.92	0.998	N
Potassium	0.92	0.92	0.91	0.996	0.91	0.995	N
Selenium	0.86	0.894	0.43	0.86	0.49	0.87	N
Silver	0.83	0.96	0.38	0.97	0.84	0.97	Y
Sodium	0.77	0.930	0.91	0.99	0.91	0.98	N
Thallium	0.73	0.875	0.31	0.84	0.34	0.85	Y
Total Uranium	0.98	0.99	0.96	0.99	0.96	0.99	N
Vanadium	0.93	0.98	0.92	0.98	0.93	0.99	Y
Zinc	0.76	0.94	0.94	0.97	0.94	0.99	N
Average Distribution	0.90	0.96	0.79	0.96	0.81	0.96	% Y: 44
Radionuclides							
Thorium-228	0.97	0.98	0.997	0.997	0.997	0.997	N
Thorium-230	0.95	0.97	0.94	0.98	0.94	0.99	N
Thorium-232	0.97	0.99	0.99	0.996	0.99	0.995	N
Uranium-233/234	0.98	0.99	0.98	0.996	0.97	0.99	N
Uranium-235/236	0.99	0.99	0.98	0.996	0.97	0.996	N
Uranium-238	0.98	0.99	0.96	0.99	0.96	0.99	N
Average Distribution	0.97	0.99	0.98	0.99	0.97	0.99	% Y: 0

Notes:
(adjusted) - correlation values based on data distribution

Correlation Value Range
1.0 - 0.95
0.949 - 0.90
0.899 - 0.80
0.799 - 0.70
0.699 - 0.0

***Correlation values presented in this table represent the relationship between data sets.**

bgs = below ground surface

Table 5. Areas E, F, and G Correlation Values

Constituent	Comparison Grouping	
	Areas EFG 16-30 ft bgs (normal)	Areas EFG 16-30 ft bgs (adjusted)
Metals		
Aluminum	0.96	0.96
Antimony	0.93	0.98
Arsenic	0.97	0.97
Barium	0.95	0.97
Beryllium	0.99	0.99
Cadmium	0.93	0.97
Calcium	0.93	0.95
Chromium	0.95	0.97
Cobalt	0.99	0.99
Copper	0.98	0.98
Iron	0.91	0.96
Lead	0.95	0.97
Lithium	0.95	0.95
Magnesium	0.97	0.98
Manganese	0.89	0.95
Mercury	0.97	0.97
Nickel	0.96	0.97
Potassium	0.95	0.95
Selenium	0.81	0.91
Silver	0.84	0.84
Sodium	0.94	0.97
Thallium	0.75	0.89
Total Uranium	0.96	0.99
Vanadium	0.99	0.99
Zinc	0.96	0.97
Average Distribution	0.94	0.96
Radionuclides		
Thorium-228	0.95	0.96
Thorium-230	0.88	0.93
Thorium-232	0.98	0.98
Uranium-233/234	0.95	0.98
Uranium-235/236	0.99	0.98
Uranium-238	0.96	0.99
Average Distribution	0.95	0.97

Notes:
(adjusted) - correlation values based on data distribution

Correlation Value Range
1.0 - 0.95
0.949 - 0.90
0.899 - 0.80
0.799 - 0.70
0.699 - 0.0

***Correlation values presented in this table represent the relationship between data sets.**

bgs = below ground surface

Table 6. Gallia Areas D, E, F, and G Correlation Values

Constituent	**Comparison Grouping**	
	Areas DEFG Gallia (normal)	**Areas DEFG Gallia (adjusted)**
Metals		
Aluminum	0.94	0.94
Antimony	0.79	0.99
Arsenic	0.79	0.98
Barium	0.97	0.99
Beryllium	0.94	0.98
Cadmium	0.89	0.99
Calcium	0.63	0.95
Chromium	0.99	0.99
Cobalt	0.95	0.98
Copper	0.53	0.53
Iron	0.98	0.99
Lead	0.90	0.97
Lithium	0.81	0.81
Magnesium	0.92	0.98
Manganese	0.87	0.98
Mercury	0.78	0.98
Nickel	0.94	0.98
Potassium	0.97	0.99
Selenium	0.77	0.77
Silver	0.94	0.98
Sodium	0.96	0.99
Thallium	0.89	0.89
Total Uranium	0.94	0.94
Vanadium	0.96	0.99
Zinc	0.90	0.97
Average Distribution	0.88	0.94
Radionuclides		
Thorium-228	0.96	0.98
Thorium-230	0.89	0.95
Thorium-232	0.97	0.99
Uranium-233/234	0.93	0.98
Uranium-235/236	0.97	0.99
Uranium-238	0.94	0.94
Average Distribution	0.94	0.97

Notes:
(adjusted) - correlation values based on data distribution

Correlation Value Range
1.0 - 0.95
0.949 - 0.90
0.899 - 0.80
0.799 - 0.70
0.699 - 0.0

***Correlation values presented in this table represent the relationship between data sets.**

Table 7. Areas H, I, and J Correlation Values

Constituent	Comparison Grouping	
	Areas HIJ 0-1 ft bgs (normal)	Areas HIJ 0-1 ft bgs (adjusted)
Metals		
Aluminum	0.97	0.97
Antimony	0.79	0.77
Arsenic	0.78	0.78
Barium	0.98	0.99
Beryllium	0.35	0.988
Cadmium	0.33	0.70
Calcium	0.82	0.99
Chromium	0.78	0.78
Cobalt	0.85	0.98
Copper	0.68	0.67
Iron	0.76	0.76
Lead	0.90	0.99
Lithium	0.95	0.994
Magnesium	0.93	0.93
Manganese	0.98	0.98
Mercury	0.86	0.85
Nickel	0.65	0.63
Potassium	0.95	0.99
Selenium	0.37	0.990
Silver	0.38	0.74
Sodium	0.83	0.830
Thallium	0.40	0.927
Total Uranium	0.89	0.90
Vanadium	0.85	0.85
Zinc	0.86	0.83
Average Distribution	0.75	0.87
Radionuclides		
Thorium-228	0.97	0.97
Thorium-230	0.87	0.86
Thorium-232	0.97	0.97
Uranium-233/234	0.59	0.91
Uranium-235/236	0.79	0.98
Uranium-238	0.89	0.90
Average Distribution	0.85	0.93

Notes:

(adjusted) - correlation values based on data distribution and removal of outliers

Correlation Value Range

1.0 - 0.95
0.949 - 0.90
0.899 - 0.80
0.799 - 0.70
0.699 - 0.0

***Correlation values presented in this table represent the relationship between data sets.**

bgs = below ground surface

Figure 11. Q-Q Plot Example, Copper in Areas A and B, Area C, and Areas D, E, F, and G Surface Soils (0 to 1 ft bgs)

5.2.5 Outlier Testing

In accordance with EPA guidance (EPA 2009), there is no indication of a sampling, laboratory, or reporting error in the data to explain the presence of potential outliers. Therefore, no observations were removed as an outlier from the PORTS background data set.

Statistical tests were performed to identify outliers as opposed to extreme background measurements. Outlier tests were performed on the study unit data sets and not the PORTS background data set as a whole. Non-detected observations were excluded from the data sets for each test. Similar to the Q-Q plots noted above, Rosner and Dixon Outlier Tests and Regression Analysis Tests highlighted observations within a data set that needed further investigation for being a possible outlier; however, the Order of Magnitude Test was the deciding test to determine if an observation was an outlier and should be removed from the final PORTS background data set. Each test is described below.

5.2.5.1 Rosner and Dixon Outlier tests

Rosner and Dixon Outlier tests, the two classic outlier tests, were performed to test for the existence of one or more outliers in a data set at a 1 percent significance level. For this grouping study, the Rosner Outlier Test was used for data sets having 25 or more samples. The Dixon Outlier Test was used for data sets having less than 25 samples. Both the Rosner and Dixon Outlier Tests assume that the data set without the suspected outliers is normally distributed, as a data set with outliers tends not to follow a normal distribution. The ProUCL Technical Guide notes that a data set without the outliers may still not follow a normal distribution; however, the outlier tests and supportive Q-Q plots represent exploratory tools used for the preprocessing of data, including the identification of potential outliers. The ProUCL Technical Guide further explains that because outlier identification statistics are only used in the identification of high outlying observations and not used in any decision-making calculations, it should not matter how the non-detect observations are treated in the outlier test statistics.

5.2.5.2 Regression analysis and scatter plots

In support of the outlier identification process, ordinary least squares (OLS) regression graphs (i.e., simple linear regression or scatter plots) were generated in ProUCL to show the graphic representation of the relationship between two metals. For each scatter plot, the overall pattern of the relationship was examined for consistency and any obvious deviations from the pattern were noted. The data points that fit the overall pattern are likely to represent natural concentrations of the metals, whereas the outliers are part of a separate population (Battelle Memorial Institute et al. 2002).

When a scatter plot displays a linear relationship, the overall pattern can be described by drawing a straight line through the data point by linear regression. A linear relationship is strong if most of the data points lie close to the regression line, whereas the relationship is weak if they are widely scattered about the line. A calculated 95 percent prediction interval can be plotted to show the probability that the metal concentrations will fall within a certain range. A 95 percent prediction interval is the range within which the target metal concentration that corresponds to a given reference metal concentration is predicted to fall 95 percent of the time. Data points that fall outside of this prediction interval should be investigated as possible data outliers (Battelle Memorial Institute et al. 2002).

5.2.5.3 Order of magnitude test

Ohio EPA guidance (Ohio EPA 2012b) states that if censored data comprise less than 75 percent of the background data set, and if the highest value data point in the background data set exceeds by an order of magnitude the value of the second highest data point, the highest data point should be considered a statistical outlier. Data sets were evaluated for outliers using this magnitude test. Data evaluation was performed using Microsoft Excel.

Within each study set, an order of magnitude limit was calculated for each parameter by multiplying the second highest value by 10 (i.e., an order of magnitude). If the highest recorded value exceeded the calculated order of magnitude limit for a parameter, the highest recorded value was considered to be an outlier. In the PORTS background data set, the following five outliers were detected at location BKGHA-19-03-SS, which is located in the upland surface soils in Area H:

- Beryllium, 61.07 mg/kg
- Cadmium, 57.27 mg/kg
- Selenium, 53.997 mg/kg
- Silver, 53.87 mg/kg
- Thallium, 49.672 mg/kg.

In conclusion, based on technical guidance and statistical testing, five outliers, detected at location BKGHA-19-03-SS in Area H, were identified and were removed from the PORTS background data set prior to performing statistical tests and background calculations. The reason for the extreme values is unknown. Supporting documentation for outlier testing is provided in Appendix H.

5.2.6 Goodness of Fit Testing

In ProUCL, Goodness of Fit (GOF) tests were performed for normal, lognormal, and gamma distributions. The goal was to determine the most representative distribution of each study area data set by assessing the correlation values of each distribution.

GOF tests were run with a 95 percent confidence coefficient, which is the default option in ProUCL. Dependent on the presence of non-detected observations in the study data set, two variations of the GOF tests were used. The variations are described below. The derived correlation values were recorded using the same method, independent of the variations of the GOF test, which described below the GOF test descriptions.

If the data set had all positive observations (i.e., a full data set with no non-detects), the GOF test was run on the full data set for all GOF statistics. If the data set had non-detected observations, the GOF test was run with non-detected results for all GOF statistics.

Once the GOF statistics were generated, the results for both types of data sets (i.e., both with and without non-detects) were evaluated in the same manner. If the data set appeared to exhibit one or more type of distribution, the highest of the three correlation coefficients was recorded in the adjusted column for that parameter. For example, in the aluminum example above (Figure 10), the data set only appears lognormal; therefore, the value of 0.971 was recorded on the correlation table for the study area. If the data was not normal, lognormal, or gamma at the confidence coefficient of 95 percent, the correlation coefficient of the normal, linear Q-Q plot was used as the default correlation value for that parameter.

GOF tests were performed for the selected study areas. Tables 3 through 7 present the results of these tests in the columns labeled as adjusted. The values are colorized and presented in the same method as those recorded for the normal Q-Q plots, as described in Section 5.2.4.

5.2.7 Hypothesis Testing

A two-sample hypothesis test approach was used to directly compare data from different depths within a single background study area to determine if the data sets are comparable and exhibit similar parameters (e.g., mean, shape, distribution).

Hypothesis tests are formulated by first developing a null hypothesis, which is a statistical representation of the test decision. The result of the hypothesis test is either an acceptance or rejection of a null hypothesis (H_0). For this grouping study, a null hypothesis was selected that states that the mean/median concentration of the first data set is equal to the mean/median of the second data set. The alternative hypothesis (H_A) then states that the mean/median concentration of the first data set is not equal to the mean/median of the second data set. The hypothesis test, a test of the null and alternative hypotheses, is represented as follows:

$$H_0\text{: Sample 1 } \mu = \text{Sample 2 } \mu \text{ vs. } H_A\text{: Sample 1 } \mu \neq \text{Sample 2 } \mu$$

Where: μ is the sample mean/median.

If the results of the hypothesis test indicate that the null hypothesis should be rejected, the alternative hypothesis is then accepted.

Hypothesis tests were run in ProUCL using untransformed data. Potential outliers were also removed (Area H only). Hypothesis tests run with data sets containing only detected values used the nonparametric Wilcoxon-Mann-Whitney test to evaluate the null hypothesis and determine if a difference was present between the background data sets being compared. Tests run with at least one non-detected result present in one of or both data sets were completed using the nonparametric Gehan test.

The Gehan test is better suited than the Wilcoxon-Mann-Whitney test to perform two-sample tests on data sets consisting of non-detected values. The Gehan test can be used when the data contain multiple non-detected values with varying detection limits, whereas the Wilcoxon-Mann-Whitney test requires that a single detection limit be used to represent non-detected values in the data set. Both the Wilcoxon-Mann-Whitney and Gehan tests assume that the variabilities (shape) of the two data distributions are comparable. Equality of variances for data sets was assumed for this study based on distributions of the data observed graphically in Q-Q plots.

Both the Wilcoxon-Mann-Whitney and the Gehan tests calculate a p-value to test the null hypothesis. A p-value is the smallest value for which the null hypothesis is rejected in favor of the alternative hypothesis. If the computed p-value is smaller than the specified value of alpha (α, the level of significance), the conclusion is to reject the null hypothesis. Hypothesis tests performed for this background data grouping evaluation were performed assuming a 95 percent confidence coefficient, which resulted in a value of 0.05 for the level of significance. Therefore, the null hypothesis was accepted for any hypothesis test where the p-value was greater than or equal to 0.05.

For this study, hypothesis tests were performed to compare data from the same background areas at different depths to determine if the data sets are comparable and exhibit similar parameters. This statistical test was used to compare Areas A and B surface soil (0 to 1 ft bgs) to Areas A and B subsurface soil (1 to 10 ft bgs), and Areas D, E, F, and G surface soil (0 to 1 ft bgs) to Areas D, E, F, and G subsurface soil (1 to 16 ft bgs).

The hypothesis tests results for Areas A and B, presented in Table 3, indicate that only 8 percent of the metals parameters and none of the radionuclide parameters have comparable data sets. Therefore, although the correlation values for Areas A and B (0 to 10 ft bgs) range between 0.96 and 0.98, as shown above in Sections 5.2.4 and 5.2.6, the data sets are not comparable. Therefore, it was decided that these two data sets, Areas A and B surface soil (0 to 1 ft bgs) and Areas A and B subsurface soil (1 to 10 ft bgs), would be evaluated separately for determination of background concentrations.

The hypothesis tests results for Areas D, E, F, and G, presented in Table 4, indicate that only 44 percent of the metals parameters and none of the radionuclide parameters have comparable data sets. Therefore, although the correlation values for Areas D, E, F, and G (0 to 16 ft bgs) range between 0.81 and 0.99, as shown above in Sections 5.2.4 and 5.2.6, the data sets are not comparable. Therefore, it was decided that these two data sets, Areas D, E, F, and G surface soil (0 to 1 ft bgs) and Areas D, E, F, and G subsurface soil (1 to 16 ft bgs), would be evaluated separately for determination of background concentrations.

5.2.8 Data Grouping Results

After reviewing the geology of the background study areas and evaluating the statistical results, final data groupings were established (Table 8). The sample depths, a description of the area, and the number of samples in each data set is included. All data sets have 12 or more samples, which meets EPA recommended minimum number of samples per data set used for statistical evaluation.

Representative surface and subsurface soil samples of the Scioto River Valley were expected to be collected in Area C; however, review of Q-Q plots (Section 5.2.4) and lithologic data (Area C borings BKG-DPT26 through BKG-DPT30; see Appendix C) indicate that soil from Area C is not representative of the same depositional conditions as observed in other background areas. Therefore, surface and subsurface soil samples from the five locations in Area C were excluded from the PORTS data set used to determine background soil concentrations.

The final background data sets for input to EPA's ProUCL software are provided in digital format in Appendix G. Background data tables for each area grouping are presented in Appendix I.

Table 8. Final Background Area Data Groupings

Soil Sampling Area	Depth (ft bgs)	Description[a]	Number of Soil Samples
Areas A and B	0 to 1	Surface soil, Scioto River Valley	25
Areas A and B	1 to 10	Subsurface soil, Scioto River Valley	25
Areas D, E, F, and G	0 to 1	Surface soil, PORTS site	30
Areas D, E, F, and G	1 to 16	Unsaturated Minford, PORTS site	187
Areas E, F, and G	16 to 30	Saturated Minford, PORTS site	12
Areas D, E, F, and G	14 to 90	Gallia, PORTS site	34
Areas H, I, and J	0 to 1	Surface soil, PORTS upland area	58

[a] PORTS site = off-site areas representative of lithology observed on site at PORTS

bgs = below ground surface
PORTS = Portsmouth Gaseous Diffusion Plant

5.3 STATISTICAL METHODOLOGY FOR BACKGROUND CALCULATIONS

Background concentrations determined for PORTS background soils represent one of the following three statistics:

- 95% UTL
- Upper Bound (per 2004 Ohio EPA guidance)
- Maximum detected value of the data set.

A 95% UTL represents a statistic such that 95 percent of observations (current and future) from the target population (i.e., background) will be less than or equal to the 95% UTL (EPA 2013b). A parametric 95% UTL takes the data variability into account. Like an upper bound value, a 95% UTL should be compared to samples collected on site on a point-by-point basis. UTL calculations for this investigation were performed using a 0.95 confidence coefficient, meaning that 5 percent of background observations are not expected to come from the background population.

ProUCL calculates a 95% UTL for normal, lognormal, or gamma distributed data. Nonparametric 95% UTLs are also determined. The selection of a representative 95% UTL is based on the best distribution of the data. Appropriate mathematical equations and statistical approach for determining 95% UTLs for normal, lognormal and gamma distributed data is provided in the ProUCL Technical Guidance.

As previously stated in Section 5.1.6, non-detected chemical results are represented by the detection limit in the ProUCL input data set. However, rather than simply using detection limits to represent non-detected results, ProUCL can calculate UTLs for normal, lognormal, and gamma data distributions by replacing the non-detected values with imputed values using regression on order statistics (ROS) or Kaplan-Meier (KM) estimates. The ROS method is used to impute values for non-detected results based upon a hypothesized data distribution (EPA 2013b). In this method, the distribution of the detected observations is assessed first, and assuming that the distribution of the non-detected observations follow the same distribution as the detected values, imputed values are assigned to the non-detected results using an OLS regression line (i.e., ordered detections and hypothesized quantiles). This approach allows for a representation of the data distribution for each non-detected result instead of using standard detection limits that are repeated for multiple non-detected results in the data set. The mathematical approach for using the ROS method is provided in the ProUCL Technical Guidance.

The nonparametric KM method is based upon a distribution function estimate that adjusts for non-detected values. The KM method is widely used in environmental applications to compute the upper limits needed to estimate upper thresholds of background populations. The KM method can be used to estimate the population mean, standard deviation, the standard error of the mean, and the variance for left-censored environmental data. The mathematical approach for using the KM method is provided in the ProUCL Technical Guidance. The calculation of both upper bound and 95% UTL values for this study used ROS and KM methodology, when appropriate, and as described below.

An upper bound concentration is a calculated data limit that can be used as the background concentration and should be compared to samples collected on-site on a point by point basis. The statistical approach for determining the upper bound value of a constituent data set is explained in the Ohio EPA publication, *Background Calculation Methodology* (Ohio EPA 2004). This methodology utilizes data percentiles to calculate an upper limit of the data. Percentiles are defined such that 25 percent of the samples are at or below the 25th percentile, 50 percent of the samples are at or below the 50th percentile (i.e., the median), and 75 percent of the samples are at or below the 75th percentile. The upper bound calculation is a numerical way to tabulate the information found on a box plot, and Ohio EPA has noted that this is a reasonable estimation of an upper bound for a background data set. The upper bound is calculated as follows:

$$\text{Upper Bound} = Q3 + k(Q3-Q1)$$

Where: Q1 is the 25th percentile value (lower quartile)
Q3 is the 75th percentile value (upper quartile)
Q3-Q1 is the interquartile range
k = 1.5.

The above approach is recommended because it is a robust, nonparametric method that requires no knowledge on the distribution of the data (i.e., normal, lognormal, etc.). The constant “k” can vary from 1.5 to 3; however, Ohio EPA recommends 1.5 for the purpose of calculating background concentrations because k=1.5 best represents the “standard” box plot.

For constituents with all detected results in the data set, statistics were generated for the data set and the Q1 and Q3 values were input into the upper bound equation. For constituents with non-detected values present in the data set, the non-detected values were replaced with imputed values using the ROS method. To determine which of the ROS imputing methods (i.e., normal, lognormal, or gamma) should be used for a data set, GOF tests were performed with non-detected values using normal, lognormal, and gamma ROS estimated values. The distribution with the highest correlation coefficient was selected as the ROS imputing method for the final data set for that constituent.

The final selection of a background concentration is dependent on the detection frequency of the constituent and the distribution of the data. The distribution of the data was determined using tests and methods provided in ProUCL. A decision tree for selection of background concentrations at PORTS is shown in Figure 12. A brief explanation of the background value decision process is as follows:

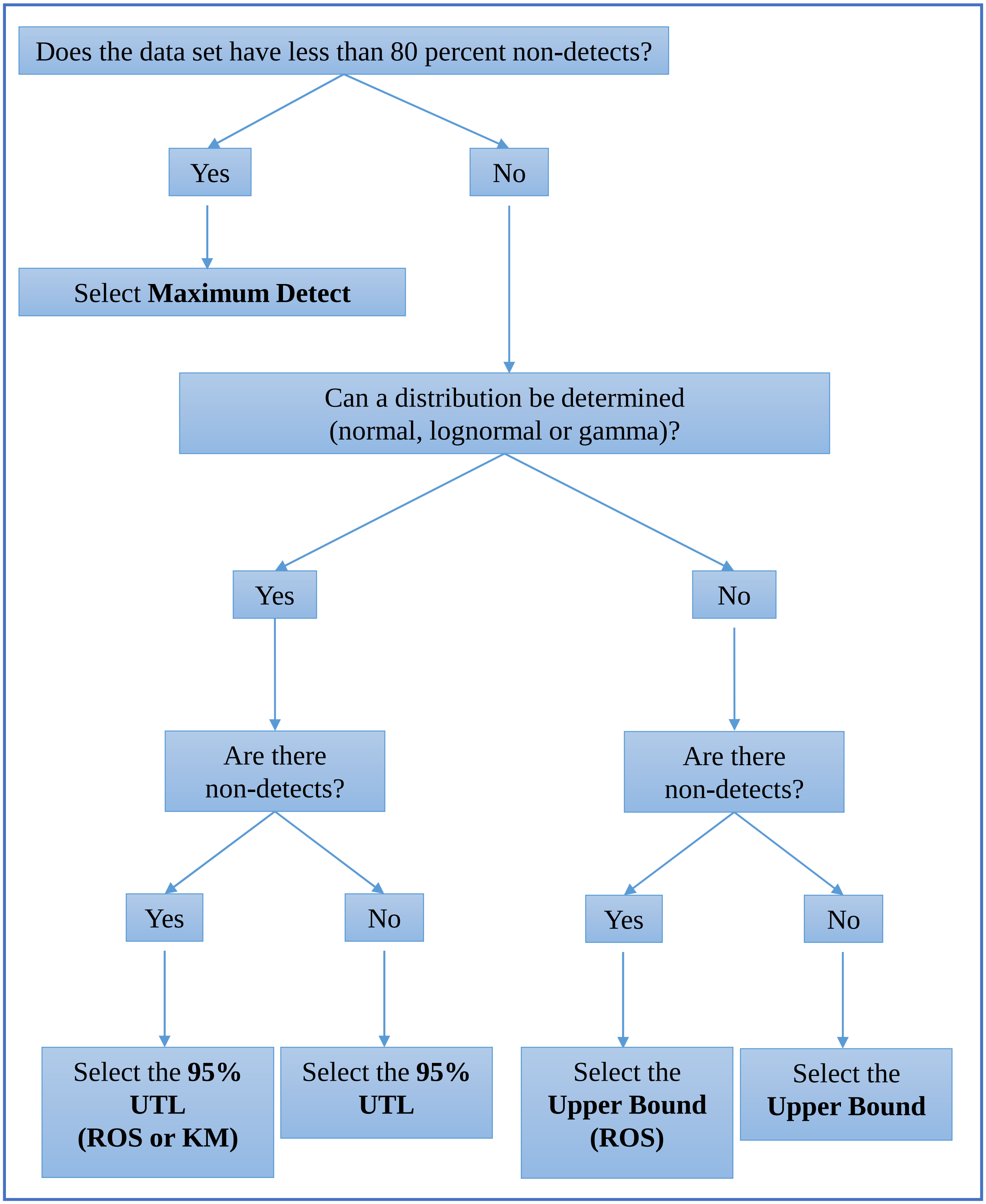
- If greater than 80 percent of the data are non-detected results, the maximum detected value is selected as the background concentration. If 80 percent or less of the data are non-detected results, the distribution of the data is determined (Helsel 2005).

- If the data distribution is determined to be normal, lognormal, or gamma and there are no non-detected results in the data set, the 95% UTL that best fits the data distribution is selected as the background concentration.

- If the data distribution is determined to be normal, lognormal, or gamma and there are non-detected results in the data set, the data is imputed to include ROS or KM estimates to account for the non-detected values, and then the 95% UTL that best fits the data distribution is selected as the background concentration.

- If no data distribution can be determined and there are no non-detected results in the data set, the upper bound is selected as the background concentration. If no data distribution can be determined and there are non-detected results in the data set, the upper bound calculated using ROS methodology to account for the non-detected results is selected as the background concentration.

Documentation supporting the results of the statistical process used for developing the PORTS background soil concentrations is provided in Appendix J.



UTL = Upper Tolerance Limit ROS = Regression on Order Statistics KM = Kaplan-Meier

Figure 12. Background Value Tree

6. BACKGROUND CALCULATION RESULTS

Background concentrations were determined for metals and radionuclides detected in the background soil sampling areas as defined in Table 8. Table 9 summarizes the calculated background concentrations for metals and radionuclides in these background sampling areas and soil units. The majority of the background concentrations represent upper bound or 95% UTL calculations; two results represent maximum detected values (mercury in Areas A and B subsurface soil, and silver in Areas H, I, and J surface soil). Background concentrations are not presented for the following chemicals that are essential to a well-balanced diet and typically are not considered hazardous to humans: calcium, magnesium, potassium, and sodium. Background concentrations are reported to three significant figures.

Table 9. Dry Weight Background Values for Metals and Radionuclides
Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Parameter	Scioto Valley		PORTS Site				PORTS Upland Area
	Surface Soil (0-1 ft) Areas AB	Subsurface Soil (1-10 ft) Areas AB	Surface Soil (0-1 ft) Areas DEFG	Unsaturated Minford (1-16 ft) Areas DEFG	Saturated Minford (16-30 ft) Areas EFG	Gallia Areas DEFG	Surface Soil (0-1 ft) Areas HIJ
Metals (mg/kg Dry)							
Aluminum	16,100	11,800	24,500	20,700	12,700	13,400	18,000
Antimony	1.88	1.29	2.05	1.83	3.51	8.43	4.06
Arsenic	14.4	11.8	30.8	29.0	85.6	129	19.8
Barium	165	92.8	114	136	72.1	99.9	182
Beryllium	0.995	0.858	1.25	1.60	1.17	1.51	1.70
Cadmium	0.527	0.328	0.241	0.282	0.688	2.00	0.858
Chromium	19.4	17.7	32.4	29.4	24.6	28.9	23.4
Cobalt	13.1	10.1	28.5	37.4	18.6	26.5	37.4
Copper	25.5	22.2	18.5	26.2	23.1	27.5	15.9
Iron	27,200	22,700	86,100	62,800	56,400	155,000	29,000
Lead	18.1	13.1	33.0	22.6	12.7	37.5	44.2
Lithium	56.9	59.6	113	123	120	97.3	116
Manganese	1,130	760	1,860	1,490	465	2,560	1,920
Mercury	0.0400	0.0470	0.0600	0.0520	0.0410	0.0674	0.0938
Nickel	30.3	25.0	22.6	50.3	52.7	78.2	29.1
Selenium	1.13	2.49	1.79	0.639	0.637	0.564	2.39
Silver	2.06	6.44	11.0	7.48	3.66	14.1	3.84
Thallium	1.31	0.964	0.327	0.359	0.821	0.501	2.93
Total Uranium	5.50	3.52	4.05	4.73	7.19	7.30	4.26
Vanadium	43.7	39.5	78.0	58.0	65.1	87.6	52.0
Zinc	111	80.2	93.1	117	148	244	85.7

Table 9. Dry Weight Background Values for Metals and Radionuclides Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Parameter	Scioto Valley		PORTS Site				PORTS Upland Area
	Surface Soil (0-1 ft) Areas AB	Subsurface Soil (1-10 ft) Areas AB	Surface Soil (0-1 ft) Areas DEFG	Unsaturated Minford (1-16 ft) Areas DEFG	Saturated Minford (16-30 ft) Areas EFG	Gallia Areas DEFG	Surface Soil (0-1 ft) Areas HIJ
Radionuclides (pCi/g Dry)							
Thorium-228	1.31	1.08	1.64	1.88	1.56	1.73	1.52
Thorium-230	2.59	1.81	1.59	1.74	2.42	2.52	1.70
Thorium-232	1.37	1.21	1.56	1.91	1.63	1.73	1.46
Uranium-233/234	1.76	1.23	1.30	1.57	2.36	2.34	1.37
Uranium-235/236	0.142	0.0558	0.0987	0.119	0.170	0.171	0.115
Uranium-238	1.85	1.18	1.36	1.59	2.41	2.45	1.40

--- all non-detects

Maximum Detect

95% UTL

Upper Bound

PORTS = Portsmouth Gaseous Diffusion Plant
UTL = upper tolerance limit

Table 10 summarizes metals concentrations in soil within the State of Ohio as referenced in scientific literature. A comparison of PORTS soil background concentrations to the results from similar investigations of soils in Ohio (Table 11) indicates inorganic and radionuclide constituents detected in this study are comparable to concentrations reported for similar Ohio soils.

Table 10. Metals and Radionuclide Concentrations in Ohio Soils

Parameter	Ohio Farm Soils[a]	1993 Ohio Agricultural Soils[b]	1993 Fernald, OH[c]	1996 Ohio Soils (Cox-Colvin)[d]	2013 Franklin County, OH[e]	1996 PORTS RFI (Minford)[f]	Range in Ohio Soils[g]
Metals (mg/kg)							
Aluminum	---	---	11,880 (0-6")	8,180	---	15,314	8,180 - 16,100
			14,742 (48-54")	(max: 16,100)			
Antimony	---	---	7.7 (0-6")	---	---	---	6.7 - 7.7
			6.7 (48-54")				
Arsenic	---	---	8.45 (0-6")	5.72	20.7	31	5.72 - 56
			8.82 (48-54")	(max: 56)			
Barium	---	---	126.09 (0-6")	63.4	163	181	63.4 - 323
			98.72 (48-54")	(max: 323)			
Beryllium	---	---	0.60 (0-6")	0.377	---	1.4	0.377 - 3.15
			0.63 (48-54")	(max: 3.15)			

Table 10. Metals and Radionuclide Concentrations in Ohio Soils (Continued)

Parameter	Ohio Farm Soils[a]	1993 Ohio Agricultural Soils[b]	1993 Fernald, OH[c]	1996 Ohio Soils (Cox-Colvin)[d]	2013 Franklin County, OH[e]	1996 PORTS RFI (Minford)[f]	Range in Ohio Soils[g]
Metals (mg/kg) (continued)							
Cadmium	0.2	0.357	0.64 (0-6")	0.507	0.789	2	0.2 - 4.40
			0.59 (48-54")	(max: 4.40)			
Chromium	12	---	15.5 (0-6")	12.1	16.4	28.6	12 - 80.5
			18.87 (48-54")	(max: 80.5)			
Cobalt	---	---	15.17 (0-6")	6.42	---	28.2	6.42 - 53.6
			15.68 (48-54")	(max: 53.6)			
Copper	19	26.2	16.43 (0-6")	11.8	---	32.6	11.8 - 58
			18.55 (48-54")	(max: 58)			
Iron	---	---	22,323 (0-6")	18,400	---	51,180	18,400 - 100,000
			27,853 (48-54")	(max: 100,000)			
Lead	19	18.2	25.57 (0-6")	16.2	41.5	32	13.35 - 147
			13.35 (48-54")	(max: 147)			
Lithium	---	---	---	---	---	35	35
Manganese	---	---	1,772 (0-6")	459	---	2,012	459 - 2,012
			940 (48-54")	(max: 1,750)			
Mercury	---	---	0.30 (0-6")	0.081	0.081	0.048	0.081 - 1.60
			0.29 (48-54")	(max: 1.60)			
Nickel	18	27.1	20.87 (0-6")	14.4	36.4	34	14.4 - 110
			28.37 (48-54")	(max: 110)			
Selenium	---	---	0.72 (0-6")	---	1.07	3	0.61 - 3
			0.61 (48-54")				
Silver	---	---	2.6 (0-6")	---	---	2.5	2.2 - 2.6
			2.2 (48-54")				
Thallium	---	---	0.58 (0-6")	---	0.743	2.5	0.43 - 2.5
			0.43 (48-54")				
Total Uranium	---	---	3.706 (0-6")	---	---	4.8	3.683 - 4.8
			3.683 (48-54")				
Vanadium	---	---	30.37 (0-6")	17.4	---	50.2	17.4 - 71
			34.97 (48-54")	(max: 71)			
Zinc	75	82.1	59.61 (0-6")	42.7	---	101	42.7 - 190
			59.19 (48-54")	(max: 190)			
Radionuclides (pCi/g)							
Thorium-228	---	---	1.560 (0-6")	---	---	---	1.5 - 1.6
			1.475 (48-54")				
Thorium-230	---	---	2.175 (0-6")	---	---	---	2.15 - 2.17
			2.153 (48-54")				
Thorium-232	---	---	1.362 (0-6")	---	---	---	1.4 - 1.6
			1.458 (48-54")				
Uranium-233/234	---	---	1.244 (0-6")	---	---	---	1.1 - 1.2
			1.061 (48-54")				

Table 10. Metals and Radionuclide Concentrations in Ohio Soils (Continued)

Parameter	Ohio Farm Soils[a]	1993 Ohio Agricultural Soils[b]	1993 Fernald, OH[c]	1996 Ohio Soils (Cox-Colvin)[d]	2013 Franklin County, OH[e]	1996 PORTS RFI (Minford)[f]	Range in Ohio Soils[g]
			Radionuclides (pCi/g) (continued)				
Uranium-235/236	---	---	0.148 (0-6") 0.125 (48-54")	---	---	---	0.13 - 0.15
Uranium-238	---	---	1.222 (0-6") 1.218 (48-54")	---	---	---	1.2

[a] The Ohio State University 1983. Values represent means.
[b] Homgren et al., 1993. Values represent geometric means.
[c] DOE 1993. Values represent 95% UTL.
[d] Cox-Colvin & Assoc. 1996. Values represent geometric mean.
[e] Ohio EPA 2013. Values represent VAP UL or 95% UPL.
[f] DOE 1996. Values represent 95% UTL.
[g] Range in Ohio Soils represents the minimum and maximum background concentrations reported in the studies presented in this table.

DOE = U.S. Department of Energy
Ohio EPA = Ohio Environmental Protection Agency
PORTS = Portsmouth Gaseous Diffusion Plant
RCRA = Resource Conservation and Recovery Act of 1976
RFI = RCRA Facility Investigation
UPL = Upper Prediction Limit
UTL = Upper Tolerance Limit
VAP UL = Voluntary Action Program Upper Limit

Table 11. Comparison of PORTS Soil Background Values to Concentrations of Metals and Radionuclides in Ohio Soils

Parameter	Scioto Valley		PORTS Site				PORTS Upland Area	Ohio
	Surface Soil (0-1 ft) Areas AB	Subsurface Soil (1-10 ft) Areas AB	Surface Soil (0-1 ft) Areas DEFG	Unsaturated Minford (1-16 ft) Areas DEFG	Saturated Minford (16-30 ft) Areas EFG	Gallia Areas DEFG	Surface Soil (0-1 ft) Areas HIJ	Range in Soil[a]
				Metals (mg/kg Dry)				
Aluminum	16,100	11,800	24,500	20,700	12,700	13,400	18,000	8,180 – 16,100
Antimony	1.88	1.29	2.05	1.83	3.51	8.43	4.06	6.7 - 7.7
Arsenic	14.4	11.8	30.8	29.0	85.6	129	19.8	5.72 - 56
Barium	165	92.8	114	136	72.1	99.9	182	63.4 - 323
Beryllium	0.995	0.858	1.25	1.60	1.17	1.51	1.70	0.377 - 3.15
Cadmium	0.527	0.328	0.241	0.282	0.688	2.00	0.858	0.2 - 4.40
Chromium	19.4	17.7	32.4	29.4	24.6	28.9	23.4	12 - 80.5
Cobalt	13.1	10.1	28.5	37.4	18.6	26.5	37.4	6.42 - 53.6
Copper	25.5	22.2	18.5	26.2	23.1	27.5	15.9	11.8 - 58
Iron	27,200	22,700	86,100	62,800	56,400	155,000	29,000	18,400 – 100,000
Lead	18.1	13.1	33.0	22.6	12.7	37.5	44.2	13.35 - 147
Lithium	56.9	59.6	113	123	120	97.3	116	35

Table 11. Comparison of PORTS Soil Background Values to Concentrations of Metals and Radionuclides in Ohio Soils (Continued)

Parameter	Scioto Valley		PORTS Site				PORTS Upland Area	Ohio
	Surface Soil (0-1 ft) Areas AB	Subsurface Soil (1-10 ft) Areas AB	Surface Soil (0-1 ft) Areas DEFG	Unsaturated Minford (1-16 ft) Areas DEFG	Saturated Minford (16-30 ft) Areas EFG	Gallia Areas DEFG	Surface Soil (0-1 ft) Areas HIJ	Range in Soil[a]
Metals (mg/kg Dry) (continued)								
Manganese	1,130	760	1,860	1,490	465	2,560	1,920	459 – 2,012
Mercury	0.0400	0.0470	0.0600	0.0520	0.0410	0.0674	0.0938	0.081 - 1.60
Nickel	30.3	25.0	22.6	50.3	52.7	78.2	29.1	14.4 - 110
Selenium	1.13	2.49	1.79	0.639	0.637	0.564	2.39	0.61 - 3
Silver	2.06	6.44	11.0	7.48	3.66	14.1	3.84	2.2 - 2.6
Thallium	1.31	0.964	0.327	0.359	0.821	0.501	2.93	0.43 - 2.5
Total Uranium	5.50	3.52	4.05	4.73	7.19	7.30	4.26	3.683 - 4.8
Vanadium	43.7	39.5	78.0	58.0	65.1	87.6	52.0	17.4 - 71
Zinc	111	80.2	93.1	117	148	244	85.7	42.7 - 190
Radionuclides (pCi/g Dry)								
Thorium-228	1.31	1.08	1.64	1.88	1.56	1.73	1.52	1.5 - 1.6
Thorium-230	2.59	1.81	1.59	1.74	2.42	2.52	1.70	2.15 - 2.17
Thorium-232	1.37	1.21	1.56	1.91	1.63	1.73	1.46	1.4 - 1.6
Uranium-233/234	1.76	1.23	1.30	1.57	2.36	2.34	1.37	1.1 - 1.2
Uranium-235/236	0.142	0.0558	0.0987	0.119	0.170	0.171	0.115	0.13 - 0.15
Uranium-238	1.85	1.18	1.36	1.59	2.41	2.45	1.40	1.2

Notes:
--- = all non-detects
[a] Represents the minimum and maximum background concentrations reported in the studies presented in Table 10.
Within Ohio soil range
Within +/-10 percent of Ohio soil range
PORTS = Portsmouth Gaseous Diffusion Plant

The PORTS background concentration for iron in the Gallia (155,228 mg/kg) exceeds the maximum concentration reported for iron in Ohio soils (100,000 mg/kg). The Gallia data set for this background study contained five concentrations that were greater than 100,000 mg/kg. In a 1995 background study, similar concentrations were reported for iron samples representing the non-contaminated population of on-site Gallia deposit soil data (Korte et al. 1995). In the 1995 study, iron concentrations in the Gallia ranged from 12,000 mg/kg to 160,000 mg/kg, with five of the sample results greater than 100,000 mg/kg. Hence, elevated iron concentrations appear to be common for the PORTS Gallia deposits. Although the background concentration for iron in this current study exceeds the maximum Ohio soil iron concentration, the background iron concentration appears to be representative of PORTS Gallia deposits.

7. CONCLUSIONS

A soil background investigation was completed at PORTS to provide, in accordance with an approved SAP, representative background data for each major soil formation on the DOE reservation, on property easements, and DOE-leased property off the DOE reservation, as of April 2015. This investigation builds on background studies completed earlier and addresses limitations of those earlier studies.

The investigation was designed to characterize concentrations of naturally occurring or ubiquitous anthropogenic constituents in surface and subsurface soil in and around PORTS. Soil samples collected from selected background locations were analyzed for radionuclides, metals, and organic chemicals; however, only metals and radionuclides, which are naturally occurring, were retained for evaluation and subsequent calculation of background concentrations.

In addition to the results presented here for naturally-occurring metals, including uranium, the background data set includes detected results for radioactive isotopes (e.g., americium, plutonium, technetium) and some organic constituents that are considered ubiquitous (e.g., PAHs, PCBs, pesticides). Because neither the radioactive isotopes nor the organic constituents are naturally-occurring, data of these anthropogenic constituents are not evaluated in this report. A preliminary analysis of these data is provided in the *Preliminary Soil Background Study Sampling and Analysis Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 2012b). The analysis in that report found that the detected concentrations are low and generally fall below risk-based soil screening levels derived considering the industrial or residential scenarios. Additional statistical analyses of these data may be completed in the future, if necessary, to support risk management decisions.

Surface and subsurface soil units were identified in the 10 soil background sampling areas (A through J), as described in Table 1. Representative upper bounds or 95% UTLs were generated for the data to provide background values for metals and radionuclides in the formation-specific surface and subsurface soils at PORTS.

Once approved by Ohio EPA, site background values will be compared to soil sample results collected at PORTS to determine if the results are greater than background concentrations. Site background values will also play an important role in development of risk-based soil PRGs. PRGs will be published in the DU RFI/CMS final report and used to develop corrective actions analyses. PRG concentrations developed for the DU RFI/CMS final report will be used to identify areas within each deferred unit requiring corrective action, assist in calculation of contaminated media volumes, and assist in preparation of cost estimates associated with the corrective action alternatives analysis. After the PRGs have been presented to the public for review in the Preferred Plan and the public comments have been addressed, the PRGs will be designated as final remediation levels (FRLs) in Ohio EPA's Decision Document. The FRLs will be established to ensure protection of human health and the environment and will be used in the Corrective Measures Implementation during site remediation. During remediation activities, it is common practice to clean up to risk-based values, but not to levels less than background concentrations. Therefore, some of the background concentrations listed in this soil background report (Table 9) may be used as PRGs, and ultimately FRLs, when risk-based values are less than background concentrations.

Specific conclusions developed in this soil background report are summarized as follows:

- The quality and coverage of the samples collected in each background sampling area are adequate for use in this background investigation. A sufficient number of samples were collected from these locations to adequately characterize the background concentrations of naturally occurring and anthropogenic constituents in soil.

- Soil samples collected in Areas A and B provide data representative of soil background conditions for DOE property in the Scioto Valley floodplain, including easements and DOE-leased property, as of April 2015.

- Soil samples collected in Areas D, E, F, and G provide data representative of surface, unsaturated, and saturated subsurface soil background conditions similar to those observed in on-site Minford and Gallia soils.

- Statistical testing and data evaluation indicated that soil samples collected in Areas H, I, and J exhibited weak correlation within themselves and identified outliers in the data set. Based on these findings, it is concluded that the data set may not be fully representative of on-site surface soil background conditions in upland areas undisturbed by present and historic site operations.

- A comparison to the results from similar background investigations of soils in Ohio (Table 10), including the 1996 PORTS background investigation, indicates inorganic and radionuclide constituents detected in this study are comparable to concentrations reported for similar Ohio soils.

8. REFERENCES

Battelle Memorial Institute, Earth Tech, Inc., and NewFields, Inc. 2002, *Guidance for Environmental Background Analysis: Volume I – Soil*, Naval Facilities Engineering Command, April 2002, UG-2049-ENV.

Bechtel Jacobs Company LLC 2003, *Identification and Screening of Candidate Sites for a Potential On-site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, BJC/PORTS-448, Bechtel Jacobs Company LLC, April.

Bonnett, B. B., Noltimier, H. C., and Sanderson, D. D., 1991, A paleomagnetic study of the early Pleistocene Minford Silt member, Teays Formation, West Virginia in Melhorn, W. and Kempton, J., eds., Geology and hydrogeology of the Teays-Mahomet Bedrock Valley Systems, Boulder, Colorado, Geological Society of America Special Paper 258, p. 9-18.

Bork, B. K, Malcuit, R. J., 1979a, Paleoenvironments of the Cuyahoga and Logan Formations (Mississippian) of Central Ohio: Summary, Geological Society of America Bulletin, Part I, v. 90, p. 1091-1094.

Bork, B. K, Malcuit, R. J., 1979b, Paleoenvironments of the Cuyahoga and Logan Formations (Mississippian) of Central Ohio, Geological Society of America Bulletin, Part II, v. 90, p. 1782-1838.

Coleman, J. M., 1976, *Deltas: Processes of Deposition and Models for Exploration*: Champaign, Illinois, Continuing Education Publication Company, Inc., 102 p.

Coogan, Alan H. 1996, *Ohio's Surface Rocks and Sediments*, modified from Chapter 3 of *Fossils of Ohio*, Ohio Division of Geological Survey Bulletin 70.

Cox-Colvin & Assoc. 1996, *Evaluation of Background Metal Concentrations in Ohio Soils.*

DOE 2012a, *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/02-0250&D1, U.S. Department of Energy, Piketon, OH, January.

DOE 2012b, *Preliminary Soil Background Study Sampling and Analysis Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0423&D1, U.S. Department of Energy, Piketon, OH, November.

DOE 2010, *2009 Groundwater Monitoring Report for the Portsmouth Gaseous Diffusion Plant*, DOE/PPPO/03-0121&D1, U.S. Department of Energy, Piketon, OH, March.

DOE 1996, *Background Sampling Investigation of Soil and Groundwater Final Report, Portsmouth Gaseous Diffusion Plant, Piketon*, DOE/OR/11-1323&D6, U.S. Department of Energy, Piketon, OH, July.

DOE 1993, *CERCLA/RCRA Background Soil Study, Fernald Environmental Management Project, Fernald, Ohio*, U.S. Department of Energy, Fernald, OH.

Engelder, T., 1993, *Stress regimens in the lithosphere*: Princeton University Press, Princeton, New Jersey, 457 p.

EPA 2013a, National Functional Guidelines for Inorganic Superfund Data Review, OSWER 9200.2-133, EPA-540-R-013-001, U.S. Environmental Protection Agency, Washington, D.C., October.

EPA 2013b, ProUCL Version 5.0.00 *Technical Guide*, *Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations,* EPA/600/R-07/041, U.S. Environmental Protection Agency, Washington, D.C., September.

EPA 2009, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, EPA530/R-09-0007, Unified Guidance, Office of Resource Conservation and Recovery Program Implementation and Information Division, U.S. Environmental Protection Agency, Washington, D.C., March.

EPA 2002, *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*, EPA 540-R-01-003, OSWER 9285.7-41, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, September.

Gilbert, Richard O. 1987, *Statistical Methods for Environmental Pollution Monitoring,* Van Nostrand Reinhold.

Hansen, Michael C. 2007, *Earthquakes in Ohio, Ohio Division of Geological Survey*, Educational Leaflet No. 9.

Helsel, Dennis R. 2005, *Nondetects and Data Analysis: Statistics for Censored Environmental Data*, John Wiley & Sons, Inc., p. 78.

Homgren et al., 1993, *Cadmium, Lead, Zinc, Copper, and Nickel in Agricultural Soils of the US of America*.

Horne, J. C, and Ferm, J. C., 1978, Carbonaceous Depositional Environments: Eastern Kentucky and Southern West Virginia: Columbia, South Carolina, University of South Carolina, Department of Geology, 151 p.

Korte, Nic, Jim Davidson, and John Wilson 1995, *Background Values for Chemical and Radiochemical Analytes for the Minford and Gallia Soils at the Portsmouth Gaseous Diffusion Plant*, Draft, Oak Ridge National Laboratory, Grand Junction Office, Grand Junction, CO, August.

Law Engineering 1978, *Final Report Gas Centrifuge Enrichment Plant Geotechnical Investigation, Piketon, Ohio*, Law Engineering, Marietta, GA.

Ohio EPA 2013, *Evaluation of Background Metal Soil Concentrations in Franklin County - Columbus Area, Summary Report*, Ohio Environmental Protection Agency, Columbus, OH, October.

Ohio EPA 2012a, *Soil and Sediment Sampling: Wet Weight versus Dry Weight,* Technical Guidance Compendium, VA30007.12.001, Ohio Environmental Protection Agency, Columbus, OH, December.

Ohio EPA 2012b, *Evaluation of Statistical Outliers and Statistically Significant Trends in Ground Water Quality Data*, DMWM and DDAGE Guidance Document #715, Ohio Environmental Protection Agency, Columbus, OH, September.

Ohio EPA 2009, *Closure Plan Review Guidance for RCRA Facilities*, Ohio Environmental Protection Agency, Columbus, OH, October.

Ohio EPA 2006, *Biological and Water Quality Study of Portsmouth Gaseous Diffusion Plant Streams*, Ohio EPA Report EAS/2006-10-4, Ohio Environmental Protection Agency, November.

Ohio EPA 2004, Division of Emergency and Remedial Response, *Background Calculation Methodology*, DERR-00-RR-039P, Ohio Environmental Protection Agency, June 30.

The Ohio State University 1983, *Background Levels of Heavy Metals in Ohio Farm Soils*, Research Circular 275-83, The Ohio State University, Columbus, Ohio.

U.S. Department of Agriculture 1990, *Soil Survey of Pike County Ohio*, U.S. Department of Agriculture, Washington D.C.

Western Regional Climate Center 2009, *Waverly, Ohio, National Climate Data Center*, Western Regional Climate Center, available at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?oh8830.

APPENDIX A: SAMPLE AREA MAP

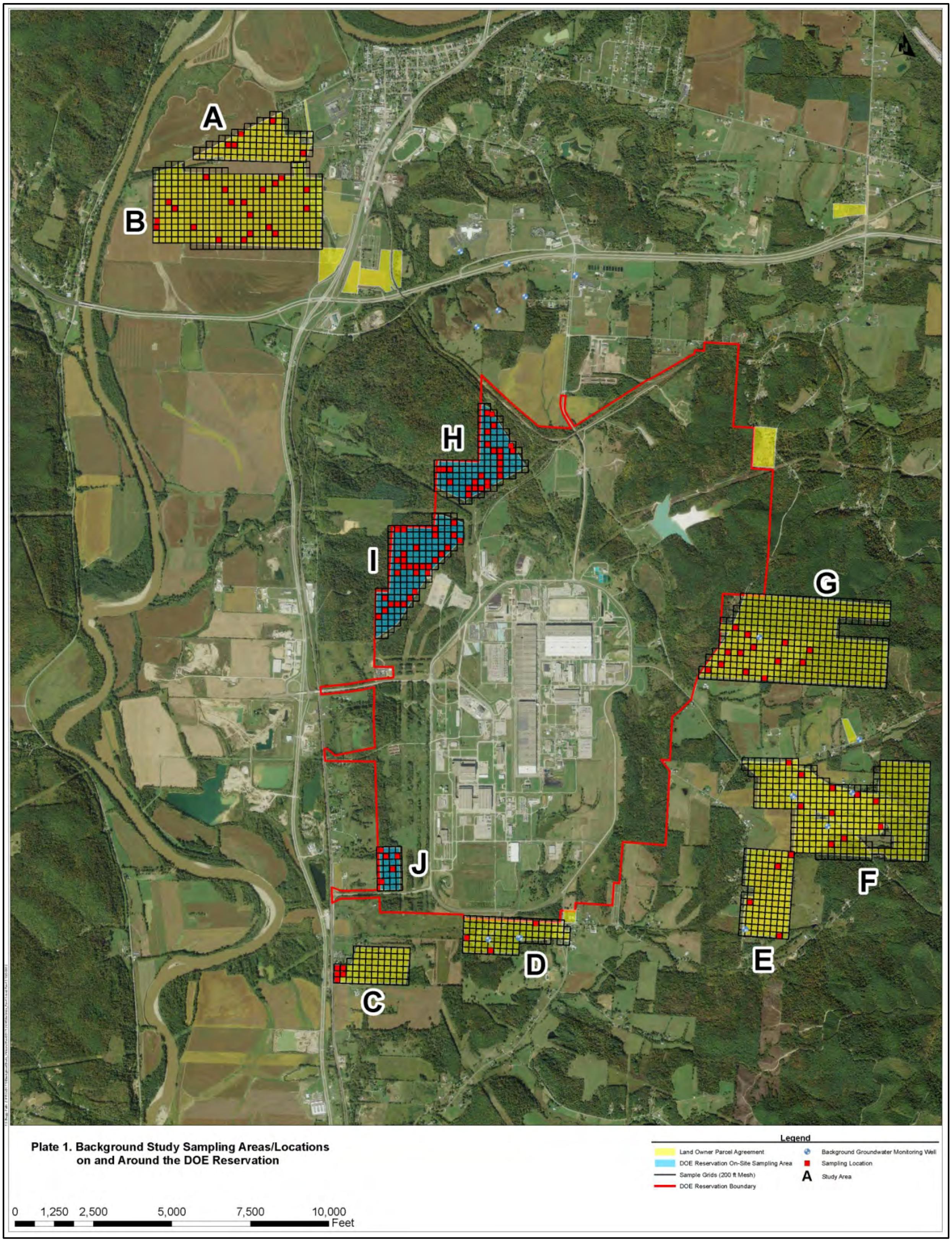


Plate 1. Sample Area Map

APPENDIX B: SOIL BORING SUMMARY

This page is intentionally left blank.

Soil Boring Locations

Soil Unit	Soil Horizon	Area A				
		BKGDPT-01	BKGDPT-02	BKGDPT-03	BKGDPT-04	BKGDPT-05
1	Scioto River Valley Surface	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
2	Scioto River Valley Subsurface	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area B																			
		BKGDPT -06	**BKGDPT -07**	**BKGDPT -08**	**BKGDPT -09**	**BKGDPT -10**	**BKGDPT -11**	**BKGDPT -12**	**BKGDPT -13**	**BKGDPT -14**	**BKGDPT -15**	**BKGDPT -16**	**BKGDPT -17**	**BKGDPT -18**	**BKGDPT -19**	**BKGDPT -20**	**BKGDPT -21**	**BKGDPT -22**	**BKGDPT -23**	**BKGDPT -24**	**BKGDPT -25**
1	Scioto River Valley Surface	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
2	Scioto River Valley Subsurface	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area C				
		BKGDPT-26	BKGDPT-27	BKGDPT-28	BKGDPT-29	BKGDPT-30
1	Scioto River Valley Surface	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
2	Scioto River Valley Subsurface	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area D		
		BKGDPT-31	BKGDPT-32	BKGDPT-33
Elevation (ft)		643.71	652.68	688.15
1	Scioto River Valley Surface	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	NA	NA	NA
3B	Off-Site Minford Surface Soil	0 - 2 ft	0 - 2 ft	0 - 2 ft
4A	Unsaturated Minford Subsurface Brown	2 - 6 ft	2 - 14 ft	2 - 8 ft
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA
6	Gallia	NA	14 - 16.5 ft	NA
Depth to Water		DRY	12.11 ft	DRY
Bedrock		6 ft	16.5 ft	8 ft

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area E			
		BKGDPT-34	BKGDPT-35	BKGDPT-36	BKGDPT-37
Elevation (ft)		697.54	679.11	675.78	698.3
1	Scioto River Valley Surface	NA	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft
4A	Unsaturated Minford Subsurface Brown	2 - 46 ft	2 - 16 ft	2 - 20 ft	2 - 38 ft
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	16 -24 ft	20 - 22 ft	38 - 46 ft
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA
6	Gallia	46 - 50.5 ft	24 - 30.5 ft	22 - 32 ft	46 - 52.5 ft
Depth to Water		NM	3.16 ft	12.57 ft	29.1 ft
Bedrock		50.5 ft	30.5 ft	32 ft	52.5 ft

NA = not applicable
NM = not measured

This page is intentionally left blank.

Soil Boring Locations (Continued)

Soil Unit	**Soil Horizon**	**Area F**									
		BKGDPT -38	**BKGDPT -39**	**BKGDPT -40**	**BKGDPT -41**	**BKGDPT -42**	**BKGDPT -43**	**BKGDPT -44**	**BKGDPT -45**	**BKGDPT -46**	**BKGDPT -47**
Elevation (ft)		688.02	692.59	723.82	750.46	745.3	700.15	723.39	790.97	726.18	715.68
1	Scioto River Valley Surface	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
2	Scioto River Valley Subsurface	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area G												
		BKGDPT-48	BKGDPT-49	BKGDPT-50	BKGDPT-51	BKGDPT-52	BKGDPT-53	BKGDPT-54	BKGDPT-55	BKGDPT-56	BKGDPT-57	BKGDPT-58	BKGDPT-59	BKGDPT-60
Elevation (ft)		696.48	714.65	724.95	692.02	715.41	683.99	688.55	705.03	700.7	675.89	688.94	675.93	679.86
1	Scioto River Valley Surface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B	Off-Site Minford Surface Soil	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft	0 - 2 ft
4A	Unsaturated Minford Subsurface Brown	2 ft - 38 ft	2 ft - 60 ft	2 ft - 70 ft	2 ft - 34 ft	2 ft - 18 ft	2 ft - 32 ft	2 ft - 30 ft	2 ft - 38 ft	2 ft - 44 ft	2 ft - 16 ft	2 ft - 34 ft	2 ft - 28 ft	2 ft - 30 ft
4B	Unsaturated Minford Subsurface Grey	NA	60 ft - 62 ft 64 ft - 71 ft	70 ft - 74 ft	NA	NA	NA	NA	38 ft - 56 ft	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	62 ft - 64 ft	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	34 ft - 42 ft	NA	NA	30 ft - 40 ft	NA	44 ft - 52 ft	16 ft - 24 ft	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	74 ft - 80 ft	NA	NA	NA	NA	56 ft - 60 ft	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Gallia	38 ft - 50 ft	71 ft - 78 ft	80 ft - 83.5 ft	42 ft - 47.5 ft	NA	32 ft to 40 ft	40 ft - 47.5	60 ft - 66 ft	52 ft - 57 ft	24 ft - 29.5 ft	34 ft - 44 ft	28 ft - 31.5 ft	30 ft - 33 ft
Depth to Water		DRY	NM	69.5 ft	30.55 ft	DRY	NM/Dry	27.90 ft	46.92 ft	38.97 ft	20.81 ft	30.55 ft	DRY	17.3 ft
Bedrock		50 ft	78 ft	83.5 ft	47.5 ft	17.5 ft	40 ft	47.5 ft	66 ft	57 ft	29.5 ft	44 ft	31.5 ft	33 ft

NA = not applicable
NM = not measured

Soil Boring Locations (Continued)

		Area H																								
Soil Unit	**Soil Horizon**	**BKGHA-01**	**BKGHA-02**	**BKGHA-03**	**BKGHA-04**	**BKGHA-05**	**BKGHA-06**	**BKGHA-07**	**BKGHA-08**	**BKGHA-09**	**BKGHA-10**	**BKGHA-11**	**BKGHA-12**	**BKGHA-13**	**BKGHA-14**	**BKGHA-15**	**BKGHA-16**	**BKGHA-17**	**BKGHA-18**	**BKGHA-19**	**BKGHA-20**	**BKGHA-21**	**BKGHA-22**	**BKGHA-23**	**BKGHA-24**	**BKGHA-25**
1	Scioto River Valley Surface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area I																													
		BKGHA-26	BKGHA-27	BKGHA-28	BKGHA-29	BKGHA-30	BKGHA-31	BKGHA-32	BKGHA-33	BKGHA-34	BKGHA-35	BKGHA-36	BKGHA-37	BKGHA-38	BKGHA-39	BKGHA-40	BKGHA-41	BKGHA-42	BKGHA-43	BKGHA-44	BKGHA-45	BKGHA-46	BKGHA-47	BKGHA-48	BKGHA-49	BKGHA-50	BKGHA-51	BKGHA-52	BKGHA-53	BKGHA-54	BKGHA-55
1	Scioto River Valley Surface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

Soil Boring Locations (Continued)

Soil Unit	Soil Horizon	Area J				
		BKGHA-56	**BKGHA-57**	**BKGHA-58**	**BKGHA-59**	**BKGHA-60**
1	Scioto River Valley Surface	NA	NA	NA	NA	NA
2	Scioto River Valley Subsurface	NA	NA	NA	NA	NA
3A	On-Site Western Boundary Surface Soil	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft	0 – 1 ft
3B	Off-Site Minford Surface Soil	NA	NA	NA	NA	NA
4A	Unsaturated Minford Subsurface Brown	NA	NA	NA	NA	NA
4B	Unsaturated Minford Subsurface Grey	NA	NA	NA	NA	NA
4C	Unsaturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
5A	Saturated Minford Subsurface Brown	NA	NA	NA	NA	NA
5B	Saturated Minford Subsurface Grey	NA	NA	NA	NA	NA
5C	Saturated Minford Subsurface Dark Grey	NA	NA	NA	NA	NA
6	Gallia	NA	NA	NA	NA	NA
Depth to Water		NA	NA	NA	NA	NA
Bedrock		NA	NA	NA	NA	NA

NA = not applicable

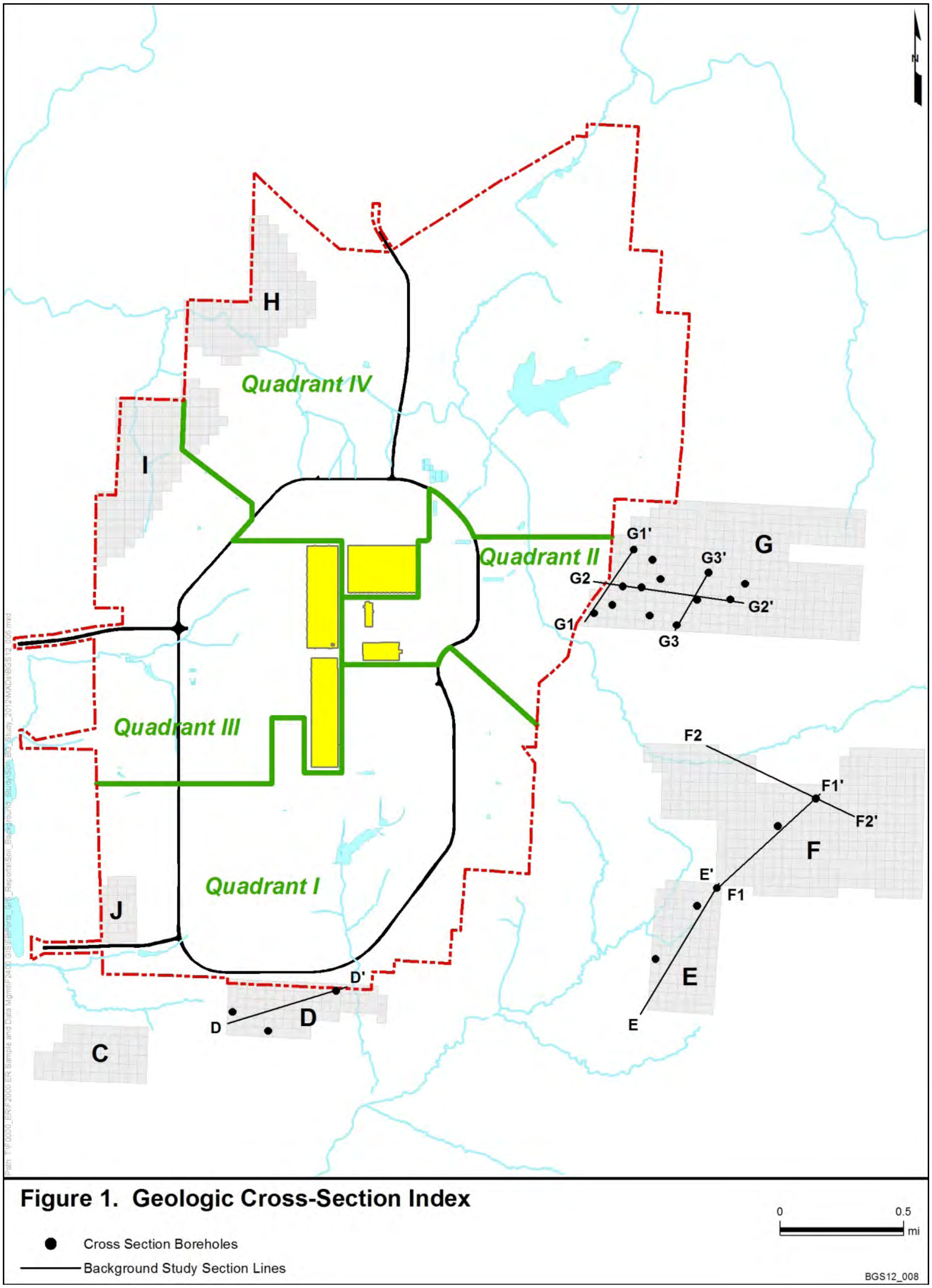
APPENDIX C: GEOLOGIC CROSS-SECTIONS AND SOIL BORING LOGS

This page is intentionally left blank.

ATTACHMENT C.1: GEOLOGIC CROSS-SECTIONS

LIST OF FIGURES

This page is intentionally left blank.



C.1.1. Figure 1. Geologic Cross-Section Index

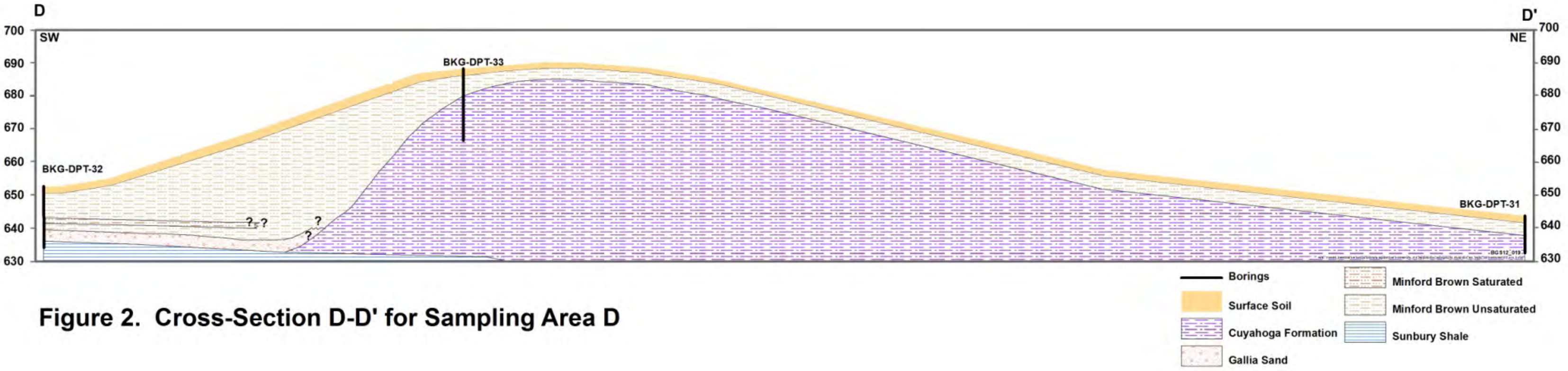
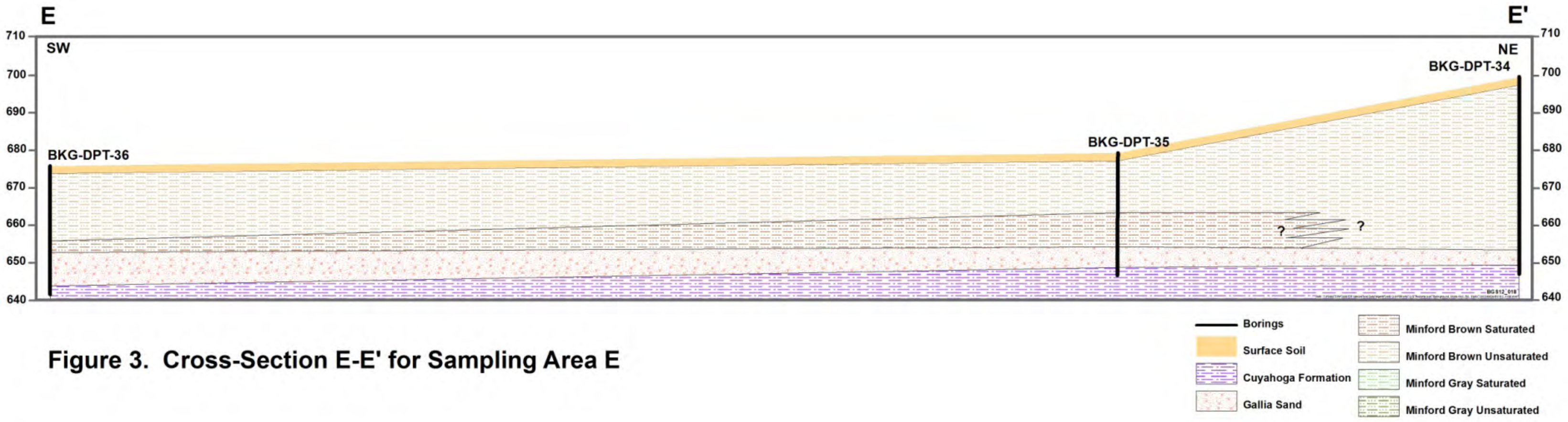


Figure 2. Cross-Section D-D' for Sampling Area D

C.1.2. Figure 2. Cross-Section D-D’ for Sampling Area D



C.1.3. Figure 3. Cross-Section E-E' for Sampling Area E

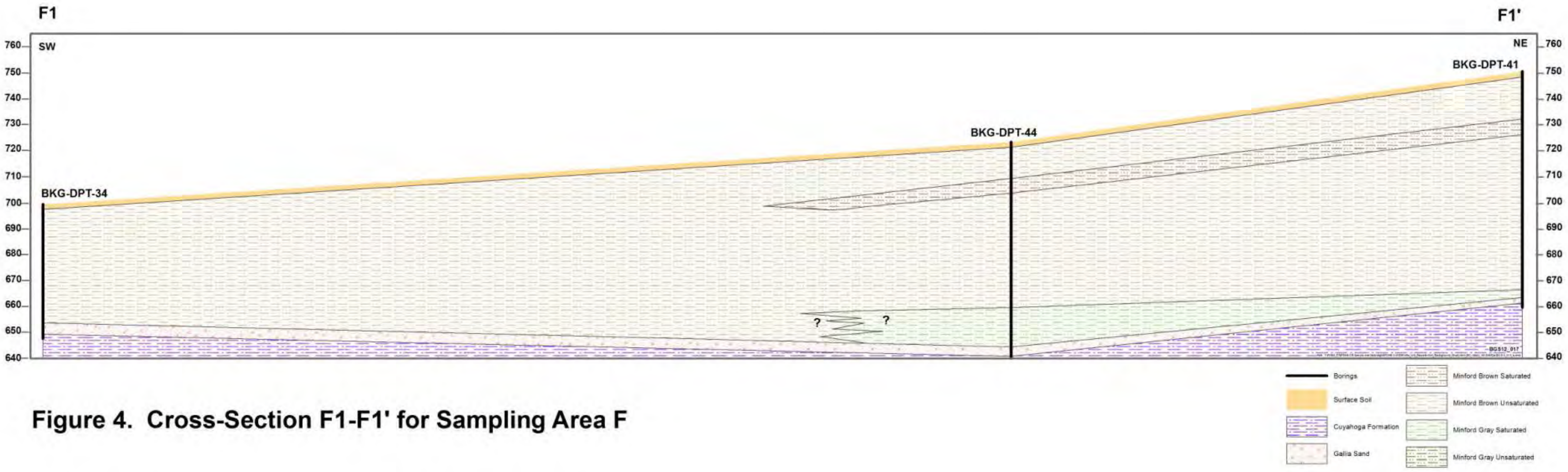
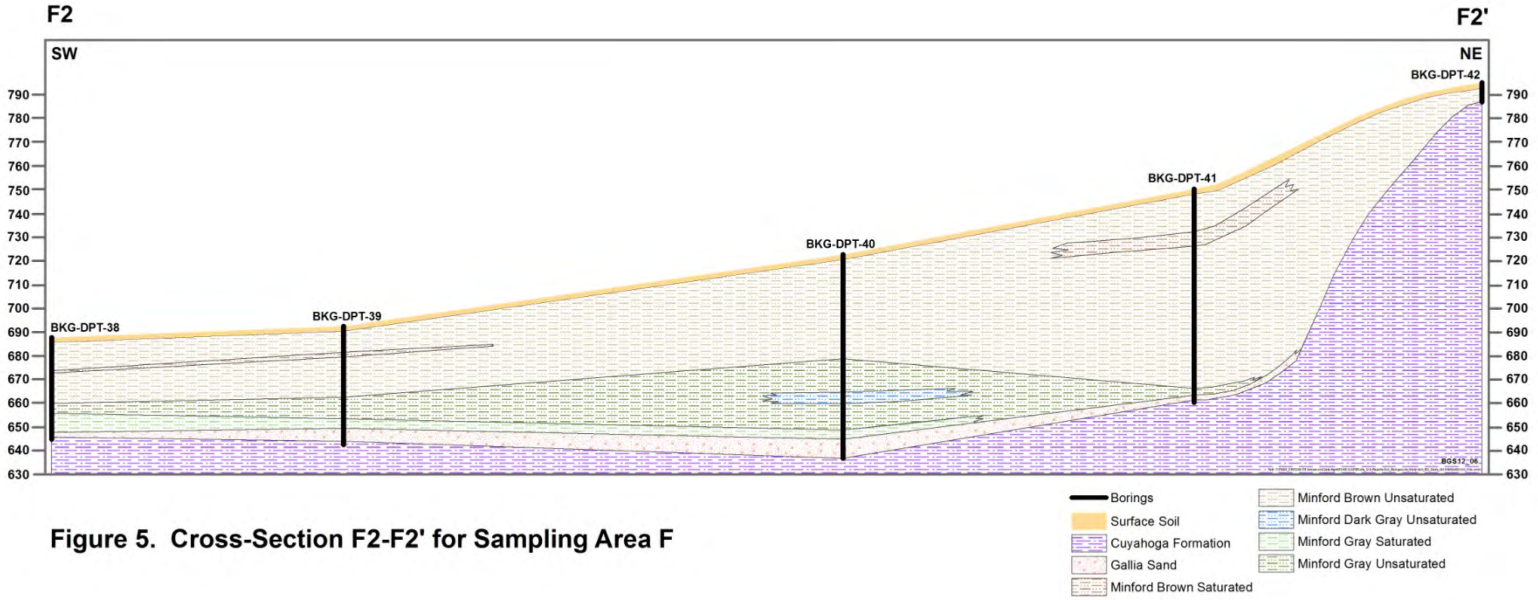


Figure 4. Cross-Section F1-F1' for Sampling Area F

C.1.4. Figure 4. Cross-Section F1-F1' for Sampling Area F



C.1.5. Figure 5. Cross-Section F2-F2' for Sampling Area F

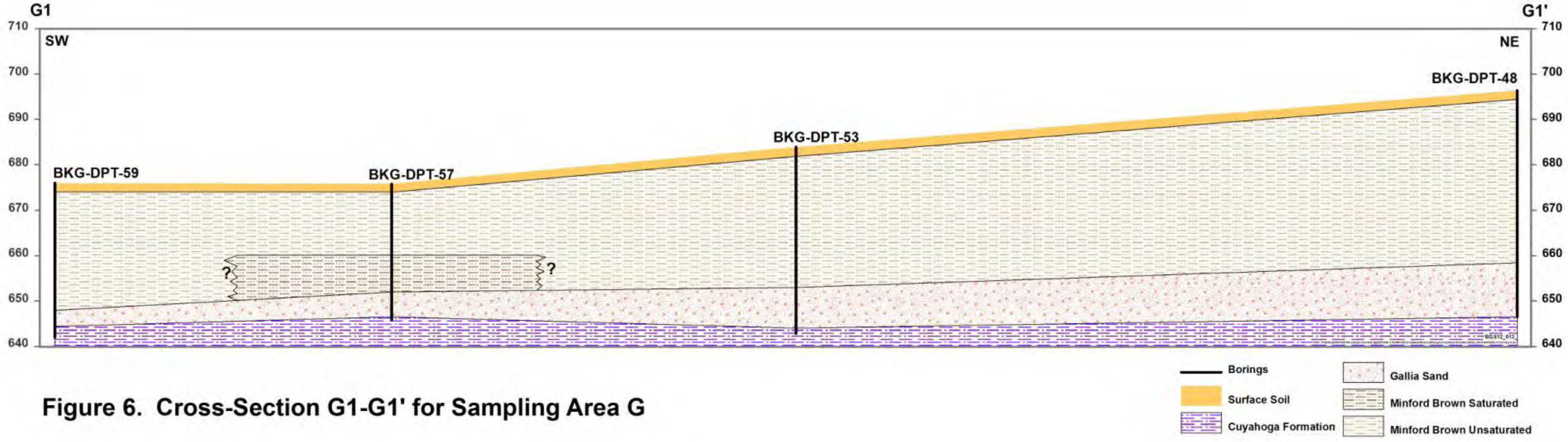


Figure 6. Cross-Section G1-G1' for Sampling Area G

C.1.6. Figure 6. Cross-Section G1-G1’ for Sampling Area G

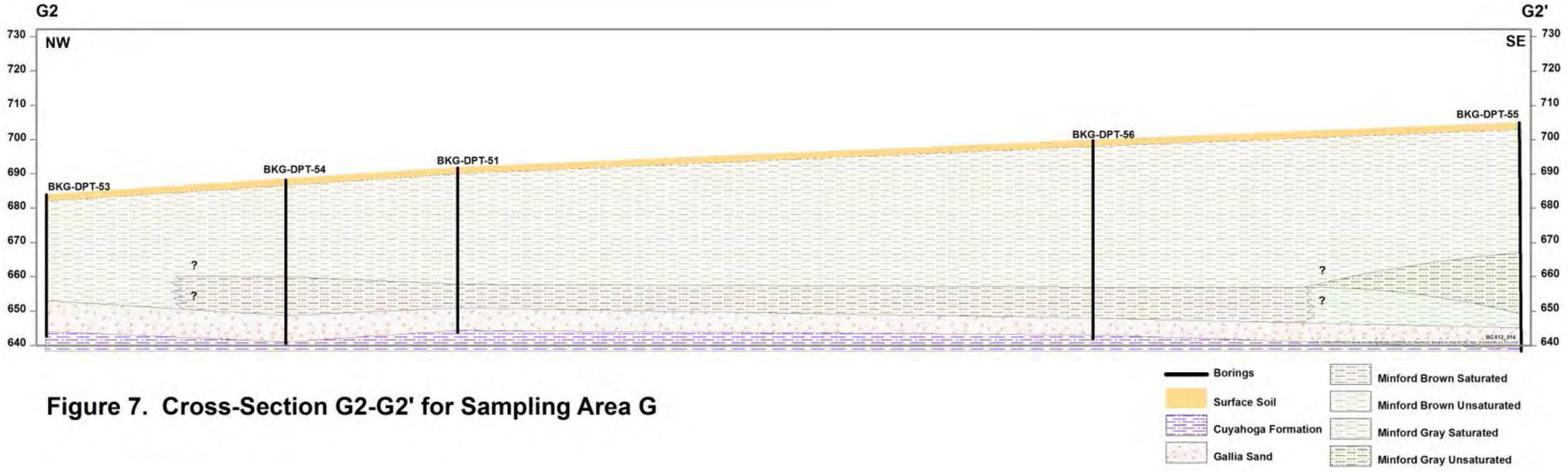


Figure 7. Cross-Section G2-G2' for Sampling Area G

C.1.7. Figure 7. Cross-Section G2-G2' for Sampling Area G

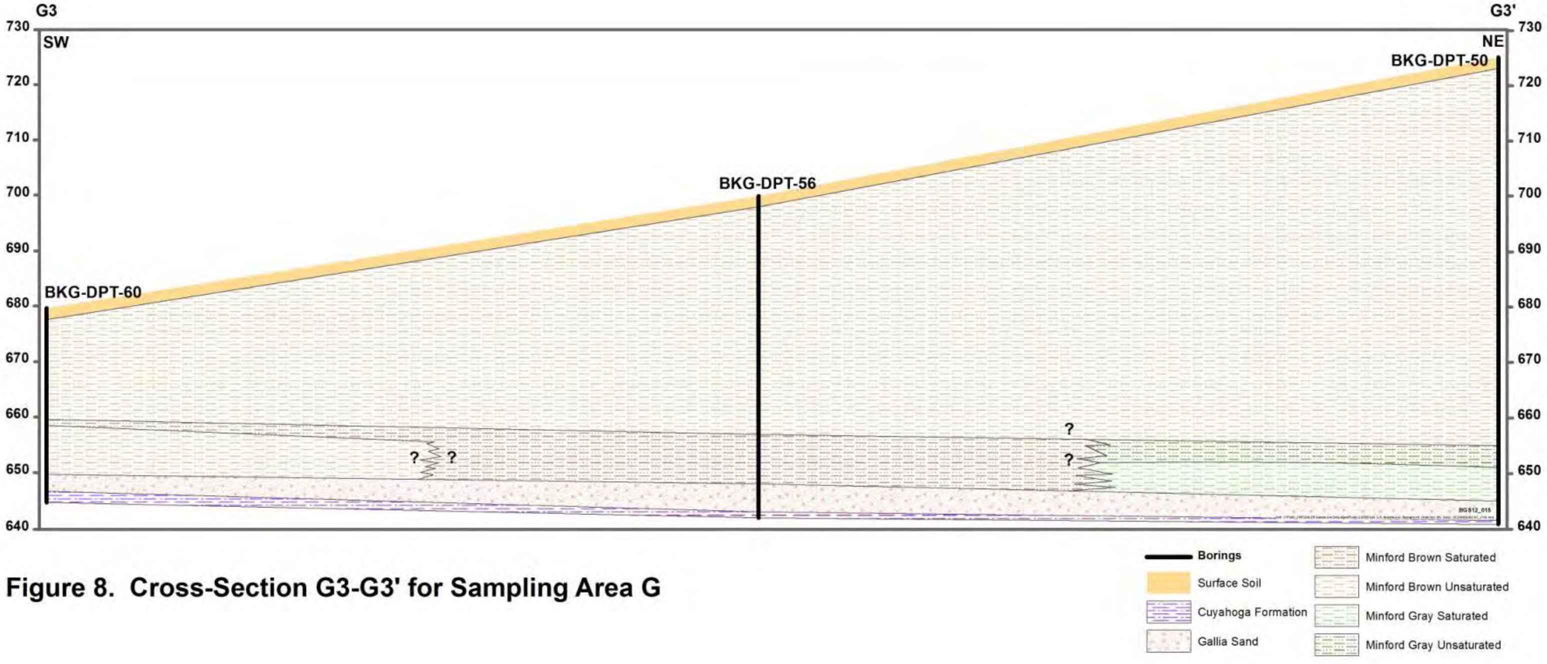


Figure 8. Cross-Section G3-G3' for Sampling Area G

C.1.8. Figure 8. Cross-Section G3-G3’ for Sampling Area G

ATTACHMENT C.2: SOIL BORING LOGS

This page is intentionally left blank.

FBP Soil Boring Log

Soil Boring No. BKGDPT01
Project: Soil BackGround
Well No: NA
Logged By: William Reid
Weather: Clear 70

Drilling Date: 5/16/2012
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 1
Date Started: 5/15/12
Date Ended: 5/15/12
Total Depth: 10 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	23			Moist Brown 10YR 5/3 silt, little sand trace gravel, becoming yellowish brown 10 YR 5/6 at 14", and becoming silt, some clay, trace sand.
		2				
		3	21			Moist, yellowish brown silt, some clay little sand, crumbly, dense.
		4				
		5	21		WHR 5/16/12	15" Very moist, yellowish brown silt, some clay trace sand, med plastic, unconformably overlying brown 7.5 YR 4/4 sand, little silt trace clay silt dense to 8" then soft to 16 WHR 5/16/12
		6				Moist to damp brown sand, little silt to 3" then very moist sand (fine to medium) WHR 5/16/12
		7	13			
		8				Moist to damp brown sand, medium some coarse little fine
		9	17			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 02	**Drilling Date:** 5/16/2012	**Sheet** 1 **of** 1	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/16/2012	1225
Well No: N/A	**Drillers:** M&W Drilling	**Date Ended:** 5/16/2012	1240
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft	
Weather: Partly cloudy	Breezy 70°		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22"		WHR 5/16/12	Moist, dark yellowish brown 10YR 4/4, silt, some clay, trace of sand, becoming yellowish ~~orange~~ brown @ 18" mark, 10YR 5/6, stiff.
		2				
		3	21			Moist, stiff, brown 7.5 YR 5/4, silt and clay, trace sand, slightly plastic.
		4				
		5	22			6" same as above grading into softer yellowish brown 10 YR 5/6 silt, some sand, little clay.
		6				soft moist silt, some sand, little clay same as above.
		7	22			
		8			WHR 5/16/12	2" soft moist, silt, ~~and~~ WHR 5/16/12 some sand, little clay, overlying unconformably, 5" WHR 5/16/12 brown, 10YR 5/3 sand, some silt, ~~then~~ 3" WHR 5/16/12 brown sand, grading into sand and 1" gravel last 2"
		9	15			
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT03
Project: Soil Background
Well No: N/A
Logged By: William Reid
Weather: Sunny, 60°

Drilling Date: 5/16/12
Project No: WBS 03.01.01.02.01
Drillers: MEW Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 1
Date Started: 5/16/2012 9:44
Date Ended: 5/16/2012 10:05
Total Depth: 10 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	WHR 5/15/12	1	19			Moist, brown 10YR 4/3 silt, some sand and clay, crumbly, trace gravel.
		2				
		3	18			Moist, yellowish brown 10 YR 5/6, fine to medium sand, well sorted., trace silt.
		4				
		5	16			Moist, strong brown 7.5 YR 5/6, fine to medium sand, coarsening with depth, starting at 9" to depth, loose.
		6				
		7	15			Moist brown coarse sand to 9" then, sand and some fine gravel coarsening with depth, some cobbles bottom 2" of sample
		8				Moist to damp, light yellowish brown 10YR 5/6, sand and gravel, some cobbles.
		9	17			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT04	**Drilling Date:** 5/16/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/16/12 1015
Well No: NA	**Drillers:** M & W Drilling	**Date Ended:** 5/16/12 1028
Logged By: William Reed	**Rig:** DPT 7730 GEOPROBE wlR 5/16/12	**Total Depth:** 10 ft
Weather: Sunny, 60s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	15			Moist, dark yellowish brown 10YR 4/4, Silt, some sand, little gravel, overlying 6" Moist, yellowish brown 10YR 5/6 fine to med sand.
		2				
		3	14			Moist, yellowish brown 10YR 5/6, fine to med Sand.
		4				
		5	16			Moist, wlR 5/16/12 ~~Moist~~ yellowish brown fine to medium sand, to 11" grading to medium, some fine sand.
		6				
		7	18		wlm 5/16/12	~~Mor~~ Same as above to 12" then 7" sand ~~silt~~ ~~sand~~ wlR 5/16/12 some silt, then brown 7.5 YR 5/4 sand, little silt, sugary texture with clear quartz grains.
		8				
		9	18			Alternating medium sand and fine sand, little silt laminae to 8" 7.5 YR 5/4 (brown), unconformably overlying fine sand 10YR 6/4 light yellowish brown to 16", then coarse sand, some gravel.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT05	**Drilling Date:** 5/16/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUND	**Project No:** WBS03.01.01.02.01	**Date Started:** 5/16/2012 13:22
Well No: NA	**Drillers:** M&W DRILLING	**Date Ended:** 5/16/2012 1355
Logged By: William REID	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Partly Cloudy 70		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	19			~~Moist~~ slightly Moist, strong brown 7.5 YR 5/4 silt, some sand little clay, crumbly.
		2				
		3	17			Moist, strong brown silt, some sand little clay, dense top 7" less dense with depth sand content increasing @ 10" silt and sand @ 15" sand; some silt and gravel.
		4				
		5	18 4			4" Moist, silt, sand & gravel, some brown and light yellowish brown mottling 7.5 Y 6/3, then brown sand and gravel, 7.5 YR 5/4, little cobbles. with 5/16/12
		6				
		7	17			Slightly moist sand and gravel, trace cobbles fining to sand and pea gravel starting at 12", to bottom, mostly rounded, some angular grains, sugary texture 7.5 YR 5/4 to 8", 10 YR 6/3 bottom 9"
		8				
		9	19			Moist light brown 7.5 YR 6/4 sand and gravel, some cobbles, poorly sorted.
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 06	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 9:00
Well No: NA	**Drillers:** M&W DRILLING	**Date Ended:** 5/15/2012 0925
Logged By: WILLIAM REID	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: FOG 57°, HIGH TODAY 78		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	17			Moist brown 7.5 YR 4/3 silt, some clay little sand, trace gravel, crumbly.
		2				
		3	21			Moist brown 7.5 YR 4/4 silt, some clay little sand, crumbly.
		4				wHR 5/15/12 ~~Orga~~
		5	23			12" Moist yellowish brown 10 YR 4/6 silt some clay, and organics stiff, grading into 5" silt, some sand, then 2" of silt and sand.
		6			wHR 5/15/12	~~[illegible]~~ wHR 5/15/2012
		7	18			Damp, strong brown 7.5 YR 5/6, fine sand (5.5") grading into medium to coarse sand 10 YR 4/6. (fining upward)
		8				
		9	15			Damp to wet, strong brown 7.5 YR 5/6 coarse sand, little gravel to 3", then all sand.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT7	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 1445
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/15/2012 1500
Logged By: William Reid	**Rig:** Geoprobe 7730	**Total Depth:** 10 ft
Weather: Partly Cloudy 75		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	15			Moist, brown 7.5 YR 4/2 silt, little clay and sand grading into mottle brown silt and some clay little sand, ~~10 Y~~ 7.5 YR 5/4 mottling last 5" witR 5/15/12
		2				
		3	17			Dense, moist, yellowish brown 10 YR 5/6 silt, some sand and clay, crumbly, trace organics
		4				
		5	24			More dense, moist yellowish brown 10 YR 5/6 silt and clay, trace sand and gravel, slightly plastic, becoming soft silt some sand last 2" same color
		6				
		7	16		witR 5/15/12	4" Moist yellowish brown silt and sand, grading into (4-~~8~~") 4" moist brown fine to medium sand ~~to~~ 7.5 YR 4/4
		8				
		9	16			Damp, brown, fine to med sand, trace gravel.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT8	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/12 1515
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/15/12 1530
Logged By: W Reed	**Rig:** Geoprobe DPT 7730	**Total Depth:** 10 ft
Weather: Partly Cloudy 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	20			Moist, brown 7.5 YR 4/2 silt, some clay little sand; grading into brown 10 YR 5/4, silt and clay, dense, slightly plastic
		2				
		3	21			Moist, strong brown silt and clay, little sand 7.5 YR 5/6, crumbly, trace organics, stiff.
		4				
		5	24			8" stiff, strong brown silt and clay, slight plastic grading into (8 - 16) soft strong brown silt, some sand to 22", then ~~yellowish~~ WHR 5/15/12 brown 7.5 YR 4/4 sand, some silt.
		6				
		7	23			soft yellowish brown (10 YR 5/6) soft silt, damp, ~~some~~ little clay and sand, some organics WHR 5/15/12
		8				
		9	20			Moist, sticky silt, some clay, little sand to 5" then silt and sand (10 YR 5/6) some 10 YR 5/4 mottling to 12" ~~then~~ damp fine sand to 10", then fine to medium brown 7.5 YR 4/5 sand.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT09	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 1458
Well No: N/A	**Drillers:** M&W Drilling	**Date Ended:** 5/10/2012 1516
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Partly Cloudy 60, Breezy		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22			12" Moist, dense brown 7.5 YR 4/2 silt, some clay trace sand, unconformably over moist, brown silt, some clay ~~to~~ 7.5 YR 5/4, mottled,
		2				
		3	22			Moist, dense, brown silt, some clay, little sand trace organics, slightly plastic
		4				
		5	20			Moist, medium dense brown 7.5 YR 5/4 silt and clay, slightly plastic WR 5/10/12
		6				6" Damp brown 7.5 YR 4/3 sand, some silt grading into lighter brown 7.5 YR 5/3 sand, medium grain sugary texture.
		7	17			
		8				Moist, brown 10 YR 5/3, medium sand, sugary texture well sorted.
		9	19			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT10	**Drilling Date:** 5/15/12	**Sheet** 1 **of** 1	
Project: SOIL Background	**Project No:** WBS 03.01.01.02.01	**Date Started:**	5/15/12 1548
Well No:	**Drillers:** M&W DRILLING	**Date Ended:**	5/15/12 1602
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:**	10 ft
Weather: Partly Cloudy 70's			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	23			7.5 YR 4/3 Moist brown silt, some sand little clay, crumbly, dense
		2				
		3	22			Moist, dense yellowish brown 10 YR 4/6 silt and clay, slightly plastic little sand.
		4				
		5	27			10" moist, dense yellowish brown silt and clay grading into softer yellowish brown, silt, some clay little sand to 21, then clay increasing becoming stiffer
		6				
		7	22			8" soft yellowish brown 10YR 5/4, silt, some clay little sand unconformably over brown 7.5 YR 4/4 sand, fine to medium well sorted trace silt
		8				
		9	20			10" of damp brown medium-fine sand. the 2" yellowish brown silt, some sand, then damp brown fine-medium sand
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG-DPT 11	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 1406
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/15/2012
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Partly Cloudy 70's		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description 10" witr 5/15/12
		1	21"			2" topsoil, then Moist ~~hard~~ stiff silt and sand 10 YR 4/4 and 10 YR 4/6 mottled, ~~then~~ 10 YR 4/6 sand, some silt and gravel crumbly.
		2				
		3	18			Moist, stiff, brown 7.5 YR 5/4 silt and sand same clay, little gravel, root strands, crumbly
		4				
		5	18"			12" same as above, unconformably over 10 YR 6/4 light yellowish brown and brown 7.5 YR 5/4 mottled silt, some sand, little clay gravel and cobbles.
		6				
		7	14"			4" same ~~as~~ above, unconformably over 7.5 YR 5/4 witr 5/15/12 brown sand, ~~and~~ some gravel, little silt poorly sorted witr 5/15/12
		8				
		9	15		witr 5/15/12	7" Moist light yellowish brown sand and gravel little cobbles, poorly sorted, overlying unconformably Moist brown 7.5 YR 4/6 med sand, coarsening at depth to sand and fine gravel last 3"
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 12	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1	
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012	1330
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/15/2012	1350
Logged By: William Reed	**Rig:** Geoprobe DPT 7730	**Total Depth:** 10 ft	
Weather: Sunny 60s			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	16			Moist dk brown silt, some sand, little clay (7.5YR 3/2) crumbly some brick fragments, trace gravel
		2				
		3	21			19" Moist dk yellowish brown 10 YR 4/6 silt some clay, little sand, crumbly grading into dk yellowish brown silt and sand, damp.
		4				
		5	19			Moist, dk yellowish brown sand, little silt trace gravel, damp at depth.
		6				
		7	21			10" same as above, grading into 8" moist yellowish brown 10 YR 5/6 silt, little sand, then grading into damp sand, some silt (yellowish brown)
		8				
		9	24			~~10~~ WR 5/15/12 8" Moist, yellowish brown 10 YR 5/6 sand and silt some organics grading into yellowish brown silt, some clay, trace sand, slightly plastic last 4" very stiff (10 ft)
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT13	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUND STUDY	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 08:35
Well No: N/A	**Drillers:** M&W DRILLING	**Date Ended:** 5/10/2012 9:05
Logged By: WILLIAM REID	**Rig:** GEOPROBE 7730	**Total Depth:** 10'
Weather: SUNNY 65°		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
				NA		witr 5/10/12 Moist yellowish brown silt, little clay 7.5YR 4/3, ~~so~~ little clay, trace gravel, dense, crumbly.
		1	20"			
		2				witr 5/10/12 Moist, brown silt, little sand, trace clay 7.5 YR 4/4 crumbly
		3	24"			
		4				witr 5/10/12 Moist, less dense (soft) silt, some clay little sand, slightly plastic 7.5YR 5/6 witr 5/10/12
		5	16			
		6				14" Damp, soft, silt, some clay and sand overlying 7.5YR5/6 sand and silt, little clay
		7	19"			
		8				witr 5/10/12 11" Damp brown 7.5 YR 5/6 silt and sand overlying 7.5 YR 6/4 witr 5/10/12 light brown sand and gravel poorly sorted, little cobbles.
		9	21			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT14
Project: Soil Background
Well No: N/A
Logged By: William Reid
Weather: Partly Cloudy 60

Drilling Date: 5/10/2012
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 1
Date Started: 5/10/2012 1427
Date Ended: 5/10/2012 1446
Total Depth: 10 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	18			8" Slightly moist, dark gray 7.5 YR 4/1 silt, some clay, dense, crumbly unconformably over moist brown sand, some silt.
		2				
		3	19			Moist, strong brown 7.5 YR 4/6 sand, some silt, trace clay
		4				10" Moist, strong brown 7.5 YR 4/6 sand, some silt, trace of clay grading into light brown 7.5 YR 6/3 sand, some gravel, trace silt
		5	18			
		6				Moist light brown 7.5 YR 6/4 sand and gravel, medium-coarse sand, gravel and little cobbles
		7	17"			
		8				same as above
		9	18			
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 15	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Backgroun	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 0945
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/15/2012 1015
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Fog 65		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	16			9" Moist, silt and sand, some gravel, dark brown 7.5YR 3/2 unconformably over moist dark brown silt, some clay little sand, crumbly.
		2				
		3	19			Moist, dense, yellowish brown silt, (color grading from previous sample to 3") ~~into~~ wrr 5/15/12 some clay little sand, (10YR 5/6),
		4				
		5	15			10" same as above, grading into (2" transition) to yellowish brown, fine sand, little silt
		6				
		7	18		wrr 51.51.	5" Moist, dark yellowish brown (10YR 4/4), fine sand, grading into coarse sand, little to some gravel, gravel increasing w/ depth
		8				
		9	17			4" moist dark yellowish brown coarse sand and gravel little cobbles, grading into medium to coarse sand, some gravel (finer)
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGPPT16	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 925
Well No: N/A	**Drillers:** M&W DRILLING	**Date Ended:** 5/10/2012 9:50
Logged By: William Reid	**Rig:** Geoprobe 7730	**Total Depth:** 10 ft
Weather: SUNNY 60's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22.5		0.0	Moist ~~red~~ WHR 5/10/12 yellowish brown silt, little sand and clay. trace rock fragment, crumbly, dense
		2				
		3	13		0.0	8" Damp, brown silt and sand, ~~sligt~~ WHR 5/10/12 little clays slightly plastic, becoming sand, some silt at depth
		4				
		5	17		0.0 WHR 5/10/12	WHR 5/10/12 12" moist, yellowish red 5 YR 5/6 ~~silt and~~ ~~sand~~ sand, some silt, becoming well sorted "sugary" sand, light brown 7.5 YR 6/4
		6				
		7	18		0.0	10" moist, yellowish red 5YR 5/6 sand, some silt grading into light brown, 7.5 YR 6/4 sand, well sorted.
		8				
		9	17		0.0	2" yellowish red ~~slt~~ WHR 5/10/12 sand and silt overlying 3" light brown sand, then 2" yellowish red sand and silt (rhymite) then 10" light brown sand, well sorted
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT17	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 1351
Well No: N/A	**Drillers:** MEW Drilling	**Date Ended:** 5/10/2012 1411
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Partly Cloudy, Breezy, 60°		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
				NA		2" Topsoil, ~~18~~ 6 WHR 5/10/12 then moist dark yellowish brown silt, little clay and sand then unconformably over moist, medium dense silt, some clay trace sand 7.5YR 5/4 WHR 5/10/12
		1	17		0.0	
		2				
		3	14			8" damp strong brown 7.5 YR 4/6 overlying brown sand, sugary texture 7.5 YR 5/4
		4				Damp grayish brown med sand, some gravel increasing with depth, little cobbles at bottom sugary texture for sand, fining upward.
		5	19			
		6				Damp, brown 7.5YR 4/4 sand and gravel, some cobbles, poorly sorted, ~~Aa~~ WHR 5/10/12
		7	19			
		8				Same as above
		9	18			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 18	**Drilling Date:** 5/9/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/9/2012 11:24
Well No: N/A	**Drillers:** M&W Drilling	**Date Ended:** 5/9/2012 11:44
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10'
Weather: Partly Sunny 68°		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1 2	22"	NA	0.0	Moist, dense, yellowish brown 10YR 4/4 silt, little clay, trace cobble, ~~to~~ 18" becoming softer, dark yellowish brown silt and clay 10YR 4/4 ~~to~~ bottom WHR 5/9/12
		3 4	19"		0.0	same as above, slightly plastic, trace sand, softer/less dense
		5 6	21		0.0	Same as above to ~~5'~~ WHR 5/9/12 8" then damp, reddish brown silt and sand, trace of clay to bottom
		7 8	19"		0.0	6" moist brown silt and sand, damp then 12" yellowish brown and white sand, well sorted, becoming poorly sorted then dark yellowish brown silt and sand, little clay, little gravel at bottom 1"
		9 10	18"		0.0	Moist coarse sand, sugary texture 10YR 8/2 and 10YR 5/4 WHR 5/9/12 "salt and pepper" little gravel, fining upward sequence, gravel increasing with depth.
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT19	**Drilling Date:** 5/9/2012	**Sheet** 1 **of** 1
Project: SOIL BACKGROUN	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/9/2012 10 40
Well No: N/A	**Drillers:** M&W DRILLING	**Date Ended:** 5/9/2012 11:05
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10ft
Weather: Partly Sunny 68°		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
				N/A		
19ss		1	21"		0.0	Moist brown (10YR 4/3) silt, ~~trace~~ little clay and gravel, and sand, crumbly. WITR 5/9/12
		2				
		3	23.5		0.0	Moist, brown (10YR 5/3) silt, some clay, trace sand, slightly plastic
		4				
		5	17"			3" moist brown (10YR 5/3) silt, some clay (sua) becoming moist yellowish brown (10YR 5/4) silt, little clay and sand to 5.5 then moist sand, some silt
		6				
		7	17"		0.0	Moist, reddish brown and white, poorly sorted sand, to 6'8", then 2" silt and sand seam, then back to white & brown sand to 7.5' then silt, sand & gravel (10 YR 5/4)
		8				
19-10'		9	15"		0.0	Moist, yellowish brown & white sand and gravel poorly sorted, rounded gravel to bottom
		10				END OF Boring
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 20
Project: Soil Background
Well No: NA
Logged By: William Reid
Weather: Partly Cloudy 60

Drilling Date: 5/10/2012
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe DPT 7730

Sheet 1 **of** 1
Date Started: 5/10/2012
Date Ended: 5/10/2012 1037
Total Depth: 10 ft

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						Moist, dense silt, little sand and clay 10YR 4/4
10:22		1	21		0.0	
		2				SAME AS ABOVE, CRUMBLY
		3	23			
		4				4" same as above grading into 8" silt, some sand becoming ~~sandy silty~~ sand, some silt 7.5YR 5/4 brown WR 5/10/12
		5	20			
		6				7" brown 7.5 YR 5/4, sand some silt, unconformably over fine sand, sugary texture 7.5 YR 5/6 strong brown
		7	15			
		8				Light brown 7.5 YR 6/4 fine to medium sand, well sorted.
		9	20			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 21	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 10:35
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 5/15/2012 10:55
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: FOGGY 60		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						8" WTR 5/15/12
		1	20			Moist brown ~~10~~ 7.5YR 5/4 silt, and sand, trace clay grading into "darker" brown 7.5YR 4/3 silt and sand, crumbly.
		2				
		3	18			Moist yellowish brown 10YR 5/4 silt, some clay and sand, trace gravel, slightly plastic
		4				
		5	12"			5" Same as above, unconformably over brown coarse sand, some gravel. ~~10 YR~~ 7.5 YR 5/4 WTR 5/15/12
		6				13" Moist brown silt, sand, and gravel, little cobbles, overlying medium sand, some gravel
		7	15			
		8				
		9	16"			Moist brown sand and gravel, little cobbles.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 22	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 13:15	
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/10/2012 1334	
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft	
Weather: Partly cloudy 60			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	21		0.0	1" Topsoil, then 6" dark grayish brown silt, some clay, trace sand, unconformably over dense yellowish brown ~~10~~ 7.5 YR 4/4 WHR 5/10/12 silt, some clay.
		2				
		3	20		0.0	Soft, brown silt, some clay, trace sand to bottom.
		4				
		5	16		0.0	6", brown, silt and sand, ~~10~~ 7.5 YR 4/4 WHR 5/10/12, unconformably over 7.5 YR 5/4 sand, medium to coarse, fining upward.
		6				
		7	15			Same as above with 4" brown silt and sand lens between 6.5" and 9" then some gravel ~~at bottom~~ in sand to bottom
		8			WHR 5/10/12	
		9	16			Moist, light brown, sugary sand, medium grain, little gravel, trace cobbles
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT23	**Drilling Date:** 5/15/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/15/2012 1120
Well No: NA	**Drillers:** M&W DRILLING	**Date Ended:** 5/15/12 1140
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10ft
Weather: Sunny 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	19			Moist brown (7.5 YR 4/4) silt and sand, trace silt, crumbly
		2				
		3	16		WHR 5/15/12	At 7" Moist brown silt and sand, trace clay WHR 5/15/12 unconformably over damp yellowish red (5YR 4/6) sand. little silt WHR 5/15/12
		4				
		5	15			11" same as above, unconformably over brown medium to coarse sand, sugary texture, WHR 5/15/12 some clear quartz grains 10 YR 5/3
		6				
		7	16			same as above, some gravel last 2"
		8				
		9	16"			Moist, brown sand and gravel, little cobbles same color as above.
		10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BGKDPT24	**Drilling Date:** 5/10/2012	**Sheet** 1 **of** 1
Project: Soil Back	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/10/2012 1056
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/10/2012 1115
Logged By: William Reid	**Rig:** Geoprobe DPT 7730	**Total Depth:** 10ft
Weather: Breezy 60		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22			2" TOPSOIL, Moist, dense yellowish brown silt, some clay, crumbly ~~7.5~~ 10 YR 4/4 wHR 5/10/12
		2				
		3	18			7" same as above, then damp brown 7.5 YR 4/4 silt, some sand and clay slightly plastic
		4				
		5	21			Damp brown 7.5 YR 4/4 silt, some clay little sand, non-plastic
		6				
		7	19			12" Moist brown silt, little sand and clay overlying silt, some sand little clay, trace gravel.
		8				
		9	20			15" Damp silt and sand ~~7.5~~ 10 YR 5/4 wHR 5/10/12, unconformably overlying sand, sugary texture 7.5 YR 6/4
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

wHR 5/10/12

FBP Soil Boring Log

Soil Boring No. ~~BKG~~ BKGDPT25

Project: SOIL BACKGROUND

Well No: NA

Logged By: William Reed

Weather: Partly Cloudy 60

Drilling Date: 5/10/2012

Project No: WBS 03.01.01.02.01

Drillers: MEW Drilling

Rig: Geoprobe 7730 DPT

Sheet 1 **of** 1

Date Started: 5/10/2012 12:34

Date Ended: 5/10/2012 13:02

Total Depth: 10 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description 11"
		1	22		0.0	Slightly moist olive brown 2.5Y 4/3 silt, little clay becoming olive brown and yellowish brown mottled silt, little clay, dense.
		2				
		3	24		0.0	Moist, yellowish brown silt, little clay and sand, 10 YR 4/4, crumbly, dense wHR 5/10/12
		4				
		5	20		0.0	6" moist, silt, little sand and clay 7.5 YR 4/4, grading in to moist, soft silt, some clay, ~~sand~~ little ~~cla~~ sand, slightly plastic. wHR 5/10/12 wHR 5/10/12
		6				
		7	20		0.0	2", moist, soft silt, some clay, little sand, 7.5 YR 4/4 overlying 6" damp sand, little silt, then silt and sand, brown 7.5 YR 4/4
		8				
		9	16		0.0	4" damp brown sand wellsorted, then sugary sand, some gravel 7.5 6/4
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT26	**Drilling Date:** 5/17/2012	**Sheet** of 1 wHR 5/17/12
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/17/12 1248
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/17/12 1300
Logged By: William REID	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Sunny 80s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						2" Topsoil
	NA	1	21			6" Moist brown 75 YR 5/2 silt, some sand little clay grading into strong brown silt, some sand little clay (7.5 YR 5/6)
		2				
	1.75	3	22			Moist, brown~~ish~~ yellow silt, some sand little gravel and clay 10 YR 6/4, some oxidation staining
	2.5 2.25	4				
		5	23			Slightly moist brown 7.5 YR 5/4 silt, some clay slightly plastic some pale yellow 2.5 Y 7/4 mottling, top6" grading into brown silt, some clay to depth
wHR 5/17/12	3.25 ~~2.75~~ 3.0	6				Moist brown 7.5 YR 5/4 silt, some clay little sand, some gray mottling 7.5 YR 5/2, stiff slightly plastic, some organics.
		7	24			
3.25	~~3.25~~ wHR 5/17/12 NA	8				Moist, ~~br~~ wHR 5/17/12 strong brown silt, some clay and sand and red oxidation staining
		9	24			
	NA	10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT27	**Drilling Date:** 5/17/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/17/12 1430
Well No: NA	**Drillers:** MEW DRILLING	**Date Ended:** 5/17/12 1455
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Sunny 70's		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)
		1	21		
		2			
		3	20		
		4			
		5	21		
		6			
		7	24		
	3.25	8			
		9	21		
	3.0	10			
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			
		20			

Description

Moist brown 7.5 YR 4/4 soft silt, some clay little sand grading into stiff gray ~~7~~5 YR 5/1 WTR 5/17/12 silt and clay ~~some~~ little sand WTR 5/17/12

Moist gray ~~7~~5 YR 5/1 WTR 5/17/12 silt, some clay trace of sand, some red oxidation staining ~~some~~ WTR 5/17/12 little yellowish brown 10 YR 5/6 mottling, sand increasing at depth

Moist yellowish brown ~~[illegible]~~ 7.5 YR 5/6 WTR 5/17/12 and gray ~~7~~.5 YR 6/1 silt, some clay little sand.

Stiff yellowish brown and gray mottled silt and clay trace sand, gray wet seam at 12", silt, some sand.

stiff ~~yellowish brown and~~ WTR 5/17/12 gray ~~to~~ 5 YR 6/1 WTR 5/17/12 silt and clay trace sand, some yellowish brown mottling to 15" ~~then~~ yellowish brown 7.5 YR 5/6 with some gray mottling stiff.

FBP Soil Boring Log

Soil Boring No. BKGDPT28	**Drilling Date:** 5/17/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/17/2012 1210
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/17/2012 1230
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10 ft
Weather: Sunny 70s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						2" Topsoil
wthr 5/17/12	~~19~~	1	19 19			Slightly moist brown 7.5 YR 5/3 silt, some sand little clay, trace organiss and oxidation staining
		2				wthr 5/17/12 ~~Slight~~ Moist brown 7.5 YR 5/4 silt, some clay little sand, dense, some oxidation staining slightly plastic
		3	20			
		4				Same as above, thin pinkish gray 7.5 YR 6/2 wet ~~silt~~ seam ~~between~~ 8" and 9" wthr 5/17/12 wthr 5/17/12
wthr 5/17/12	~~[illegible]~~	5	24			
		6				Strong brown 7.5 YR 5/6 silt and clay, trace of sand, slightly plastic, some gray 7.5 YR 5/1 mottling and wood slivers, stiff
	4.25	7	20			
		8				12" Moist, stiff strong brown 7.5 YR 5/6 silt and clay, grading into strong brown silt, some clay and sand, not as stiff, some gray mottling in both
wthr 5/17/12	~~24~~ 3.0	9	24			
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 29	**Drilling Date:** 5/17/2012	**Sheet** 1 **of** 1	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/17/2012 1342	
Well No: NA	**Drillers:** M&W DRILLING	**Date Ended:** 5/17/2012 1415	
Logged By: William REID	**Rig:** Geoprobe 7730 DT	**Total Depth:** 10 f	
Weather: Sunny, breezy 70			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	20			4" Moist brown 7.5 YR 4/4, silt, trace clay grading into light gray 2.5 YR 7/2 silt, some sand little clay with red oxidation staining
		2				
	3.0	3	21			sameras above to 16" then ~~br~~ little brown mottlingg. w HR 5/17/12
		4				
		5	22			Same as above to 10" Then strong brown 7.5 YR 5/6 silt, little ~~some~~ clay + ~~so~~ sand, some light with HR 5/17/12 ~~brown~~ gray mottling with HR 5/17/12
		6				
		7	23			Moist gray and brown 7.5 YR 6/1 and 7.5 YR 5/4 silt, some clay, trace sand, slightly plastic
	3.25	8				Moist, stiff gray 7.5 YR 6/1 and strong brown 7.5 YR 5/4 silt, some clay little sand little ~~some~~ oxidation staining and organics
		9	29			
	2.0	10				
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT30	**Drilling Date:** 5/16/2012	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/16/12 1525
Well No:	**Drillers:** M&W Drilling	**Date Ended:** 5/16/12
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 10'
Weather: Partly Cloudy 70's Breezy		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	19			Moist dark grayish brown 10YR 4/2 silt; some sand trace of clay to 10"; then moist, soft silt, little sand 7.5 YR 6/6 (reddish yellow, some oxidation staining.
		2				
		3	17			Moist light yellowish brown silt, some sand and dark iron minerals with red oxidation ~~staing~~ WHR 5/16/12 staining, trace clay.
		4				
		5	18			Moist light yellowish brown, silt, some sand with dark oxidation staining around weathered dark mineral, almost looks like hornblend WHR 5/16/12
		6				
		7	21			Moist yellowish brown silt, some sand little clay, clay increasing at depth, some red oxidation staining entire length.
		8				
		9	23			Moist gr gray and brown silt and clay stiff.
		10				END OF BORING
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. KBGDPT31
Drilling Date: 5/18/2012
Sheet 1 **of** 1
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 5/18/2012 9:10
Well No:
Drillers: M & W Drilling
Date Ended: 5/18/2012 9:20
Logged By: William Kid
Rig: Geoprobe 7730 DPT
Total Depth: 11'
Weather: Sunny 70's

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1				2" Topsoil, moist yellowish brown 10YR 5/6 silt some sand little clay trace gravel, soft
		2	20			Stiff yellowish brown silt and clay, some rock fragments grading into light brownish gray clay and silt, some rock fragment.
		3	23			
		4				
	425	5	23			Stiff yellowish brown and gray mottled silt and clay some rock fragments
	50	6				
		7	26			hard, weathered shale, red & yellow oxidation staining along basal parting surfaces, becoming more competant with depth (2.5 Y 4.1)
		8				
		9	30"		with 5/18/12	Dark gray weathered shale, Iron (limonite) staining ~~alon~~ on basal cleavage surfaces
		10				" with 5/18/12 weathered shale
		11				END OF Boring
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGOPT32	**Drilling Date:** 5/21/12	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/21/12 13 54
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/21/12 15 00
Logged By: William Reid	**Rig:** Geoprobe 7730 DT	**Total Depth:** 18'
Weather: Sunny 80		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	18			1" Topsoil, Moist brown 7.5 YR 5/4 silt, some clay little sand and organics, crumbly
		2				
		3	21			Moist, medium stiff silt, some clay ~~reddish~~ ~~brown~~ with 5/21/12 yellowish red 5 YR 5/6 with little light gray mottling 5 YR 7/1. Gray mottling increasing with depth.
		4				
		5	29			Stiff silt and clay, little sand, to 9", then soft silt, ~~trace~~ with 5/21/12 little clay trace sand to 16 then stiff silt and clay, slightly plastic yellowish red & gray mottled
		6				
		7	20			Moist yellowish red silt, some clay, trace sand, some gray mottling to 14" then yellowish red, sand content increasing with depth @ 18" yellowish red silt and sand
		8				
		9	29			slightly moist yellowish red silt to 5" then ~~red~~ yellowish red and gray mottled silt, some clay little sand to then ~~redd~~ yellowish red silt some clay to 29 softer with 5/21/12
		10				
		11	24			6" gray 5 YR 6/1 silt, little sand trace clay with 5/21/12 unconformably over yellowish red silt, some sand, little rock fragments to 18 then red silt, ~~and~~ little sand to 20 then yellowish red silt and sand, some rock.
		12				
		13	20			Moist to damp reddish brown silt and clay some sand and rock fragments to 5" then reddish brown & gray mottled silt, some sand to 18 then reddish brown silt, sand and rock fragment.
tooling switch @ 13.5		14	>			
		15	36			Gallia-like, moist, crumbly reddish yellowish red silt, sand and gravel, to 34 then reddish brown clay, some silt.
		16				
	∇	17	60			damp to wet, yellowish red sand, some silt, little gravel to 13, then weathered sale to 18 the ~~sh~~ with 5/21/12 Sunbury Shale to bottom. with 5/21/12
		18				
		19				
		20				Depth to water @ 15 30 15.50'

FBP Soil Boring Log

Soil Boring No. BKGDPT 33	**Drilling Date:** 5/21/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/21/12 8:54
Well No: NA	**Drillers:** M & W Drilling	**Date Ended:** 5/21/12
Logged By: William Reed	**Rig:** Geoprobe DPT 7730	**Total Depth:** 21.5
Weather: Sunny 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	20			2'Topsol, moist slightly stiff strong brown 7.5 YR 5/6 silt, some clay trace sand to 14" then strong brown silt little clay and gravel.
		2				
		3	27			Slightly moist slightly stiff, silt, some clay and gravel, gravel red stained reddish yellow 7.5 YR 6/6
		4				
		5	24			Slight moist, medium stiff silt, some clay and gravel, little sand, reddish yellow 7.5 YR 6/6
		6				
		7	20			Dry crumbly silt, some sand and rock fragments, ~~yello~~ WHR 5/21/12 reddish yellow 7.5 YR 6/6
		8				
smaller tubing		9	34			Dry crumbly silt, some rock fragments (shale) some sand, sameas above.
		10				
		11	29			same as above
		12				
		13	35			getting into weathered shale, dry crumbly 7.5 YR 7/4 "pink" silt and clay some rock,
		14				
		15	48			Dry crumbly, light brown 7.5 YR 6/3, weathered Shale to 2' then 2' Zone of reddish brown 7.5 YR 4/4 gravel then back to weathered Shale to bottom.
		16				
		17	42 WHR 5/21/12			Dry crumbly weathered Shale, light brown 7.5 YR 6/3
		18				
		19	60"			Dry crumbly reddish yellow 7.5 YR 6/6 weathered Shale to 55" then light gray 7.5 YR 7/1 weathered shale
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT33	**Drilling Date:** 5/21/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/21/12 8:54
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/21/12
Logged By: William Red	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 21.5 ft
Weather: Sunny 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21				light gray 7.5 YR 7/1, dry crumbly weathered shale, basal parting
		22				
		23				Auger Refusal
		24				
		25				
		26				
		27				
		28				
		29				
		30				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 34
Project: Soil Background
Well No: NA
Logged By: William Reid
Weather: Partly sunny 70s
Drilling Date: 5/23/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT
Sheet 1 **of** 5
Date Started: 5/23/12 1008
Date Ended: 5/23/12 1340
Total Depth: ~~47~~ ft WHR 6/21/12 52

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.0	1 2	18			Topsoil with trace gravel top 2" Then moist, soft reddish yellow silt, little sand and clay 7.5YR 6/6
	>4.5	3 4	20		WHR 5/23/12	Dry, hard crumbly reddish yellow silt, ~~and~~ ~~stiff~~ some gravel and cobbles, little sand and clay. WHR 5/23/12
	>4.5	5 6	27			14" slightly moist, stiff, reddish ~~yellowis~~ yellow silt, some clay little gravel, overlying stiff, ~~yell~~ reddish yellow silt and clay. WHR 5/23/12
	>4.5	7 8	21			Stiff, moist reddish yellow silt and clay, trace sand.
	>4.5	9 10	29			Stiff, light brown 7.5 YR 6/4 silt and clay grading into reddish yellow silt and clay.
	4.5	11 12	27		WHR 5/23/12	Moist stiff brownish yellow 10YR 6/6 silt and clay unconformably ~~grading~~ ~~into~~ over reddish yellow silt and clay, trace sand little organics WHR 5/23/12
	>4.5	13 14	27			Moist, stiff reddish yellow 7.5 YR 6/6, ~~little~~ ~~organics~~, silt and clay, little organics WHR 5/23/12 WHR 5/23/12
	3.25	15 16	36			8" Stiff, moist silt and clay, grading into silt, some clay to 28" then stiff silt and clay all reddish yellow 7.5 YR 6/6.
Switch tool @	4.25	17 18	27			Stiff, moist silt and clay, slightly plastic, reddish yellow 7.5 YR 6/6
		19 20	41			Medium stiff silt and clay reddish yellow 7.5YR 6/6 to 12" grading into light yellowish brown 10YR 6/4.

FBP Soil Boring Log

Soil Boring No. BKGDPT34	**Drilling Date:** 5/23/12	**Sheet** 2 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/23/12 1008
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/23/12 1340
Logged By: William Reid	**Rig:** Geoprobe 7730	**Total Depth:** 47 ft
Weather: Partly Sunny 70s		52 WHR 6/21/12

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.0	21 22	34			Medium stiff, moist, reddish yellow and light gray mottled (7.5 YR 6/6 and 7.5 YR 7/1) silt and clay, plastic WHR 5/23/11
	2.75	23 24	42			Same as above
		25 26	38			4" same as above grading into very pale brown 10YR 7/3 silt, some clay to 50, then silt, little sand to bottom
		27 28	36			6" soft, moist silt, little clay very pale brown, grading into brownish yellow silt some clay to 22 then clay content decreasing at depth, trace gravel
		29 30	47			12" moist brownish yellow 10 YR 6/6 silt, some clay, trace gravel grading into very pale brown silt, little clay.
		31 32	35			moist to damp, soft, reddish yellow 7.5 YR 6/6 and yellow 10YR 7/6 mottled silt, little sand.
		33 34	44			Same as above, ~~less~~ little yellow mottling WHR 5/23/12
		35 36	45			Same as above
		37 38	48			Same as above
		39 40	60			Same as ~~able~~ above to 48" then silt, some sand to bottom. WHR 5/23/12

FBP Soil Boring Log

Soil Boring No. BKG DPT 34	**Drilling Date:** 5/23/12	**Sheet** 3 **of** 3
Project: Soil background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/23/12 1008
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/23/12 1340
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** ~~47~~ 52 ft
Weather: Partly Cloudy 70s		wrm 6/21/12

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	48			Moist to damp, silt, some sand, soft, brownish yellow 10 YR 6/6.
		42				
		43	51			Same as above
		44				
		45	52			same as above to 50" then silt, sand and gravel yellowish brown 10 YR 5/4
		46				
		47	12			Dry crumbly silt, sand and gravel 10 YR 5/4 yellowish brown and light yellowish brown 2.5Y 6/4 mottled
						Refusal
		48				
		49				
		50				
		51				
		52				
		53				
		54				
		55				
		56				
		57				
		58				
		59				
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT 34	**Drilling Date:** 5/24/12	**Sheet** 4 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/24/12 0910
Well No:	**Drillers:** M+W	**Date Ended:** 5/24/12 1110
Logged By: Alison Lake	**Rig:** Geoprobe 7730 DPT	**Total Depth:** ~~46.5'~~ 52 ft with 6/21/12
Weather: Sunny, 75°F +		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						Due to refusal on 5/23/12, an additional attempt to reach bedrock is being made. Sleeve + logging will commence at ~~46~~ 5/24/12 45'.
				NA	NA	
		41				(Attempting to establish extent of balba + reach bedrock)
		42				See log sheet from previous day (5/23/12)
		43				
		44				
		45				Dry silt, sand, +gravel, light yellowish Brown 10YR 5/6 trace clays. 45-46.5'
		46				Hard refusal at 46.5'
		47				
		48				
		49				
		50				
		51				
		52				
		53				
		54				
		55				
		56				
		57				
		58				
		59				
		60				

FBP Soil Boring Log

WHR 6/21/12

Soil Boring No. BKG DPT 34	**Drilling Date:** 6/21/2012	**Sheet** 5 **of** 5	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/21/2012	0930
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/21/12	1100
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 52 ft	
Weather: Sunny 80s			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41				AUGER DRILL TO 46' BG, see logs from 5/23 and 5/24 for description for 0 – 46
		42				
		43				
		44				
		45				
		46				
		47	24			Slightly moist silt sand and gravel, little rock at 20" ~~redd~~ yellowish red and brownish yellow mottled. WHR 6/21/12
	∇	48				
		49	24			wet, strong brown, silt, sand and gravel, little rock fragments
		50				
		51	24			8" Dry, strong brown silt, sand and gravel, little rock. Weathered, gray shale @ 51'
		52				END OF BORING
		53				
		54				
		55				
		56				
		57				
		58				
		59				
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT35
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly cloudy 80

Drilling Date: 5/23/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 2
Date Started: 5/23/12 1525
Date Ended: 5/23/12 1645
Total Depth: 32 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	20			2" Topsoil, then moist silt, some sand little clay and gravel, yellowish brown 10YR 5/6
		2				
		3	19			Damp, 14" silt, sand and gravel, yellowish brown 10YR 5/6 unconformably over stiff silt and clay pale ~~light~~ WITR 5/23/12 brown 10YR 6/3
		4				
	4.0	5	28			Moist light gray 7.5 YR 7/1 grading into brownish yellow silt, some clay little sand 10YR 6/8 WITR 5/23/12 WITR 5/23/12
		6				
		7	24		WITR 5/23/12	Slightly moist, silt, some clay little sand. ~~reddish~~ strong brown 7.5 YR 5/6, wet silt and sand along side of sample between 18-24"
		8				
		9	33			Moist strong brown and light gray mottled silt, some clay, trace sand.
		10				
	3.5	11	27			Moist strong brown silt, some clay, trace sand vertical 1/4" light gray, damp silt, some sand ribbon crumbly
		12				
	2.0	13	26			Moist, strong brown silt, little clay and sand trace gravel and organics
		14				
	0.5	15	42			Damp yellowish brown 10YR 5/8 silt, little to some sand, little clay trace gravel
		16			∇	
		17	30 WITR 5/23/12			Damp to wet yellowish brown 10YR 6/6 silt, some sand little clay trace gravel
		18				
		19	30			Damp yellowish brown silt, some sand little clay and ~~trace~~ gravel WITR 5/23/12
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 35		**Drilling Date:**	5/23/12	**Sheet** 2 of 2	
Project:	Soil Background	**Project No: WBS 03.01.01.02.01**		**Date Started:**	5/23/12 1525
Well No:	NA	**Drillers:**	M & W Drilling	**Date Ended:**	5/23/12 1645
Logged By:	William Reid	**Rig:**	Geoprobe 7730 DPT	**Total Depth:**	32 ft
Weather:	Partly Cloudy				

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Depth to H_2O 3.16 **Description**
		21	24			Damp to wet silt and sand, little gravel, trace Clay 10 YR 6/4 brownish yellow
		22				
		23	32			wet brownish yellow 8" silt and sand, 2" gravell and sand then silt, sand and rock fragments to 24 then yellowish brown silt and little sand. 10 YR 5/8
		24				
		25	26			6" wet silt and sand yellow, 10YR 7/6, unconformably over brown 7.5 YR 5/4 silt, sand and gravel, rock fragments at 20" Gallia
		26				
		27	3.0		G ∇	wet silt, sand and gravel 7.5 YR 5/4, then 6" yellowish brown sand then silt, sand and gravel, some rock fragments
		28				
		29	32			wet silt sand and gravel 10 YR 6/4
		30				
		31	30			6" Dry silt, sand and gravel, then 6" reddish brown shale then gray shale to bottom.
		32				
		33				END OF BORING
		34				
		35				
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT36	**Drilling Date:** 5/22/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/22/12 8:45
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/22/12 1207
Logged By: William Reed	**Rig:** Geoprobe 7730 DT	**Total Depth:** 34 ft
Weather: Cloudy 60's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description ~~Stable~~ Stable depth to H2O 12.57' @ 13:15
	3.5	1 2	20			3" Topsoil, then 3" moist brown 7.5 YR 5/3 silt, little clay, trace sand, overlying brownish yellow silt some clay trace sand and gravel 10 YR 6/6
		3 4	23			Moist, medium stiff silt, some clay, trace sand to 17", some gray mottling 7.5 YR 6/1 to 21", then damp silt, some sand, trace clay.
		5 6	26			20" Moist medium stiff silt and clay, brownish yellow overlying light gray 7.5 YR 7/1 clay, some silt, slightly plastic ~~very~~ stiff. WHR 5/22/12
	3.0	7 8	22			11" same as above, then brownish yellow, 10 YR 6/6 silt and clay, trace sand stiff, some organics
		9 10	27			6" yellow 10 YR 7/6 and light gray 10 YR 7/1 mottled silt and clays overlying reddish yellow 7.5 YR 6/4 silt and clay medium stiff then, stiff light brown silt and clay plastic
		11 12	24			84" of same as above overlying reddish yellow silt, sand and gravel and some cobbles gallia-like
		13 14	28			Moist, stiff reddish yellow 7.5 YR 6/6 and light gray, mottled 7.5 YR 7/1 silt, ~~som~~ little clay and sand and cobbles. WHR 5/22/12
		15 16	36			Moist, reddish yellow 7.5 YR 6/6 silt and clay trace sand to 10" then moist, soft silt, little to some sand with rock fragments to 30, then damp strong brown silt 7.5 YR 5/6, some sand
		17 18	26			Moist soft, brownish yellow 10 YR 6/6 silt, little sand rock fragments at 24, becomes yellow 10 YR 7/6 at 22.
		19 20	44			Brownish yellow, silt and rock fragment, to 12" then soft brownish yellow silt, little clay to 30, sand increasing in content, ~~then~~ becoming silt and sand ~~to~~ at 38 to bottom WHR 5/22/12

FBP Soil Boring Log

Soil Boring No. BIIG-DPT36	**Drilling Date:** 5/22/2012	**Sheet** 2 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/22/2012 845
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/22/2012 1202
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 34 ft
Weather: Cloudy 68°		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	24		∇M	Damp to wet brownish yellow silt, little to some sand, one in sand seam at 20 and 23,
	∇	22				+ Wet GALLIA Wet 12" wet sand overlying wet sand and gravel, some rock fragments to 28, the wet sand and pea gravel.
		23	36			
		24			∇G	wet yellowish brown 10 YR 6/6 pea gravel to 28, then sand and gravel to bottom
		25	35			
		26				
		27	NR			WHR 5/22/12 ~~Reddish~~ Yellowish brown silt, sand and gravel, some rock fragments
went to smaller Tubing		28				
		29	15			Same as above
		30				
		31	18			same as above, some reddish brown mottling 2.5 YR 4/4
		32	22			4" sand and gravel, then gray, weathered gray shale, most likely Cuyahoga
		33	28			
		34				END OF BORING
		35				
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT 37	**Drilling Date:** 5/22/12	**Sheet** 1 **of** 3	
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 5/22/12	1530
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/22/12	1800
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 53.5 ft	
Weather: Cloudy 70's			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	21			1" Topsoil, moist ~~yellowish red~~ reddish yellow 7.5 YR 6/8 WHR 5/22/12 silt, and clay stiff, trace sand, stiff WHR 5/22/12
		2				
		3	24			Slightly moist, crumbly silt, little sand and clay, rock fragments bottom 6" reddish yellow ~~&~~ 7.5 YR 6/8
		4				
		5	26			Dry crumbly silt, some sand little rock fragments, @ 13" rock fragments increasing in content to some rock fragments 10 YR 6/6 brownish yellow
		6				
	>4.5	7	22			Dry crumbly silt, some sand and gravel, some organics top 12" some rock fragments last 10" 10 YR 6/8 brownish yellow
		8				
		9	24			Dry crumbly silt, some rock fragments little sand, olive yellow 2.5Y 6/6
		10				
		11	26			Same as above, little clay 20-24"
		12				
	>4.5	13	25			Dry, hard, crumbly, silt, some rock fragments and gravel, little clay and sand. Very stiff
		14				
	4.0	15	26			Dry crumbly silt, some clay, little rock fragments and sand, little softer
		16				
switch tooling →		17	24			Moist reddish ~~brown~~ yellow WHR 5/22/12 and gray mottled silt and clay, plastic 7.5 YR 6/6 and 7.5 YR 6/1 silt increasing last 5"
		18				
	4.25	19	~~2~~9 WHR 5/22/12			Same as above entire length.
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 37	**Drilling Date:** 5/22/12	**Sheet** 2 of 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/22/12 1530
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/22/12 1800
Logged By: William Reif	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 53.5 ft
Weather: Cloudy 70s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.25	21	30			10YR 7/6 Slightly MOIST, yellow silt, some clay slight reddish yellow motting
		22				Moist, stiff silt and clay, plastic reddish yellow 10 YR 7/6. plastic
	3.25	23	31			
		24				with 5/22/12 7.5 YR 6/6 reddish yellow 5" Dry crumbly silt, some rock little sand overlying stiff moist silt and clay, plastic 10 YR 6/4 light yellowish brown, becoming brownish yellow at 40"
	3.0	25	50			
		26				
		27	30			15" moist reddish yellow silt, little to some clay overlying silt and clay plastic, yellow 10 YR 7/6
		28				
		29	56			Same as above to 48" then silt sand some rock fragments, 7.5 YR 6/8 reddish yellow
		30				
		31	46			18" moist reddish yellow, 7.5 YR 6/8 silt, sand and gravel crumbly grading into silt and clay, stiff, plastic
		32				with 5/22/12 7.5 YR 7/6
		33	52			18" moist slightly plastic reddish yellow silt, some clay grading into moist, softer reddish yellow silt, some sand little clay 7.5 YR 6/8
		34				14"
		35	60			Moist reddish yellow silt, some sand little clay grading into yellow, silt and sand. 10 YR 7/6
		36				
		37	46			Moist to damp ~~reddish~~ brownish with 5/22/12 yellow silt, some sand to 28 becoming wet silt and sand 10YR 6/6
		38			∇M	Wet, fine sand, little silt, very pale brown 10YR 7/4
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT 37	**Drilling Date:** 5/22/12	**Sheet** 3 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/22/12 1530
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/22/12 1800
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 53.5 ft
Weather: Cloudy 70s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	46			wet, reddish yellow sand 7.5YR 6/6
		42				same as above
		43	42			
		44				WHR 5/22/12 ~~more~~ fine to medium sand. 7.5 YR 6/4
		45	48			
		46			▽G	wet silt, sand and gravel 10YR 6/4
		47	50			
		48				
		49	46			
		50				
		51	52			Damp wet gray 10YR 6/1 sand, some gravel overlying reddish yellow silt sand and gravel
		52				
		53				16" weathered shale
		54				4" ~~Gray shale~~ WHR 5/22/12 (shale had mud patina
		55				
		56				
		57				
		58				
		59				
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT 38
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly Cloudy 80s

Drilling Date: 6/12/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 of 3
Date Started: 6/12/12 1358
Date Ended: 6/12/12 1530
Total Depth: 43'

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.5	1 2	16		wltr 6/12/12	4" Topsoil, then slightly moist, brownish yellow 10YR 6/6 silt, ~~so~~ little clay and sand.
		3 4	22			slightly moist, crumbly brownish yellow silt, little clay and sand.
	0.5	5 6	19			Moist to damp, yellow 7.5 YR 7/6 silt, some sand little clay and gravel, little red oxidation staining
	4.0	7 8	29			4" Damp yellow silt some sand and gravel little clay unconformably over silt, ~~red~~ some sand wltr 6/12/12 and gravel grading into stiff, strong brown 7.5 YR 5/6 silt and clay slightly plastic
	2.75	9 10	23			Moist, ~~red~~ strong wltr 6/12/12 brown clay and silt, with some 1/2" to 1" yellow silt laminae and rock fragments to 16" then silt and clay to bottom.
	>4.5 on bottom	11 12	26			12" light yellowish brown 10YR 6/4 silt and clay with thin yellow silt laminae, unconformably over damp to wet brownish yellow silt, some sand to 24", then stiff ~~gray~~ brownish yellow silt and clay. wltr 6/12/12
	4.0	13 14	30			Stiff brownish yellow silt and clay, little sand and gray mottling 10YR 6/1.
2" fooling	2.75	15 16	40		∇	8" Wet brownish yellow silt and sand, little ~~gravel~~ gravel wltr 6/12 unconformably over moist, brownish yellow silt and clay, some gray mottling.
	3.5	17 18	53			Moist stiff yellowish brown 10YR 5/6 and gray 10YR 6/1 mottled silt and clay
		19 20	44			Moist soft brownish yellow and gray mottled silt, some sand to 28" grading into gray ~~mottled~~ silt, damp little clay and fine sand wltr 6/12/12

FBP Soil Boring Log

Soil Boring No. BKGDPT-38	**Drilling Date:** 6/12/12	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/12/12 1358
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/12/12 1530
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 43'
Weather: Partly Cloudy 80s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.75	21 22	42"		WHR 6/12/12	8" damp gray silt, little sand and clay grading into gray and brownish yellow mottled silt ~~and st~~ ~~same~~ little to some clay to 28" then ~~yello~~ brownish yellow silt, little sand and clay
	3.0	23 24	38			same as above, little gray mottling
	1.75	25 26	58			Same as above, some sand and gravel last 4"
	0.5	27 28				soft, moist to damp, brownish ~~yellowish~~ and gray mottled silt, some ~~little~~ WHR 6/12/12 clay trace sand.
	0.5	29 30	42			Soft, damp gray silt, WHR 6/12/12 ~~trace~~ little sand and clay, becoming silt, some clay last 6"
	~~4.5~~ 0.5	31 32	42			4" dry gray silt, some clay little sand, some strong brown sand seam to 5" then damp/ ~~dry~~ WHR 6/12/12 gray silt, little Clay and sand.
		33 34	48		▽ M	Damp to wet gray silt, some sand little clay.
		35 36	54		WHR 6/12/12	~~to wet~~ gray silt, some sand, little clay.
		37 38	52			same as above
		39 40	54			Same as above

FBP Soil Boring Log

Soil Boring No. BKGDPT 38
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly Cloudy 80
Drilling Date: 6/12/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drillers
Rig: Geoprobe 7730 DPT
Sheet 3 **of** 3 WHR 6/12/12
Date Started: 6/12/12 1358
Date Ended: 6/12/12 1530
Total Depth: 43'

DTW 16.1'

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	43		∇a	4" wet silt, some sand little gravel unconformably overlying wet yellowish brown 10YR 5/6 silt sand and gray gravel and rock fragments
		42				
		43	36			4" moist gray silt and clay, overlying weathered gray shale
		44				END OF BORING
		45				
		46				
		47				
		48				
		49				
		50				
		51				
		52				
		53				
		54				
		55				
		56				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 39		**Drilling Date:** 6/12/12		**Sheet** 1 **of** 3	
Project: Soil Background		**Project No:** WBS 03.01.01.02.01		**Date Started:** 6/12/12	1650
Well No: NA		**Drillers:** M&W Drilling		**Date Ended:** 6/12/12	1815
Logged By: William Red		**Rig:** Geoprobe 7730 DPT		**Total Depth:** 50 ft	
Weather: Partly cloudy 80					

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.25	1	20			~~Moist~~ WHR 6/12/12 2" Topsoil, overlying moist yellowish brown silt, and gravel, some sand, dry crumbly. WHR 6/12/12
		2				
		3	26			Slightly moist, Strong brown 7.5YR 5/6 crumbly silt sand and gravel, little cobbles - looks Gallia-like
		4				
	2.5	5	26			Same as above down to 11", then unconformably over moist yellowish brown silt and clay, some yellow 10YR 7/6 mottling/lamine WHR 6/12/12
		6				
	1.5	7	26			Moist yellowish brown silt and clay, some reddish yellow thin lamine to 22", then 4" of reddish yellow damp silt.
		8				
		9	23			WHR 6/12/12 Same as above, laminated silt and clay and ~~et~~ silt laminaet to 21 then ~~pt~~ pale brown silt 10 YR 6/3 to bottom. WHR 6/12/12
		10				
		11	26			Moist reddish yellow silt, some clay to 8" then pale brown 10YR 6/3 silt ~~to~~ 13" then yellowish brown silt and clay, stiff to 20 then wet pale brown 10 YR 6/3 silt, little sand and clay
		12				
	>4.5	13	28			6" wet pale brown silt, some sand, unconformably over brownish yellow silt and clay to 16, then stiff clay some silt to bottom
	2" tooling	14				
	3.75	15	38			Stiff slightly moist yellowish brown and brownish yellow mottled 10YR 5/6 and 10YR 6/8 silt and clay,
		16				
	3.75	17	48			stiff moist ~~ye~~ WHR 6/12/12 brownish yellow and some gray 10YR 6/1 mottled clay and silt, slightly plastic.
		18				
	1.25	19	56			Same as above, becoming softer at 46".
		20				

FBP Soil Boring Log

WHR 6/12/12

Soil Boring No. BKGOPT-39	**Drilling Date:** 6/12/12	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/12/12 1650
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/12/12 1845
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 50 ft
Weather: Partly Cloudy, 80s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description WHR 6/12/12
	3.0	21 22	56			Moist ~~brownish~~ yellow and gray mottled silt and clay to extending to 40" becoming yellowish brown with little gray mottling.
	1.5	23 24	48			Same as above to 28 becoming yellowish brown and gray mottled silt, little clay and gravel, becoming softer with depth.
	1.25	25 26	50			soft ~~so~~ WHR 6/12/12 slightly plastic yellowish brown and gray mottled silt, some clay little sand and gravel
	2.5	27 28	51			Yellowish brown with little gray mottling, silt and clay little gravel and sand becoming gray silt and clay some yellowish brown mottling, slightly stiffer
	1.5	29 30	48			reddish yellow, dry crumbly silt and clay little sand trace gravel to 24 grading into moist gray silt, some clay little yellowish brown mottling.
	1.5	31 32	50			Moist to damp gray silt, little to some clay, trace sand, some yellowish brown mottling.
	1.5	33 34	43			Damp gray silt, little clay and sand, little gravel between 32 and 35"
		35 36	42			same as above
		37 38	42			same as above
		39 40	39		▽	Same as above to 18", then wet silt some sand, little gravel between 26 and 28"

WHR 6/12/12

FBP Soil Boring Log

Soil Boring No. BKGDPT 39
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly Cloudy 80

Drilling Date: 6/12/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 3 **of** 3
Date Started: 6/12/2012 1650
Date Ended: 6/12/2012 1845
Total Depth: 50 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	54			Wet gray silt, some sand little gravel
		42				
		43	40		∇G	Same as above to 26" then wet gray silt sand and gravel - Gallia
		44				
		45	26			Wet gray and ~~reddish~~ WHR 6/12/12 reddish yellow silt sand and gravel, some gray rock fragments
		46				
		47	29			Same as above
		48				
		49	38			WHR 6/12/12 weathered gray shale
		50				END OF BORING
		51				
		52				
		53				
		54				
		55				
		56				
		57				
		58				
		59				
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT 40	**Drilling Date:** 6/13/2012	**Sheet** 1 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/13/12 0846
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 6/13/12 1830
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 86'
Weather: Partly Cloudy 60's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22			18" dry, crumbly, silt, some sand and gravel reddish yellow overlying slightly moist silt some sand and clay.
	NA rock	3	19			20" Dry, crumbly strong brown 7.5YR 5/6 silt, sand and gravel, some cobbles
Hydraulic hose 1235 resume	NA rock	5	24			slightly moist, silt, gravel and ~~sand~~ sand, WHR 6/13/12 some cobbles, strong brown 7.5YR 5/6, silt and clay seam between 16-20"
	>4.5	7	25			6" moist brownish yellow silt and clay some gravel little sand unconformably WHR 6/13/12 over dry strong brown (7.5YR 5/6) silt sand and gravel, then ~~yell~~ brownish yellow silt and clay, little gravel, and gray mottling
	3.5	9	20			Moist, brownish yellow silt some clay grading into stiff brownish yellow silt and clay, some yellow mottling 10YR 7/6
	2.5	11	32			moist, stiff yellowish brown clay ~~sand~~ and WHR 6/13/12 silt, ~~becoming~~ becoming less stiff around 16" some 1/4" thin yellow silt seams
	2.75	13	29			Moist, stiff yellowish brown silt and clay to 24" then yellowe silt ~~and~~ some clay to 28 then yellowish brown silt and clay.
	2.5	15	37			Moist, stiff, yellowish brown silt and clay, some thin 1/4-1/2" yellow 10YR 7/6 silt laminae,
	1.0	17	41			Moist, yellowish brown silt and clay, little thin yellow lamanade to 30", then some thin yellow laminae, then yellow silt last 2".
	2.0	19	45			Moist yellowish brown silt and clay, some thin yellow laminae ~~and~~ and WHR 6/13/12 ~~thin~~ WHR 6/13/12 little thin gray ~~lamina~~ WHR 6/13/12 laminae, plastic

FBP Soil Boring Log

Soil Boring No. BKGDPT10
Drilling Date: 6/13/12
Sheet 2 **of** 5
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 6/13/12 0846
Well No: NA
Drillers: M&W Drilling
Date Ended: 6/13/12 1830
Logged By: William Reid
Rig: Geoprobe 7730 DPT
Total Depth: 86'
Weather: Partly Cloudy 66

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.0	21 22	44			moist yellowish brown silt and clay, thin yellow laminae between 12 and 24" then back to silt and clay.
		23 24	48			Moist, yellowish brown silt and clay to 28, then ~~th~~ reddish yellow silt, some clay very moist.
		25 26	40			Moist brownish yellow silt, some clay to 7" ~~then~~ moist stiff reddish brown clay to 13, then brownish yellow silt ~~to~~ 32 then laminated yellowish brown and yellow, silt and clay
		27 28	48			26" moist stiff yellowish brown silt and clay with gray, yellow or black laminae ~~to~~ then mosit to damp silt, some sand little gravel.
		29 30	30			Moist, brownish yellow silt, sand and gravel. some ~~reddish~~ yellowish red gravel, brownish yellow silt seams, between 11 an 14 and 16 and 21. WIR 6/13/12
		31 32	58			~~Moist~~, same as above WIR 6/13/12
		33 34	48			Same as above to 36, then brownish yellow silt, some sand and gravel to bottom.
	3.0	35 36	54			Moist, yellowish brown silt, some clay little sand and gravel.
	1.0	37 38	52			same as above, with silt, sand and gravel seams at 12-24" and 36 to 43"
	3.5	39 40	46			18" silt sand and gravel, ~~and~~ strong brown 7.5 YR 5/6 grading into yellowish brown and gray mottled silt, some clay. WIR 6/13/12

FBP Soil Boring Log

Soil Boring No. BKGDPT40	**Drilling Date:** 6/13/12	**Sheet** 3 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/13/12 0846
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/13/12 1830
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 86'
Weather: Partly Cloudy 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	56			same as above to 24, then) WHR 6/13/12 dry crumbly strong brown silt, sand and ~~gra~~ gravel to 36 then very moist gray silt, some sand little clay
		42				
		43	45 WHR 6/13/12			Moist, soft gray silt, some sand little clay, some yellowish brown mottling
	1.0	44				
		45	46			Moist soft, gray silt, little sand and clay trace gravel
		46				
		47	44			24" slightly moist crumbly silt and gravel, some sand, unconformably over moist gray silt, some clay, gravel seam between 32 an 36.
		48				
	2.0	49	46			moist gray silt, some clay little sand, trace of gravel, some organics
		50				
	2.25	51	58			Same as above
		52				
	2.0	53	56			10" WHR 6/13/12 ~~silt~~ gray silt sand and gravel grading into gray silt, some clay, little sand.
		54				
	2.5	55	54			moist, plastic gray silt and clay some ~~bro~~ WHR 6/13/12 yellowish brown mottling last 8"
		56				
		57	52			same as above.
		58				
		59	56			Moist soft, plastic clay, some silt dark gray
		60				

FBP Soil Boring Log

Soil Boring No. BKG OPT 40	**Drilling Date:** 6/13/12	**Sheet** 4 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/13/12 0846
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/13/12 1830
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 86
Weather: Partly Cloudy 70s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.75	61	46			wtr 6/13/12 ~~Ver~~ Very moist, gray silt, some clay grading into stiffer dark gray 7.5YR 4/1 clay some silt trace gravel
		62				
	2.25	63	56			same as above to 32, ~~then~~ same gray 7.5YR 6/1 laminae
		64				
	2.0	65	54			moist wtr 6/13/12 ~~moist~~, gray silt and clay, plastic, trace sand and fine gravel
		66				
	2.0	67	58			same as above.
		68				
	1.75	69	58			same as above.
		70				
	1.5	71	56			same as above
		72				
	2.25	73	58			Same as above
		74				
	1.5	75	54			Same as above
		76				
		77	50			Moist gray silt, some sand, trace gravel to 29 then wet gray silt and sand, little gravel.
		78			▽	
		79	22			Same as above wet
		80				~~Sa~~ wtr 6/13/12 gray silt, sand and gravel

FBP Soil Boring Log

Soil Boring No. BKG-DPT-40	**Drilling Date:** 6/13/12	**Sheet** 5 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/13/12
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/13/12 6:30
Logged By: William Reid	**Rig:** Geoprobe TT30 CPT	**Total Depth:** 86'
Weather: Partly Cloudy 70		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						wet gray silt, sand and gravel, some cobbles
split spooning		81				
		82				Dry gray silt, sand and gravel,
		83	16			
		84				Dry gray silt, sand and gravel, some cobbles with 6" weathered shale @ ~~bottom~~ bottom of split spoon, and some in shoe wltR 6/13/
		85	18"			
		86				END OF BORING
		87				
		88				
		89				
		90				
		91				
		92				
		93				
		94				
		95				
		96				
		97				
		98				
		99				
		100				

FBP Soil Boring Log

Soil Boring No. BKG-RPT-11	**Drilling Date:** 6/14/12.	**Sheet** 1 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/14/12 0848
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/14/12 1500
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 90ft
Weather: Sunny 80s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description 7.5YR 6/4
		1	20			2" Top soil, then dry light brown, silt, some sand and gravel, to 12" then slightly moist, brownish yellow (10YR 6/6) ~~some~~ silt, some clay little sand. WTR 6/14/12
		2				
	4.5	3	24			Yellowish brown 10 YR 5/6 silt, gravel, some cobbles, little clay and sand, slightly moist, crumbly
		4				
		5	29			Moist brownish yellow silt and clay, some gravel and cobbles, little sand, busted quartz cobbles last 3"
		6				
	3.5	7	27			Moist, brownish yellow silt and clay, little gravel, grading into yellowish brown silt and clay, became stiffer and laminated with thin yellow laminae (10YR 7/6).
		8				
	40	9	29			Moist, stiff yellowish brown clay, some silt, some thin yellow silt laminae.
		10				
		11	29		WTR 6/14/12	6" stiff, yellowish brown clay then 8" of ~~yellowish~~ yellow and brownish yellow laminated silt, then yellowish brown silt and clay with thin yellow silt laminae, some rock at bottom.
		12				
	2.75	13	30			Moist yellowish brown clay, some silt with thin yellow laminae to 16" then brownish yellow silt to 24", then back to yellowish brown clay some silt.
change tooling →		14				
		15	46			Moist, brownish yellow silt and clay to 8" then yellowish brown clay, some silt to 24" thin laminated silt and clay to bottom.
		16				
		17	40			Moist, brownish yellow clay and silt, unconformably over damp yellow silt, some clay and sand then reddish yellow 7.5 YR 7/6, silt some sand little clay, wet at bottom.
	▽	18				
		19	43			Wet, reddish yellow 7.5 YR 7/6 silt and sand little clay.
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT41	**Drilling Date:** 6/14/12	**Sheet** 2 **of** 5	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/14/12	0848
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/14/12	1800
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 90 ft	
Weather: Sunny 80C			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21 22	40			same as above, becoming less wet at 32"
	1.5	23 24	39			wet sand and silt to 23, unconformably over moist, yellowish brown silt and clay (aquitard) some thin yellow laminae
	2.25	25 26	39			Moist, ~~yellow and~~ WTR 6/14/12 yellowish brown silt and clay with WTR 6/14/12 some yellow and gray laminae to 20" then ~~2~~ soft yellow silt to 28"; then dry crumbly strong brown silt, sand and gravel.
		27 28	34			Slightly moist, crumbly, strong brown silt, sand and gravel to 20", then moist silt, some sand to 30" then slightly moist silt, sand and gravel.
		29 30	30			Moist, yellowish red silt, some clay, little gravel and sand.
		31 32	42			Slightly moist brownish yellow silt, little sand and clay, with silt, sand and gravel lenses at 14-16", 31-36" and 40-42.
		33 34	44			Dry brownish yellow crumbly silt, some clay, little sand to 24" then strong brown silt, sand and gravel, dry crumbly.
		35 36	42			Dry, crumbly reddish yellow 7.5 YR 7/6, silt some gravel, little clay to 30" then dry crumbly silt sand and gravel.
		37 38	44			Dry, crumbly, reddish yellow silt, some clay little gravel and sand to 36" then damp crumbly silt, sand and gravel.
		39 40				Damp to moist, crumbly reddish yellow silt sand and gravel,

FBP Soil Boring Log

Soil Boring No. BKGDPT41	**Drilling Date:** 6/14/12	**Sheet** 3 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/14/12 0848
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 6/14/12 1500
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 90'
Weather: Sunny 80s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
			58			WHR 6/14/12 slightly moist ~~to~~ brownish yellow and gray mottled silt, some clay little gravel to 24 then dry strong brown silt sand and gravel to 48, ~~then~~ moist brownish yellow silt some clay little gravel to bottom.
	3.5	41	~~58~~			
		42	WHR 6/14/12			
		43	54			WHR 6/14/12 ~~moist~~ Dry, crumbly silt, some clay, ~~little~~ little sand, trace gravel, brownish yellow WHR 6/14/12
		44				same as above to 12" then dry crumbly ~~silt~~ strong brown silt, sand and gravel
		45	46			
		46				same as above
		47	45			
		48				Same as above
		49	45			
		50				same as above to 20, then damp brownish yellow silt, little sand and clay.
		51	46			
		52				Moist brownish yellow silt, little clay trace gravel to 18 then strong brown silt sand and gravel to 24 then yellowish brown silt, little clay and gravel to 30 then dry strong brown silt sand and gravel
		53	36			
		54				Moist reddish yellow silt, some clay and gray motting to 8" then strong brown silt sand to 18 then moist yellowish brown silt some clay then some gravel 36 to 48
		55	48			
		56				moist, brownish yellow silt, some sand and gravel, little clay to 18 then silt, some clay little gravel to 30 Then strong brown silt sand and gravel
		57	42			
		58				Moist strong brown silt, sand and gravel to 8" then ~~m~~ soft silt, some clay trace sand to 26 then strong brown silt sand and gravel.
		59	36			
		60				

FBP Soil Boring Log

Soil Boring No.	BKGDPT 41	**Drilling Date:**	6/14/12	**Sheet** 4 **of** 5	
Project:	Soil Background	**Project No: WBS 03.01.01.02.01**		**Date Started:**	6/14/12 0848
Well No:	NA	**Drillers:**	M & W Drilling	**Date Ended:**	6/14/12 1500
Logged By:	William Reed	**Rig:**	Geoprobe 7730 DPT	**Total Depth:**	90 ft
Weather:	Sunny 80s				

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		61 62	48			Strong brown silt, sand and gravel to 18" then moist silt, some clay to 36" then siltsand and gravel to bottom
	2.25	63 64	50			moist brownish yellow and yellowish brown clay, some silt, grading into silt, some clay at 18" extending to bottom, becoming stiffer at 44"
		65 66	43			moist, brownish yellow, ~~and~~ little gray mottled silt, little clay and sand, little gravel beginning at 28 to bottom. wjr 6/14/12
	2.5	7 8	50			Moist brownish yellow and pale brown mottled silt, some clay little sand trace gravel to 32, then strong brown silt, sand and gravel to 48' then brownish yellow silt and clay
		9 70	48			yellowish red and pale brown silt, some clay little gravel, gravel increasing with depth, but still in little range
	2.5	71 72	53			Moist ~~reddish~~ yellowish red silt, some clay little grey motting to 38, then ~~some~~ little gravel to bottom.
		73 74	50			Moist brownish yellow silt, some sand little gravel.
	1.0	75 76	53			Moist reddish yellow silt, some clay trace gravel to 24 then silt, some clay little sand to 29 then moist silt, some sand little clay to bottom
		77 78	39			Moist, ~~[illegible]~~ wjr 6/14/12 brownish yellow silt, little clay sand and ~~organic~~ organic material, ~~to~~ some gravel seams at 19-20, and 30-34 wjr 6/14/12
		79 80	49			Moist yellowish brown silt, some sand little clay, gravel seam between 17" and 22.

FBP Soil Boring Log

Soil Boring No. BKGDPT 41	**Drilling Date:** 6/14/12		**Sheet** 5 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**		**Date Started:** 6/14/2012 08:48
Well No: NA	**Drillers:** M&W Drilling		**Date Ended:** 6/14/12 1508
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT		**Total Depth:** 90 ft
Weather: Sunny 80			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		81	47			Very moist brownish yellow silt, some sand trace gravel
		82				
		83	41			Moist, brownish yellow silt, some sand little gravel to 24, then gray silt, some sand little yellowish brown mottling
		84				
		85	48			Very moist to damp, gray silt, some sand little gravel
		86				
		87	41			Very moist to damp gray silt, some sand to 34, then gray and yellowish brown mottled silt sand and gravel.
		88				
		89	28			Damp gray silt and sand to 9" then silt, sand and gravel to 16", then weathered shale.
		90				
						END OF BORING
		91				
		92				
		93				
		94				
		95				
		96				
		97				
		98				
		99				
		100				

FBP Soil Boring Log

Soil Boring No. BKG DPT 42	**Drilling Date:** 6/14/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/14/12 1610
WellNo: NA	**Drillers:** ~~Geo~~ MEW Drilling	**Date Ended:** 6/14/12 1750
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 30 ft
Weather: Sunny 80		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	23			1" Topsoil, dry crumbly silt sand and gravel, brownish yellow 10YR 6/6
		2				
	3.75	3	25			Moist, brownish yellow clay, some silt, stiff, trace ~~gravels~~ gravel, WHR 6/14/12
		4				
	>4.5	5	22			Moist stiff yellowish brown and gray mottled with ~~silt~~ clay 6/14/12 some silt trace sand to 16, then 2" gravel sea then stiff clay, some silt trace sand.
		6				
		7	28			Dry, crumbly basal partings, brownish yellow and gray silt, some clay, hard - looks like weathered shale
		8				
		9	36			Dry crumbly soft, weathered gray and reddish brown clay and silt (shale)
		10				
		11	48			~~Dry crumb~~ WHR 6/14/12 Same as above
Change tooling →		12				
		13	48			Dry crumbly silt and clay, basal partings then hard gray clay, then dry crumbly shale like material to to 44 then gray clay, hard, no basal parting
		14				
		15	50			Dry crumbly brownish yellow clay and silt to 10 then dry gray clay to 32 then strong brown clay some small gravel (calia?)
		16				
		17	48			Dry crumbly silt and clay, gray and brownish gray to 18, then yellow to bottom
		18				
		19	50			same as above
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 42
Drilling Date: 6/14/12
Sheet 2 **of** 2
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 6/14/12 1610
Well No: NA
Drillers: ME W Drilling
Date Ended: 6/14/12 1750
Logged By: William Reid
Rig: Geoprobe 7730 DPT
Total Depth: 30 ft
Weather: Sunny 80

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						Dry powdery clay and silt, little gravel trace sand.
		21	58			
		22				Same as above
		23	52			
		24				Dry gray powdery clay and silt, some Shale fragments, crumbly.
		25	42			
		26				Dry brownish yellow clay and silt to 48, some shale fragment, with ~~becom~~ 6/14/12 becoming gray, more competant shall last 6"
		27	54			
		28				Dry brownish yellow crumby silt and clay, (weathered Shale)
		29	58			
		30				Refusal
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 43
Project: Soil Background
Well No: NA
Logged By: Alison Lake
Weather: Sunny, clear, 85°F

Drilling Date: 5/24/12
Project No: WBS 03.01.01.02.01
Drillers: M+W
Rig: 7730 Geoprobe

DOE/PPPO/03-0667&D0 FBP-ER-RCRA-WD-RPT-0189
Revision 0
January 2015

Sheet 1 **of** 3
Date Started: 5/24/12
Date Ended: 6/18/12
Total Depth: 56

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1 2	19"	NA	NA	10 YR 5/4 Yellowish brown, slightly moist silty clay. Stiff Trace silt, sand. Trace organic material.
		3 4	24"			10 YR 5/4 yellowish brown, stiff, slighty moist silty clay. Some gray mottling. Trace silt.
		5 6	22"			10 YR 4/4 Dark yellowish brown. Very stiff, cohesive slightly moist, silty clay. Gray mottling @ 5.5-6'. Black ~~organics~~ AL 5/24/12 mottling @ 4.5-4.7'.
		7 8	24"			10 YR 5/4 yellowish brown with gray mottling @ 7'-8'. Slightly moist, very stiff, slightly cohesive silty clay.
		9 10	24"			10 YR 4/4 Dark yellowish brown with gray + black mottling throughout. Stiff, slightly cohesive, slighty moist. Moist gray silt seem @ 9.1-9.2'.
		11 12	24"			10 YR 4/4 Dark yellowish brown with gray + black mottling throughout. Very stiff, noncohesive, slightly moist. Moist gray silt seem from 10.8-11.0' and gravel/rock frags.
		13 14	24"			SAA to 12.6'. 12.6-13.8' 10YR 5/2 grayish brown very moist to wet soft silt with trace fine sand. 13.8-14' wet grayish brown fine to coarse sand w/ trace fine gravel.
		15 16	24"			14'-14.8' wet coarse to fine sand w/ ~~tr~~ AL 5/24/12 some silt 10YR 4/6 Dark yellowish brown. 14.8-15.4' Stiff, slightly moist, noncohesive 10YR 5/4 silty clay. 15.4-16' Moist clay with sand and trace fine to coarse gravel.
		17 18	22"			10YR 5/4 yellowish brown, slightly moist silty clay. Stiff non cohesive. Trace fine to coarse sand + coarse gravel with grey mottling throughout.
		19 20	24"			10YR 6/4 light yellowish brown, dry. Very stiff, noncohesive silty clay

FBP Soil Boring Log

Soil Boring No. BKGnd T43	**Drilling Date:** 5/24/12	**Sheet** 2 **of** 3	
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 5/24/12	
Well No: NA	**Drillers:** M+W	**Date Ended:** 6/18/12	1300
Logged By: Alison Lake	**Rig:** 7730 Geoprobe	**Total Depth:** 56	
Weather: Sunny, clear, hot, breezy 85°F			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	24"			20-20.8' SAA. 20.8'-21.6' 10YR 6/4 lt yellow brown wet silt with trace fine sand. 21.6-22' 10YR 5/8 yellow brown stiff, tight, dry silty clay, noncohesive
		22				
		23	24"			10YR 5/6 Dry stiff silty clay w/ gray mottling throughout. Non cohesive
		24				
		25	24"			SAA
		26				
		27	24"			~~26~~ 26-26.5 SAA. 26.5-28' 10YR 5/6 yellow brown. Dry, ~~stiff to~~ stiffer Medium silt. trace fine sand
		28				
		29	24"			~~SAA~~ moist, medium stiff. silt. Coarse Gravel @ 28.4. 10YR 5/6
		30				
		31	24"			30-30.6' very moist SAA. 30.6'-32. Slightly moist, stiff silt and clay. 10YR 5/8 yellow brown with gray mottling. Trace coarse gravel
		32				
		33	24"			10YR 4/6 dry Clayey silt, noncohesive, medium stiff, Clayey silt. grey mottling throughout. Coarse sand w/ trace fine gravel from 32.2-32.4.
		34				
		35	24"			10YR 4/6 progressing to 5/3. Slightly moist to moist Clayey silt, trace coarse gravel. Medium stiff non cohesive
		36				10YR 5/3 moist to wet clayey silt. Medium stiff to soft non cohesive. trace coars gravel.
		37	24"			
		38				
		39	24"			SAA
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT 43	**Drilling Date:** 5/24/12	**Sheet** 3 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/24/12
Well No: NA	**Drillers:** M+W	**Date Ended:** 6/18/12 1300
Logged By: Alison Lake	**Rig:** 7730 Geoprobe	**Total Depth:** 56'
Weather: Sunny, Clear, hot, breezey, 85°F		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						6/18/12 13:05 DTW 33.49
				NA	NA	SAA.
		41	24"			
		42				SAA
		43	24"			
		44				Very moist to wet Medium to soft clayey silt 10YR 5/4
		45	24"			
		46				Moist to very moist soft clayey silt Noncohesive 10 YR 5/4
		47	24"			
		48			∇	Wet, soft to very soft clayey silt with some fine sand. 10YR 7/1 lightgray.
		49	24"			
resume 6/18/12 witReed logging @ 50		50				Refusal @ 51' 50-50.5' SAA. 50.5-51', dry sand (fine to coarse) + coarse gravel 10YR 5/8 yellowish Brown - Gallin to 52
		51	24"			
		52			∇ on spoon	Dry yellowish brown silt, sand and gravel
		53	24			
		54				same as above for 16" then weathered gray shale
		55	24			
		56				Estimated depth to shale 55.5 END OF BORING
		57				
		58				
		59				
		60				

24.8 water

wHR 6/19/12

FBP Soil Boring Log

Soil Boring No. BKGDPT 44
Project: Soil Background
Well No: NA
Logged By: William Reid
Weather: Partly Cloudy 80

Drilling Date: 6/18/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 5
Date Started: 6/19/12 0828
Date Ended: 6/19/12 1558
Total Depth: 83 ft

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	0.5	1	23			4" Topsoil then pale brown 10YR 6/3 silt ~, some sand little clay.
		2				
	0.5	3	18			Moist to damp sticky brown 10 YR 5/3 silt, some sand, ~~trace~~ little clay trace gravel. wHR 6/19/12
		4				Same as above to 4", then some gravel to 6" then brownish yellow silt and clay, some gray mottling, little gravel and sand.
	1.0	5	14			
		6				moist yellow silt and clay some gray and yellow laminae, then brownish yellow laminated silt and clay 11-15" then yellowish brown silt and clay
	3.0	7	24			
		8				~~Moist~~, yellowish brown clay and silt to 7 then laminated silt to 10" then 4" yellowish brown silt and clay then laminated silt to ~~16" then~~ ~~red~~ yellowish brown clay and silt
	3.0	9	26			
		10				Moist yellowish brown silt, some rock fragment to 3" then yellowish brown silt and clay to 17" then laminated silt to 34 then yellowish brown clay and ~~silt~~ wHR 6/19/12
	2.25	11	34			
		12				Moist, stiff ~~reddish~~ yellowish brown clay some silt, slightly plastic to 14, then yellowish brown silt some clay to 29, then reddish brown silt and clay
	1.5	13	34			
		14				wet, light yellowish brown silt, some clay Sand and gravel to 10" then moist yellowish brown silt
		15	34			
		16				Same as above to 20, then moist yellowish brown silt, some sand and gravel little clay
		17	32			
		18				Moist yellowish brown silt, some sand, little gravel to [illegible], then moist strong brown silt, sand and gravel
		19	42			
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 44
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: sunny 80s

Drilling Date: 6/19/12
Project No: WBS 03.01.01.02.01
Drillers: MEW Drilling
Rig: Geoprobe 7730 DPT

Sheet 2 **of** 5
Date Started: 6/19/12 0828
Date Ended: 6/19/12 1358
Total Depth: 83 ft

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	54			15" moist yellowish brown silt, some clay little sand and gravel then strong brown dry crumbly silt sand and gravelly to 30" then yellowish brown silt, some clay little sand
		22				
		23	54			Moist brownish yellow silt, little clay sand and gravel to 18 then moist yellowish brown silt, some clay, trace gravel
		24				
		25	54			Moist, brownish yellow silt, some sand little clay trace gravel, some gray mottling
		26				
		27	44			Dry, strong brown silt sand and gravel to 26, then slightly moist brownish yellow and yellow mottled silt some clay little gravel and sand,
		28				
	3.25	29	42			slightly moist, brownish yellowish silt, little clay and sand trace gravel
		30				
		31	54			slightly moist, crumbly brownish yellow silt some sand little gravel to 44 then silt, sand and gravel.
		32				
	3.5	33	54			brownish yellowish silt, some sand little gravel ~~Same as~~ WR 6/19/12 above, ~~sa~~ small cobble seam between 6-8"
		34				
		35	52			brownish yellow silt, some sand little gravel little strong brown mottling.
		36				
		37	46			Dry reddish yellow 7.5YR 6/6 silt sand and gravel to 24" then slightly moist silt, some sand trace clay
		38				
		39	52			Dry reddish yellow silt, some sand little gravel to 46, becoming some gravel at bottom.
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT 44	**Drilling Date:** 6/18/12	**Sheet** 3 **of** 5	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/18/12	0828
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/19/12	1558
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 83 ft	
Weather: Partly Cloudy			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	54			Dry crumbly silt, some sand little gravel to 12" then strong brown silt sand and gravel to 24" then dry crumbly silt some sand little gravel to 30 then silt, sand and gravel
		42				
	3.5	43	42			Same as above to 10" then reddish yellow silt, some clay little sand slightly moist.
		44				
		45	42			slightly moist brownish yellow silt, some clay grading into silt some sand little clay and gravel to 26, then silt sand and gravel 36 then strong brown silt, some
		46				
		47	41			Moist to damp strong brown silt, some sand and gravel to 26 then silt, some sand, trace gravel.
		48				
		49	37			Moist to damp strong brown and grey mottled silt, some clay little sand.
		50				
		51	54			Moist to damp gray some strong brown mottling silt, some clay little sand. slightly plastic
		52				
		53	43			Damp gray, little strong brown mottling silt, some clay and sand grading into reddish yellow silt, sand and gravel,
		54				
		55	52			Dry, light brown crumbly silt sand and gravel to 28, then yellowish brown and gray mottled silt to 48 then silt sand and gravel
		56				
		57	46		WHR 6/19/12	~~Moist~~ Dry, crumbly gray and brown mottled silt sand and gravel
		58				
		59	41			Damp gray and some brown mottled silt, some sand little gravel, becoming brown with little gray mottling at 12"
		60				

FBP Soil Boring Log

Soil Boring No. BKG-DPT44	**Drilling Date:** 6/19/12	**Sheet** 4 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/19/12 0858
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/19/12 1558
Logged By: William Reid	**Rig:** Geoprobe 7730 DT	**Total Depth:** 83 FT
Weather: Partly Cloudy 90s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		61	44			Damp, ~~gray~~ WHR 6/19/12 pale brown silt, little sand and gravel.
		62				Damp to wet pale brown 10YR 6/3 silt, ~~little~~ some sand, trace gravel
		63	48		WHR 6/19/12	
		64			∇M	Wet, silt, some sand, gray 10YR 6/1
		65	48			
		66	22			wet gray silt and sand to 67' ~~dense~~ refusal WHR 6/19/12
Split spooning →		67				gray-green (light greenish gray GLEY1 7/1) sand stone (fragment damp) sand some gray silt and
		68	17"			
		69				Damp to wet gray silt, some sand little gravel, not Gallia.
		70	24			
		71				Same as above
		72	24			
		73				Same as above
		74	24			
		75				Same as above
		76	24			
		77				Same as above to 16", then gray silt sand and gravel.
		78	24			
		79			∇G	wet, gray silt sand and gravel
		80	16			

FBP Soil Boring Log

Soil Boring No. BKGDPT 44
Project: Soil Background
Well No: NA
Logged By: William Reid
Weather: Sunny 90's

Drilling Date: 6/19/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7-30

Sheet 5 **of** 5
Date Started: 6/19/12 0858
Date Ended: 6/19/12 1558
Total Depth: 83 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		81				WHR 6/19/12 Dry, Gray silt, sand, ~~and~~ gravel, ~~some~~ and rock fragments. WHR 6/19/12 shale at 82.5' WHR 6/19/12
		82	24			
		83				
		84				END OF BORING
		85				
		86				
		87				
		88				
		89				
		90				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 45	**Drilling Date:** 6/15/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/15/12 0950
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/15/12 1054
Logged By: William Reed	**Rig:** Geoprobe 7730DPT	**Total Depth:** 28 FT
Weather: Sunny 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	4.0	1	22			2" Top soil then 5" dry yellowish brown silt, some sand overlying slightly moist brownish yellow silt, some clay little sand
		2				
	2.5	3	25			slightly moist yellowish brown silt and clay trace sand and gravel to 12", ~~grading~~ then 1" gravel seam unconformably over yellowish brown clay some silt, slightly plastic WHR 6/15/12
		4				
		5	24			Slightly moist brownish yellow and gray silt and clay some gravel and shale fragments beginning at 12", ~~some~~ little basal parting; WHR 6/15/12 WHR 6/15/12
		6				
		7	28			Dry crumbly ~~yet~~ brownish yellow weathered shale, with basal partings
		8				
		9	30			4" rock fragment unconformably over brownish yellow weathered shale
		10				
		11	36			Same as above
		12				same
		13	37			
		14				
		15	52			Dry crumbly, powdery silt, ~~same~~ little gravel no basal partings grading into weathered shale with basal partings. WHR 6/15/12
		16				
		17	44			Dry, powdery weathered shale brownish yellow
		18				
		19	46			same as above
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 45
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Sunny, 70s
Drilling Date: 6/15/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT
Sheet 2 **of** 2
Date Started: 6/15/12 0956
Date Ended: 6/15/12 1054
Total Depth: 28 FT

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	50			Same - Dry powdery weathered shale, pulverized by hammer
		22				
		23	54			
		24				
		25	52			same as above, may be fractured as ~~red~~ WHR 6/15/12 yellowish red seam with ~~sa~~ small gravel coating ~~yellowish brown seal wea~~ WHR 6/15/12 brownish yellow weathered shale,
		26				
		27	52			Same as above
		28				
		29				Refusal
		30				
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT46	**Drilling Date:** 6/20/12	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/20/12 1324
Well No: NA	**Drillers:** ME W Drilling	**Date Ended:** 6/20/12 1520
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 16.5'
Weather: Partly Cloudy 90		

1530 DTW 1.55 ft

wHR 6/20/12

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	21			1" Topsoil, 10" dry strong brown silt, some sand little gravel and clay then dry, dusty, silt, little sand.
		2				
		3	24			8" dry | crumbly silt, some sand and gravel ~~then~~ ~~yell~~ brownish yellow and gray mottled silt, some sand little gravel trace clay. (wHR 6/20/12)
		4				
		5	26			Slightly moist brownish yellow silt, some clay and gravel little sand to 16" then dry crumbly silt and gravel some clay and sand strong brown,
		6				
		7	30			Dry strong brown silt, ~~grand~~ gravel, some sand little clay to 6" ~~then~~, gray and brownish yellow silt and clay, some basal parting (wHR 6/20/12)
		8				
	∇	9	14			wet (creek level) "weathered shale," soft can be reformed, does have basal parting overlying 6" of brownish yellow sand and silt, little clay.
		10				
		11	42			Dry gray clay, with basal partings last 12", some brownish yellow mottling
		12				
		13				Dry gray clay/weathered shale - initial refusal @ 13' recharge hammer
		14	24			weathered shale
		15				
		16	24			
		17				TERMINATION
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 47		**Drilling Date:** 6/20/12 WIR 6/20/12		**Sheet** 1 **of** 3	
Project: Soil Background		**Project No: WBS 03.01.01.02.01**		**Date Started:** 6/20/12 0913	
Well No: NA		**Drillers:** MEW Drilling		**Date Ended:** 6/20/12 1105	
Logged By: William Reid		**Rig:** Geoprobe 7730 DPT		**Total Depth:** 45ft	
Weather: Sunny 80s					

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	12			1''Topsoil, then dry crumbly silt, some sand and gravel, strong brown 7.5YR 5/6
		2				10''
	2.0	3	24			Dry crumbly yellowish red 5YR 4/6 silt sand and gravel, ~~grading~~ unconformably over ~~to~~ moist gray silt, some clay WIR 6/20/12 WIR 6/20/12 little yellowish brown mottling
		4				
	545	5	24			Dry dense strong brown silt, sand, gravel and clay, some yellowish red mottling.
		6				
	>4.5	7	24			Moist, dense brownish yellow silt and clay, little sand, to
		8				17'' then dense yellowish red and brownish yellow silt and clay, little gravel
	>4.5	9	26			12'' yellowish red and brownish yellow silt and clay some gravel grading into silt and clay, stiff
		10				Dense yellowish red and brownish yellow mottled silt and clay, little gravel and sand.
	4.0	11	34			
		12				
	3.5	13	36			Moist, crumbly brownish yellow silt and clay little gravel, little yellowish red motting
switch tooling →		14				
	3.0	15	48		WIR 6/20/12	Moist crumbly brownish yellow silt and clay little gravel and sand to 36, then ~~becom~~ grades into silt and clay, some gravel, little sand.
		16				
		17	44			24'' Moist crumbly brownish yellow silt and clay, little gravel, and sand then dry crumbly yellowish red 5YR 5/6 silt, sand and gravel.
		18				
		19	46			slightly moist reddish yellow 7.5YR 6/6 silt, some clay, gravel and sand.
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT47	**Drilling Date:** 6/20/12	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/20/12 0913
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/20/12 1105
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 45 ft
Weather: Sunny, 80s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	60			Same as above to 39" then moist, ~~yellowis~~ WHR 6/20/12 brownish yellow 10YR 6/6 silt and clay little gravel
		22				
		23	53			WHR 6/20/12 Slightly moist, silt, some sand and gravel little clay brownish yellow, grading into (at 36) silt, some clay and sand, little gravel, moist some yellowish red mottling
		24				
		25	45			27" Slightly moist yellowish brown silt sand and gravel unconformably over moist, ~~yellow~~ brownish WHR 6/20/12 yellow silt and clay little sand and gravel
		26				
		27	50		WHR 6/20/12	~~Same as above.~~ Moist, brownish yellow Silt and clay, some sand, little gravel and little gray mottling.
		28				
		29	49			Moist ~~brown~~ WHR 6/20/12 yellowish brown silt and clay little sand and gravel to 27 then gray and yellowish red mottled silt and clay, little gravel and sand.
		30				
		31	60			Gray and yellowish red mottled silt and Clay little gravel, grad into silt and clay some gravel. little sand @ 42"
		32				
		33	57			Moist, yellowish brown 10YR 5/4, silt and clay little gravel and sand.
		34				
		35	54			moist yellowish brown and gray mottled
		36				
		37	54			Dry crumbly, yellowish brown silt and clay, little gravel and sand to 48, then silt, clay, some gravel and sand
		38				
		39	48			slightly moist, crumbly silt, sand and gravel, little clay
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT47	**Drilling Date:** 6/20/12	**Sheet** 3 **of** 3
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/20/12 0913
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/20/12 1105
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 45ft
Weather: Sunny, 80s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	50			Dry, crumbly, strong brown silt, sand gravel, little clay.
		42				
		43	48			weathered shale
		44				
		45	28			
						Refusal
		46				
		47				
		48				
		49				
		50				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 48	**Drilling Date:** 6/6/2012	**Sheet** 1 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/6/12 1454
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/6/12 1926
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 50 ft
Weather: Cloudy 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.5	1	18			Slightly moist, strong brown 7.5 YR 5/6 silt, some sand and gravel crumbly
		2				
		3	21			8" Moist reddish yellow, 7.5 YR 6/4, silt, some clay ~~little~~ wHR 6/6/12 and gravel, little sand, unconformably over dry crumbly strong brown silt, sand and gravel
		4				
		5	28			3" dry crumbly silt ~~strong~~, sand & gravel unconformably over 4" moist strong brown silt, some clay little sand then moist silt, sand, and gravel, little clay
		6				
		7	29			slightly moist silt sand and gravel, little clay strong brown 7.5 YR 5/6, some reddish yellow 7.5 YR 7/6 mottling
		8				
	3.75	9	28			same as above down to 12" then slightly moist strong brown silt, some clay little sand, stiff, little gray 7.5 YR 6/1 mottling
		10				
	3.25	11	42			stiff brownish yellow 10YR 5/6 silt, some sand and gravel, little clay to 29 then slightly moist silt, some clay little sand, some gray mottling (10 YR 6/1)
		12				
	2.0	13	46			Moist yellowish brown 10YR 6/8 ~~and gray~~ wHR 6/6/12 silt and clay little gravel and sand some gray mottling, slightly plastic
		14				
		15	45			Moist yellowish red 5YR 4/6 silt and clay some gravel little sand some yellowish brown 10YR 5/6 mottling to 34" then silt, some gravel sand and clay strong brown 7.5 YR 5/6
		16				
		17	38		wHR 6/6/12	~~Moi~~ dry crumbly yellowish red 5YR 5/6 silt sand and gravel overlying pale brown 10YR 6/3 silt sand and gravel, some cobbles
		18				
	2.25	19	41			Slightly moist silt and clay, some gravel, little sand brownish yellow 10YR 6/6 little gray mottling grading into moist silt and clay, little sand and gravel.
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 48
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Cloudy, Shower 70°

Drilling Date: 6/6/12
Project No: WBS 03.01.01.02.01
Drillers: MEW Drilling
Rig: Geoprobe 7730 DPT

Sheet 2 **of** 3
Date Started: 6/6/12 1953
Date Ended: 6/6/12 1926
Total Depth: 50 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.0	21	41			Moist reddish yellow 7.5YR 6/6 silt and clay some gravel little sand ~~little~~ little with yellow mottling 10 YR 7/6 slightly plastic 6/6/12
		22				6" Moist reddis yellow silt and clay little gravel unconformably over 14" of strong brown silt sand and gravel then yellowish brown silt some clay, and to 34 then with some gravel little sand, 7.5 YR 5/8
		23	43			
		24				
	3.5	25	48			Moist, strong brown silt and clay some gravel little sand some yellow motting 10 YR 7/6
		26				
	3.25	27	56			Same as above to 48" then moist reddish yellow silt and clay little gravel trace sand.
		28				
	4.0	29	54			Stiff, moist reddish yellow clay, same silt little to some gravel, trace yellow mottling crumbly
		30				
	3.5	31	54			Moist reddish yellow silt and clay, grading into silt and clay with 6/6/12 some gravel between 12 and 30 ~~then~~ silt and clay little to trace gravel, ~~some~~ little gray mottling
		32				
		33	48			slightly moist with 6/6/12 ~~yell~~ reddish yellow silt some clay some gravel little clay, coarser gravel at 36" trace cobbles
		34				
		35	54			slightly moist at top, dry at 40" reddish yellow silt some clay little sand and gravel, crumbly some gravel and a rock 48"
		36				
		37	44		∇M	Gallia-like? wet silt, sand and gravel, some rock fragments, to 28 then damp silt some sand and gravel.
		38				
Switch to auger @1655		39	24			Dry hard, silt sand and gravel, some cobbles (rock fragments) strong brown 7.5 YR 5/ with yellow sandstone fragments. Gallia?
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 48
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly Cloudy 70s

Drilling Date: 6/6/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 3 **of** 3
Date Started: 6/6/12 1453
Date Ended: 6/6/12 1926
Total Depth: 50 ft

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	>4.5	41	24			Dry hard silt and clay brown with little gravel and sand Gallia?
		42				
	>4.5	43	24			Slightly moist hard, clay silt, rock sand and gravel, strong brown to 1 foot, then reddish brown 5YR 5/4 Gallia?
		44				
	>4.5	45	24			Same as above portions look till-like
		46				
	>4.5	47	24			Hard grayish brown 10YR 5/2 to brown 10YR 5/3 clay, gravel, some cobbles silt and sand
		48				
		49	24			~~weathered gray shale~~ WTR 6/6/12 Hard grayish brown clay silt and gravel, little sand
		50				weathered gray shale at 50'
		11				END OF BORING
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT49	**Drilling Date:** 5/30/12	**Sheet** 1 **of** 4
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 71.5 / 78 6/8/12
Weather: Partly Cloudy 80		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1 2	18		wHR 5/30/12	~~Mo~~ Slightly moist yellowish brown silt, some clay and gravel, some oxidation staining crumbly 10YR 5/8
		3 4	24			Moist yellowish brown silt, some clay and gravel to 12" then moist yellowish brown silt and clay, stiff, slightly plastic
	2.0	5 6	24			Moist strong brown 7.5YR 5/6 clay, some silt trace sand, slightly plastic
		7 8	36		wHR 5/30/12	~~Mo~~ same as above entire length.
		9 10	42			Same as above
	1.0	11 12	39			Same as above, 2" sand and silt seam at 26-28"
		13 14	46		wHR 5/30/12	Moist, stiff silt and clay yellowish brown 10YR 5/6 ~~silt and clay~~ with some yellow 10YR 7/6 laminae. Silt content increasing the last 12"
	3.0	15 16	50			Moist slightly stiff, silt and clay ~~some~~ little wHR 5/30/12 rock fragments, some organics, light brown 7.5YR 6/3 with some yellow ~~mottling~~ laminae. wHR 5/30/12
		17 18	52			Same as above.
	4.0	19 20	56			laminated minford silt and clay, yellowish brown 10YR 5/6 with yellow laminae 10YR 7/6 trace rock fragments.

FBP Soil Boring Log

Soil Boring No. BKGDPT49	**Drilling Date:**	**Sheet** 2 **of** 4
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 71.5/78 6/8/12
Weather: Partly Cloudy breezy 80		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	>4.75	21 22	52			Slightly moist strong brown silt, some clay and sand little rock fragments, crumbly
		23 24	46			Moist, stiff strong brown and yellow mottled silt and clay little sand and fine gravel crumbly
	3.5	25 26	58			Slightly moist, light brown and some strong brown mottling, silt, some clay, little sand and fine gravel, trace rock fragments
	2.5	27 28	58"			Slightly moist light brown and strong brown mottling silt, some sand and gravel little clay, unconformably over Strong brown and gray 7.5 YR 7/1 silt and clay 12-42, grading back to silt, some sand and gravel
WHR 5/30/12	3.0 ~~2.5~~	29 30	58			Strong brown and light brown mottled silt, some sand and gravel little clay, slightly moist crumbly
		31 32	56			Slightly moist, brownish yellow silt, some sand and gravel, little clay to 26, grading into strong brown silt, some sand and yellow 10YR 7/6 mottling to 40 then silt, some sand and gravel
		33 34	58			Moist silt, some sand and gravel to 10" then strong brown silt, some ~~yel~~ clay and yellow mottling then silt, some sand and gravel.
	3.5	35 36	56			Same as above down to 36" then grading into stiff moist strong brown silt and clay, stiff slightly plastic.
	4.5	37 38	59			Slightly moist ~~same~~ WHR 5/30/12 silt, some clay and sand, little gravel to 28 becoming stiff silt and clay little sand and gravel, crumbly.
	4.0	39 40	59			Slightly moist, reddish yellow 7.5YR6/8 silt and clay little sand, 1" sand seam @ 24" grading into silt, some sand and gravel, some oxidation staining to 48 then dry crumbly silt and clay

FBP Soil Boring Log

Soil Boring No. BKGDPT49	**Drilling Date:** 5/30/12	**Sheet** 3 **of** 4
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12
Logged By: William Reid	**Rig:** Geoprobe 7730 DT	**Total Depth:** ~~71.5~~ 78 6/8/12
Weather:		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	56		WHR 5/30/12	Dry, crumbly silt, some clay, little sand and gravel, reddish yellow 7.5YR 6/6, becoming ~~[illegible]~~ silt, little clay and gravel at 36, rock fragment and gravel at bottom 2"
		42				
		43	NR (36)			sample tube failed, sample interval retrieved from hole after rods pulled. Appears strong brown 7.5 YR 5/6 silt and clay, some sand and ~~at sample~~ WHR 5/30/12 ~~tube catcher~~ gravel, crumbly 14" grading into Dry crumbly silt and clay, stiff to 36"
		44			WHR 5/30/12	
	2.75	45	48			Moist reddesh yellow silt, some clay trace gravel trace yellow motting. 10 YR 7/6 7.5 YR 5/6 WHR 5/30/12
		46				
	2.0	47	56			36" of moist ~~reddish~~ Strong brown ~~10 YR~~ 7.5 YR 5/6, silt and clay, slightly plastic, grading into gray 7.5 YR 6/1 silt and clay some ~~red~~ Strong brown motting.
		48				
	2.75	49	56			Moist gray 7.5 YR 6/1 silt and clay trace gravel and sand, some reddish yellow motting 7.5 YR 6/6
		50				
	4.0	51	56			Moist, stift silt and clay light brown 7.5 YR 6/3 WHR 5/30/12 and strong brown 7.5YR 5/6 mottled, ~~grad~~ at 24" grading into silt, some clay and gravel little sand to bottom.
		52				
	4.0	53	56			Stift, slightly moist silt and clay, gray 7.5 YR 6/1 and brown 7.5 YR 5/4 mottled.
		54				
	3.0	55	56			Stiff, slightly moist silt and clay gray 7.5 YR 6/1 some brown 7.5 YR 5/4 mottling, ~~softer at bottom~~ WHR 5/30/12
		56				
		57	56			Same as above
		58				
	1.75	59	56			Same as above, softer at bottom.
		60				

FBP Soil Boring Log

Soil Boring No. BKG DPT 49	**Drilling Date:** 5/30/12	**Sheet** 4 **of** 4
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12 6/8/12 0845
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12 6/8/12 1040
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 71.5 / 78 6/8/12
Weather: Partly Cloudy 70s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.75	61	56			Moist, gray 7.5 YR 6/1 silt and clay, some brown mottling top 10," then all gray to depth. plastic
		62				
	2.5	63	56			Dark gray 2.5 Y 5/1 silt and clay, little sand, crumbly
		64				Moist gray silt, some clay, little sand
drove 64-65	2.0	65	32			
	1.5	66	55"			Same as above
		67				Same as above
	1.5	68	56			
		69				
▽		70	56		▽	same as above to 46," then wet sand to 52, then wet ~~grayish~~ and brown sand, silt and gravel, wet, gravel brown, silt and sand gray
		71	8			8" wet gray silt, sand and gravel - refusal END OF BORING / Resume 6/8/12
		72				5" fluff, moist crumbly silt sand and gravel little cobbles, brownish yellow and gray mottled
auger drilling resumed 6/8/12 @ 0834		73	19"			
		74				
		75	18		WHR 6/8/12	brownish yellow silt sand and gravel, some cobbles, ~~some gravel~~. cobbles are a greenish gray Gley 2 6/1 sandstone, moist.
		76				Brownish yellow silt, sand & gravel, some cobbles rods were wet 15' of H_2O on rods.
		77	22			
		78				Gray shale in split-spoon shoe @ 78' END OF BORING
		79				
		80				

FBP Soil Boring Log

Soil Boring No. BKGDPT 50	**Drilling Date:** 6/4/12	**Sheet** 1 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/4/12 1553
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/5/12 1542
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 84 ft
Weather: Partly Cloudy 75 F		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.75	1	23			Dry Topsoil 2" then light brown silt, little clay and sand to 3" then ~~yellowish~~ brownish yellow silt, some sand and clay and rock/gravel WHR 6/5/12
		2				
	3.75	3	26			Moist, stiff plastic, brownish yellow silt and clay, little gravel trace sand.
		4				
	>4.75	5	24			Moist, stiff, reddish yellow 7.5 YR 6/6 silt and clay, slightly plastic,
		6				
	2.25	7	25			slightly moist, reddish yellow silt and clay to 8" becoming laminated silt and clay with thin yellow 10 YR 7/6 laminate, gravel seam at 14"-15"
		8				
		9	32			Same as above, yellow silt laminae ~~little~~ are slightly thicker WHR 6/5/12
		10				
	2.75	11	27		WHR 6/5/12	same as above to 8" ~~then~~ 1" reddish brown 5 YR 4/4 gravel lens then back into to WHR 6/5/12 ~~yellowish~~ brownish yellow and yellow laminae yellow laminae are thin silt laminae. 10 YR 6/6 and 10 YR 7/6
		12				
	1.5	13	36			Same as above to 30", then soft, damp silt, some clay and gravel, little rock fragments and cobbles, brownish yellow 10 YR 6/6
		14				
	2.25	15	29			slightly moist reddish yellow silt some clay and sand to 5" unconformably over strong brown 7.5 YR 6/6 silt, sand and gravel, to 16" then light brown 7.5 YR 6/3 silt, some clay ~~16~~ 26 then gallia-like silt sand and gravel WHR 6/4/12
		16				
	3.25	17	36			Moist brownish yellow 10 YR 6/8 silt, some clay, little gravel to 24" becoming yellowish red, little sand and gravel to bottom.
		18	~~3~~			
		19	42		WHR 6/5/12	Moist ~~brownish~~ yellowish red 5 YR 5/8 silt and clay, some gravel ~~beco~~ to 32", becoming strong brown silt sand and gravel, gallia-like dry. WHR 6/4/12
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 50	**Drilling Date:** 6/4/2012	**Sheet** 2 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/4/2012 1553
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/5/2012 1542
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 84 ft

Weather: Partly cloudy 70s

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.25	21	55			Slightly Moist strong brown silt, some sand and gravel little clay to 18" then strong brown silt, some clay little sand and gravel to 30, then yellowish brown 10YR 5/8 silt, some sand and gravel.
		22				
	2.5	23	55			Slightly moist silt and clay, little gravel and sand strong brown 7.5YR 5/8, ~~some~~ little gray motting 7.5YR 6/1 then strong brown silt sand and gravel from 42 to bottom gallia-like WHR 6/4/12
		24				
	2.25	25	52			Dry strong brown silt, sand and gravel to 14" then reddish yellow 5YR 4/6 and some gray 5YR 6/1 mottledg, silt and clay, trace gravel.
		26				
	3.5	27	48			Moist, strong brown and gray silt and clay little sand and gravel to 30 then strong brown silt sand and gravel, dry
		28				
	2.25	29	52			18" of slightly moist reddesh yellow and yellow mottled silt and clay grading into yellowish red silt, some clay to 34 ~~then~~ then strong brown silt and clay to bottom. WHR 6/4/2012
		30				
	2.25	31	55			same as above, silt and Gravel seam ~~between~~ at '8 and 26" WHR 6/4/12
		32				
	1.5	33	56			18" of moist yellowish brown silt and clay, unconformably over Strong brown, silt, sand and gravel (gallia-like) to 36" then ~~reddish~~ yellowish red and gray mottled silt, ~~and~~ some clay, damp WHR 6/5/12 WHR 6/5/12
		34				
	2.5	35	50			Moist yellowish red ~~[illegible]~~ silt and clay, some gray motting little gravel trace sand WHR 6/4/12.
		36				
	3.25	37	52			Same as above
		38				
		39	54			Moist yellowish red silt and clay, little sand to 14" then silt, ~~little~~ some sand, little gravel and clay to 30, then silt and clay little gravel and sand to bottom. WHR 6/4/12
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 50	**Drilling Date:**	**Sheet** 3 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/14/2012 1553
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/15/2012 1542
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 84 ft
Weather: Partly Cloudy 70s		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.0	41	55			Moist, yellowish brown silt and clay, little gravel, trace sand, crumbly.
		42				same as above
	3.0	43	55			
		44				Same as above, silt clay and gravel Seam between 14 and 22."
	3.0	45	55			
		46				Moist strong brown silt, some clay, little sand and gravel, slightly moist crumbly 10YR 6/4
	3.0	47	55			
		48				Moist, brownish yellow, silt and clay little sand, trace gravel, crumbly.
	3.25	49	48 WR 6/14/12			
		50				Moist, light brown silt and clay, some red oxidation staining, trace gravel, plastic
	3.0	51	55			
		52				Same as above, stiffer.
	4.5	53	55			
		54				Same as above
	2.25	55	55			
		56				Moist, brownish yellow silt and clay, trace gravel and sand, Stiff.
	4.5	57	55			
		58				same as above, little gravel, trace sand
	3.5	59	54			
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT50	**Drilling Date:** 6/4/12	**Sheet** 2 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/4/12 0853
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/5/12 0842
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 84 ft
Weather: Partly Cloudy 70's 6/4 Partly Sunny 70s 6/5		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		61	54			Dry crumbly yellowish brown and gray mottled silt and clay, evidence of some basal parting
		62				same as above.
		63	54			
		64				
	4.0	65	55			same as above
		66			wHR 6/5/12	~~Dry~~ slightly moist ~~Moist~~, stiff gray clay, some 10 YR 5/1 gradind into yellowish brown 10 YR 5/6 and gray clay and silt.
	3.5	67	55			
		68				same as above to 24" then gray silt, little clay and sand crumbly
		69	55			
		70				Moist, gray silt, little clay and sand to 30" then damp gray sand, little silt to bottom
		71	34			
		72				Damp, gray sand little silt to 32" then wet sand little silt 7.5YR 6/1
	▽ 6/4	73	51		▽	
		74				wet gray sand, little silt, wet
		75	55			
	End 6/4 Start 6/5	76				Same as above.
		77	55			
		78				wet, gray sand, trace gravel, to 29" then wet gray silt, sand and gravel, Gallia?
		79	31			
		80			▽	

FBP Soil Boring Log

Soil Boring No. BKG DPT 50	**Drilling Date:** 6/5/2012	**Sheet** 5 **of** 5
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/4/2012 1553
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/5/2012 1542
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 84 ft
Weather: Cloudy - to Partly Cloudy 60's to 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
			9"			wet, reddish gray silt sand and gravel 5 YR 5/2
Drove 64' switching to augers		81	18	SS	wtr 6/5/12	A40 3" moist reddish yellow silt some sand, unconformably over gray 7.5 YR 5/1 silt and bluish gray sandstone fragment GLEY2 6/1
	wtr 6/5/12	82				
		83	24	SS		Moist reddish yellow silt, sand and gravel, some cobbles
		84				83.5' Weathered gray shale END OF BORING
		85				
		86				
		87				
		78				
		89				
		90				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 51
Drilling Date: 5/31/12
Sheet 1 **of** 3
Project: SOIL BACKGROUND
Project No: WBS 03.01.01.02.01
Date Started: 5/31/12 1320
Well No: NA
Drillers: M&W Drilling
Date Ended: 5/31/12 1500
Logged By: William Reid
Rig: Geoprobe 7730 DPT
Total Depth: 48'
Weather: Partly Cloudy 80

1540 Depth to H2O 30.06
1610 Depth to H2O 30.55

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.0	1 2	17			2" Topsoil, then slightly moist silt, some sand little clay, brown 10YR 5/3
	3.0	3 4	17			Moist, stiffer silt, some clay and gravel to 12" then silt and clay, trace gravel, brown 10YR 5/3
	>4.75	5 6	24			Moist, yellowish brown silt and clay to 12" then zone of rock fragment then laminated clay, some silt yellowish brown and yellow 10YR 7/6
	4.0	7 8	24			moist, stiff, yellowish brown and yellow laminated clay, some silt to 11" then 4" yellowish brown sand and rock fragments then ~~yellows~~ brownish yellow silt and clay some sand. WHR 5/31/12
	4.5	9 10	24			stiff yellowish brown and brownish yellow, Slightly moist silt and clay, ~~little~~ some gravel and little sand. crumbly WHR 5/31/12
	2.5	11 12	34			Moist yellowish brown 10YR 5/8 silt and clay Some gravel, little sand, some red oxidation staining
	3.25	13 14	36			slightly moist yellowish red 5YR 4/6 with yellowish brown mottling 10YR 6/6 silt, sand and gravel, looks like Gallia (but not)
	3.5	15 16	36			Slightly moist stiff brownish yellow 10YR 6/6 silt and clay some gravel, little sand, red oxidation staining.
	3.25	17 18	38			SAME AS ABOVE
	2.25	19 20	36			Slightly moist, not as stiff brownish yellow silt and clay, some sand, to bottom, WHR 5/31/12 @ 6" to 12" is a rock and gravel seam with silt and sand

FBP Soil Boring Log

Soil Boring No.	BKGDPT 51	**Drilling Date:**	5/31/12	**Sheet** 2 **of** 3	
Project:	Soil Background	**Project No: WBS 03.01.01.02.01**		**Date Started:**	5/31/2012 1320
Well No:	NA	**Drillers:**	MEW Drilling	**Date Ended:**	5/31/2012 1500
Logged By:	William Reed	**Rig:**	Geoprobe 7730	**Total Depth:**	48'
Weather:	Partly cloudy 80				

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.5	21	42			WITR 5/31/12 Moist, ~~b~~ brownish yellow silt, slightly and clay, little sand and gravel, ~~slightly~~ plastic some, red oxidation staining. WITR 5/31/12
		2				
	3.25	3	44			same as above to 24", then silt sand and gravel gallia-like sequence to 32 then back into moist silt ~~sand~~ and clay, ~~some~~ little sand brownish yellow with yellowish red pebbles. WITR 5/31/12
		4				
	1.75	5	45			slightly moist, soft, brownish yellow silt, some clay little sand, some red oxidation staining
		6				
	1.5	7	48			same as above, with yellowish red 5YR 5/8 oxidation staining last 18" of sample tube
		8				
	0.75	9	48			WITR 5/31/12 Moist, soft brownish yellow silt ~~sand~~ and sand with red oxidation staining grad into brownish yellow little staining to 18, then yellowish red 5YR 5/6 silt, some clay and little sand.
		30				
		31	54			Damp, yellowish red silt, little clay and sand, gravel at top,
		32				
		33	52			Damp yellowish red silt, some sand, little clay to 32" then silt and sand, little clay trace gravel
		34				
		35	48		▽	Damp to wet sand, some silt ~~trace clay~~ little gravel, trace clay WITR 5/31/12
		36				
		37	48			WITR 5/31/12 wet ~~brown~~ yellowish red sand some silt, to 14, then silt sand and gravel seam to 22 then wet sand, little gravel and silt. to bottom
		38				
		39	32			wet yellowish red, sand, little silt, rock fragment and gravel in a sand at 8-12" then coarse sand at bottom 4"
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT51
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly cloudy 80

Drilling Date: 5/31/2012
Project No: WBS 03.01.01.02.01
Drillers: M&W Drillers
Rig: Geoprobe 7730 DPt

Sheet 3 **of** 3
Date Started: 5/31/2012 1320
Date Ended: 5/31/2012 1500
Total Depth: 48 ft

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	44			Wet sand, yellowish red, to 32 then yellowish red silt, sand and gravel - Gallia.
		42				
		43	26			Wet sand and gravel to 18 then wet silt sand and gravel
		44				
		45	24			Wet sand and gravel
		46				
		47	26			Wet sand and gravel to "10" then witR 5/31/12 Moist silt sand and gravel to 18, then gray weathered shale yellowish red
		48				END OF BORING
		49				
		50				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT52	**Drilling Date:** 6/7/12	**Sheet** 1 **of** 1
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/7/12 0925
Well No: NA	**Drillers:** Mew Drilling	**Date Ended:** 6/7/12 1100
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 18 ft
Weather: Partly Cloudy 60s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						2" Topsoil wtt 6/7/12
		1	19			Moist ~~brow~~ yellowish brown silt, some sand little gravel to 13" then reddish brown 5YR 5/4 silt sand and gravel.
		2				
	2.75	3	30			Dry, reddish brown silt sand and gravel down to 2a, then brownish yellow silt and clay little gravel 10YR 6/6
		4				
		5	27			Moist brownish yellow silt and clay to 6" then brownish yellow silt, some clay, evidence of basal parting (probably due to geoprobe)
		6				
		7	36			Dry crumbly silt some clay, ~~yellow~~ brown ish ~~brown~~ yellow, wtt 6/7/12 two strong brown silt, sand and gravel seams at 8-10" and 24-25"
		8				
		9	36			same as above strong brown silt sand and gravel lens at 25-29"
		10				
		11	47			Dry crumbly silt, little clay ~~yellowish brown~~ brownish yellow wtt 6/7/12 10YR 6/6 unconformably over gray silt, little clay 10 YR 6/1, reddish brown silt sand and gravel to 26-32, silt, platy
		12				
		13	51			Dry crumbly silt, little clay and gravel gray 10 YR 6/1, almost fissle
		14				
		15	47			Dry crumbly silt little clay and gravel gray to 18 then reddish brown silt sand and gravel seam to 21, gray to 32, then yellowish brown 30 - 36 then gray to bottom.
		16				
		17	34 ~~31~~			Same as above, could only advance to 17', damp 2" brown damp silt seam at the bottom Cannot retrieve 17-18 sample sleeve stuck in sample to no gallia evidence
		18				Refusal weathered shale @ 18'
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT53	**Drilling Date:** 5/30/2012	**Sheet** 1 **of** 3
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12 0901
Well No: N/A	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12 1150
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 41 ft
Weather: Partly Cloudy 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.75	1 2	23			Moist brownish yellow silt, some clay to 15" becoming more clay rich to bottom and stiffer
	4.5	3 4	23			Moist ~~stiff~~ reddish yellow silt, some clay little sand 7.5 YR 6/6 unconformably over brownish yellow silt and clay, stiffer 10 YR 6/6
	2.0	5 6	24			Moist stiff brownish yellow (10 YR 6/6) silt and clay some organics to 12", then laminated yellowish red and reddish yellow clay, some silt for 10", then mottled at bottom. 5YR 5/6 and 5YR 6/6
	2.5	7 8	28			Moist, stiff clay, some silt plastic yellowish red and reddish yellow slightly laminated then mottled 10-19" ~~then~~ light brown silt and clay little rock frag 7.5 YR 6/4
	2.5	9 10	25			Moist light brown silt and clay, then 1½" "chert" nodule with accretion rings @5" then light brown silt and clay, some organics to 12", then 2-inch sand seam with chert fragments, then silt, grading into silt & clay
	3.75	11 12	25			stiff, moist light brown 7.5 YR 6/3 silt and clay, with brownish yellow silt, some clay, little rock seam between 13" and 18"
	4.0	13 14	26			Stiff moist light brown silt and clay some red oxidation staining between 8 and 13"
	3.5	15 16	26			Stiff, moist light brown silt and clay, some yellowish brown mottling 10 YR 5/6 from 17" to bottom
	4.0	17 18	25			stiff slightly moist reddish yellow 7.5 YR 6/8 silt, some clay, little sand. crumbly.
	4.0	19 20	28			same as above to 18" then, dry light brown 7.5 YR 6/3 and red 2.5 YR 5/6 mottled silt some sand, little round gravel dry crumbly.

FBP Soil Boring Log

Soil Boring No. BKGDPT53	**Drilling Date:** 5/30/12	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/30/12 0901
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/30/12 1150
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 41 ft
Weather:		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	15	21 22	34			Moist light brown 7.5 YR 6/3 silt, some sand, trace gravel to 5" then yellowish red silt 5YR 5/8 little sand and rock, sand and gravel seam between 18" and 24".
		23 24	29			Moist reddish yellow silt, some clay trace rock fragments to 18" then moist silt, some clay little rock fragments, yellow 10 YR 7/6 mottling last 4."
	1.25	25 26	39			Moist, soft silt, some clay little rock fragment and sand, clay content decreasing with depth yellowish brown 10 YR 5/6 with some yellow 10YR 7/6 mottling and iron oxidation staining at bottom.
		27 28	36			Moist yellowish brown silt, ~~some~~ WHR 5/30/12 clay little sand to 18" unconformably over yellowish brown silt sand and gravel to 30 ~~then~~ WHR 5/30/12 strong brown silt and clay with rock fragment in bottom.
		29 30	29			Moist to damp yellowish brown silt, some sand rock fragments, and gravel starting at 12" extending to 18" then yellowish brown silt, some sand and gravel to bottom.
		31 32	33			1ft of yellowish brown silt, some sand little clay overlying silt, sand and gravel — Gallia
		33 34	31			Damp strong brown 7.5YR 5/8 silt, sand, gravel some rock fragments to 24, then dense sand some gravel, little silt
			15			
change tooling →		35 36	29			Damp ~~reddish~~ WHR 5/30/12 strong brown 7.5 YR 5/6 silt sand and gravel grading into a sand, some silt WHR 5/30/12 little gravel at 18 to bottom
		37 38	18			Strong Brown silt, sand and gravel, some rock fragment
		39 40	36			Strong Brown 7.5 YR 5/6 silt sand and gravel, some rock fragments to 24"

FBP Soil Boring Log

Soil Boring No. BKGDPT53
Drilling Date: 5/30/12
Sheet 3 **of** 3
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 5/30/12 0901
Well No: NA
Drillers: M&W Drilling
Date Ended: 5/30/12 11:50
Logged By: William Reid
Rig: Geoprobe 7730 DPT
Total Depth: 41 ft
Weather:

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41				weathered Gray shale
		42				END OF BORING
		43				
		44				
		45				
		46				
		47				
		48				
		49				
		50				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 54	**Drilling Date:** 5/31/12	**Sheet** 1 **of** 3
Project: SOIL BACKGROUND	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/31/12 0904
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/31/12 1050
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 48
Weather: Partly Cloudy 66		

1130 Depth to H_2O 30.15
1530 27.90

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	17		WHR 5/31/12	~~Stop~~ 1" Topsoil, then slightly moist silt, some sand @ 13" then slightly moist silt, some clay little sand 7.5YR 6/8 reddish yellow
		2				
		3	27			Moist, brownish yellow silt, some clay crumbly some red oxidation staining, 10 YR 6/6
		4				
	2.5	5	26			18" Moist brownish yellow silt, some clay crumbly some red oxidation staining grading into soft, moist to damp silt, little clay and sand, ~~stiff~~ WHR 5/31/12 little oxidation staining
		6				
	1.75	7	28			Moist, soft brownish yellow silt, some clay and gravel, little sand and red oxidation staining becoming soft at bottom 2", damp.
		8				
	3.0	9	30			Moist, brownish yellow silt, some clay and gravel, gravel is yellowish Red 5YR 4/6, little sand.
		10				
	3.5	11	36			Moist brownish yellow silt, some clay and gravel to 12" Then reddish yellow 7.5YR 6/6 silt and clay stiff, little oxidation staining
		12				
	3.5	13	36			Moist light brown and reddish yellow mottled silt and clay, trace sand and gravel 7.5YR 6/3 and 7.5YR 6/6
		14				
	3.25	15	40			Moist, brownish yellow silt and clay, little sand, crumbly,
		16				
	1.5	17	42			Same as above, getting softer last 12"
		18				
	4.0	19	56			Soft moist, silt, some clay little sand to 28, getting stiffer silt an clay ~~some~~ little sand brownish yellow WHR 5/31/12
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 54	**Drilling Date:** 5/31/2012	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/31/12 0904
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/31/12 1050
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 48'
Weather: Partly Cloudy 68		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.0	21	45			Moist light brown and, brownish yellow mottled silt, some clay little sand and gravel to 20" then light brown 7.5 YR 6/3, little mottling, getting softer. ~~ma~~ WHR 5/31/12
		22				
		23	58			Same as above to 30" then Strong brown, slightly moist, silt, ~~some~~ little clay, sand and gravel, crumbly WHR 5/31/12
		24				
		25	48			Moist, strong brown silt, some sand to 30" then silt and sand, damp, some light brown mottling 7.5 YR 6/3
		26				
	1.75	27	39			Moist damp strong brown silt and sand; sand, silt, and gravel seam between 6 and 12";
		28				
	▽	29	36		▽	Moist, damp strong brown, silt, and sand trace clay wet at 29.5'
		30				
		31	54			Wet sand, some silt, yellow 10 YR 7/6 down to 48", then Strong brown, silt sand and gravel, ~~some sand~~ little rock fragments WHR 5/31/12
		32				
		33	48			Wet, sand
		34				
		35	42			some gravel
		36				
		37	44			little gravel
		38				
		39	50			some gravel
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 54
Drilling Date: 5/31/12
Sheet 3 of 3
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 5/31/12 0904
Well No: N/A
Drillers: MEW DRILLERS
Date Ended: 5/31/12 1050
Logged By: William Reid
Rig: Geoprobe 7730 DPT
Total Depth: 48
Weather: Partly cloudy 70

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	42			Wet strong brown, silt sand and gravel
		42				
		43	40			Same as above
		44				
		45	44			same as above
		46				
		47	22			Moist brown 7.5YR 5/4, silt, sand and gravel to 10" then gray weathered shale at 47.5'
		48				
		49				END OF BORING
		50				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 55	**Drilling Date:** 6/6/2012	**Sheet** 1 **of** 4
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/6/2012
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/7/2012
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 67
Weather: Partly Cloudy 60's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	23			2" topsoil, moist strong brown silt some sand little clay, crumbly.
		2				
		3	14			3" moist silt, some clay and gravel, little sand overlying strong brown 7.5 YR 5/6 silt, sand and gravel
		4				
	2.5	5	29			strong brown silt sand and gravel unconformably over reddish yellow silt, some ~~clay~~ WTR 6/6/12 clay, little sand grading into pale brown 10YR 6/3 silt, some clay, soft.
s v		6				
f v ~~f w~~		7	36		WTR 6/6/12	3" pale brown silt, some sand and gravel unconformab ~~grading~~ ~~into~~ WTR 6/6/12 unconformably over reddish yellow silt and clay 7.5 YR 6/6 to 28 ~~then~~ strong brown silt, sand, and gravel 7.5 YR 5/6 Gallia-like
		8				
		9	41			Dry strong brown silt sand and gravel Gallia-like sequence crumbly
		10				
		11	48			same as above
		12				
		13	43			same as above, finer gravel
		14				
		15	39			same as above, little clay in gallia-like ~~se~~ material between 20" and 28"
		16				
		17	37			Same
		18				
		19	41			Dry crumbly silt, sand and gravel to 9" then moist silt, some sand clay and gravel to 16, then Dry crumbly silt sand and gravel to 35 then silt some clay gravel and sand to 39, then moist clay little sand, all strong brown then silt, some
		20				

9-16
35-39

FBP Soil Boring Log

Soil Boring No. BKG DPT 55	**Drilling Date:** 6/6/12	**Sheet** 2 **of** 4
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/6/12 0925
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/7/12 1505
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 67'
Weather: Partly Cloudy, 70		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						7.5YR 6/6
		21	49			Moist, reddish yellow silt and clay little sand, some gray 7.5 YR 6/1 mottling to 44, then dry crumbly silt, some sand and gravel to bottom
13-24 38-	3.5	22 23	48			Dry crumbly silt sand and gravel to 13, then ~~m~~slightly moist silt some clay, little sand and gravel to 24, then dry crumbly silt sand and gravel to 38 then moist, stiff silt and clay little sand
0-7 25-32	2.75	24 25	43			Dry crumbly silt sand and gravel to 7" ~~then~~ slightly moist, ~~some~~ WTR 6/6/12 silt, some clay little sand to 25, then silt, some clay gravel and sand to 32, ~~then~~ slightly moist silt, some clay little sand
	2.75	26 27	44		WTR 6/6/12	~~moist~~ 32", Dry crumbly silt, some clay little gravel and sand then moist reddish yellow and gray mottles silt and clay, slightly plastic.
	2.25	28 29	48			Moist, Yellowish brown 10YR 5/8 silt, ~~some~~ and WTR 6/6/12 clay trace sand, slightly to medium plastic.
	3.25	30 31	54			Moist, same as above
	3.0	32 33	52			Moist yellowish brown silt and clay crumbly
	1.0	34 35	51			Moist yellowish brown silt and clay grading into soft gray 10YR 6/1 clay, some silt plastic
	2.5	36 37	46			Moist plastic, gray clay some silt, some brownish yellow mottling between 14 and 24" silt content increasing at becoming silt, some clay at 29" extending to 45" then gray silt to bottom.
	1.0	38 39 40	45			Moist to damp gray silt, little clay 1/4" sand seam at 8", clay content increasing at 31" becoming gray silt, some clay at 36" extending to bottom.

FBP Soil Boring Log

Soil Boring No. BKGDPT55	**Drilling Date:** 6/6/2012	**Sheet** 3 of 4	
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/6/12 0925	
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/7/12 1505	
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 67 ft	
Weather: Partly cloudy 70			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.0	41	46			Moist gray silt some clay extending to 20 becoming stiffer, clay content increasing, gray silt and clay at 25", plastic, trace brownish yellow mottling between 30 an 34.
		42				same as above, with WHR 6/6/12 ~~yello~~ brownish yellow mottling increasing to ~~some~~ little with WHR 6/6/12.
	20	43	50			
		44				same as above to 34" ~~some~~ with little gravel to 36". Then damp gray silt, ~~little~~ trace brownish yellow mottling WHR 6/6/12
	2.0	45	47			
		46				Moist, gray silt and clay trace sand, some brownish ~~yellow~~ mottling ~~to bottom~~ to 34" then little mottling
	2.5	47	51			
		48				very moist gray silt, little sand to 30, ~~then~~ moist gray silt, some clay little brownish yellow mottling
	1.75	49	36			
		50				Moist gray silt and clay, ~~st~~ plastic getting stiffer with depth, trace dark gray mottling between 42 and 50"
	0.75	51	55			
		52				Moist gray 10YR 5/1 silt, little to some clay ~~d~~ stiffer, but crumbly WHR 6/6/12
	3.75	53	44			
		54				Moist gray silt, little clay to 24 then wet gray silt, some sand
∇		55	39		∇	
		56				wet gray silt and sand, trace clay
		57	52			
		58				wet gray sand, some silt trace gravel
		59	44			
		60				

FBP Soil Boring Log

Soil Boring No. BKG-DPT 55	**Drilling Date:** 6/6/2012	**Sheet** 4 **of** 4	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/6/12	0925
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/7/12	15:05
Logged By: William Reed	**Rig:** Geoprobe 7730DPT	**Total Depth:** 67'	
Weather: Partly Cloudy 70			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						with 6/6/12
		61	24			Wet gray and Strong ~~yellowish~~ brown mottled silt, sand and gravel, some cobbles
		62				
		63	22			
6/7		64				8" Auger refusal 6/7 return with augers
		65	24			wet, strong brown silt sand and cobbles, some gravel
		66				then dry silt sand and gravel weathered gray shale
		67				
		68				
		69				
		70				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 56	**Drilling Date:** 6/4/2012	**Sheet** 1 **of** 3
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/4/2012 1248
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 6/4/2012 1434
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 58 FT
Weather: Partly Cloudy 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.5	1	23			4" Topsoil & manure, slightly moist brown 7.5YR 5/4 silt, little sand and clay then brownish yellow 10YR 6/6 silt, some clay trace sand.
		2				
	>4.5	3	23			Moist, stiff WHR 6/4/12 ~~yellowish~~ brownish yellow 10YR 6/6 silt, some clay little sand trace gravel, little oxidation staining.
		4				
	5.0	5	24			Moist stiff brownish yellow silt, some clay little sand and gravel to 12" then softer silt and clay trace sand.
		6				
	>4.5	7	22			Moist, silt, some clay little sand, becoming wet at 14-16", then, dry hard silt sand and gravel, gallia-like, strong brown 7.5YR 5/6
		8				
	4.5	9	26			10" of Gallia-like material dry, unconformably over slightly moist silt, some clay little sand, brownish yellow 10 YR 6/6 then strong brown silt and clay ~~Som~~ little gravel, stiff
		10				
	4.0	11	29		WHR 6/4/12	WHR 6/4/12 Dry, stiff silt, ~~some~~ and WHR 6/4/12 clay, WHR 6/4/12 rock fragments and sand between 4 and 8, ~~Be~~becoming moist stiff silt and clay crumbly to ~~20~~ 22" WHR 6/4/12 to bottom.
		12				
	2.5	13	32			dry, crumbly laminated silt, some clay almost shale-like light reddish brown 5YR 6/4 then slightly moist silt and clay, some rock fragments
		14				
	3.25	15	56			Moist, stiff yellowish red silt and clay, some yellow 10YR 7/6 laminae down to 20" then brownish yellow 10 YR 6/6 silt, then → to 24 silt and clay to bottom
		16				
	4.5	17	36			Moist brownish yellow silt and clay, trace gravel, becoming stiffer at 24" to bottom, some yellow mottling
		18				
		19	36			Slightly moist yellowish brown 10YR 5/8, some yellow mottling 10YR 7/6 silt, some clay, dry crumbly then moist silt and clay.
		20				

FBP Soil Boring Log

Soil Boring No. BKG DPT 56	**Drilling Date:** 6/14/2012	**Sheet** 2 **of** 3
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/14/2012 1248
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/14/2012 1434
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 58 ft
Weather: Partly Cloudy 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.25	21	50			slightly moist ~~yell~~ wR 6/14/12 brownish yellow 10YR 6/8 silt, some clay little sand. crumbly
		22				
	3.75	23	45			slight moist, brownish yellow silt, some clay little sand and gravel, crumbly
		24				
	3.25	25	48			same as above
		26				
	2.75	27	52			Slightly moist, yellowish brown silt, some clay trace sand, some gray mottling 10YR 6/1
		28				
	3.0	29	48			same as above.
		30				
	3.75	31	52			moist, yellowish brown silt and clay, stiff, some gray mottling little gravel.
		32				
	4.0	33	56			Moist, yellowish brown and gray mottled silt and clay, trace sand, stiff.
		34				
	1.75	35	52			Moist yellowish brown and gray mottled silt, some clay trace~~s~~ gravel and ~~stif~~ sand, soft
		36				
	2.0	37	54			Moist brownish~~es~~ yellow 10YR 6/8 silt, some clay little gravel to 48", then reddish yellow 5YR 5/4 and brownish yellow silt, some clay and sand.
		38				
	2.25	39	50			Moist, brownish yellow silt, some clay, little sand and gravel, some gray mottling
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 56
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Partly Cloudy breezy 70s
Drilling Date: 6/4/2012
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT
Sheet 3 **of** 3
Date Started: 6/4/2012 1248
Date Ended: 6/4/2012 1434
Total Depth: 58'

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	1.5	41	46			Moist, strong brown and light gray, mottled, 7.5YR 5/8 and 7.5YR 7/1 silt, some clay trace sand becoming reddish yellow 7.5 YR 6/6, little gray mottling silt, little sand, becoming damp bottom 8"
		42				
		43	48		▽	same as above to 14", grading into strong brown sand some silt, to 24, then wet at 36"
		44				
		45	54			Damp to wet sand, some silt, little clay strong brown ~~10Y~~ 7.5YR 5/8 WHR 6/4/12
		46				
		47	51			34" wet reddish yellow sand, little silt grading into damp sand some silt.
		48				
		49	51			Wet reddish yellow sand, some silt between 12 and 18" then sand ~~back~~ to 27, 2" silt and clay seam then back to sand to bottom. WHR 6/4/12
		50				
		51	56			wet, reddish-yellow sand and cobbles, trace gravel
		52				
		53	28			3" Wet sand grading into wet pea gravel
		54				
		55	26			Wet pea gravel to 24 then slightly moist silt, sand and gravel, ~~then wet~~ WHR 6/4/12
		56				
		57	25			wet silt, sand and cobbles (rock fragments) for ~~6"~~ 12" WHR 6/4/12 then weathered light yellowish brown 10YR 6/4 shale, then 4" later gray shale.
		58				END OF BORING
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT56R
Project: Soil Background
Well No: NA
Logged By: William Reed
Weather: Raining 70

Drilling Date: 6/11/12
Project No: WBS 03.01.01.02.01
Drillers: M&W Drilling
Rig: Geoprobe 7730 DPT

Sheet 1 **of** 3
Date Started: 6/11/12 1015
Date Ended: 6/11/12 1211
Total Depth: 58 ft

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22		WHR 6/11/12	2" TOP soil, dry, crumbly, silt, little sand ~~then~~ to 10" then slightly moist silt, some clay trace sand, 10YR 6/6 brownish yellow
		2				
	2.5	3	21			slightly moist, ~~pett~~ brownish yellow silt and clay trace sand some red oxidation staining
		4				
	2.25	5	25			slightly moist, brownish yellow silt and clay, little gravel, some yellowish Brown mottling 10YR 5/6
		6				
		7	29			10" slightly moist brownish yellow silt and clay, some yellowish brown mottling overlying unconformably dry yellowish brown 10 YR 5/8 silt, some clay, sand and gravel.
		8				
	>4.5	9	28			16" dry crumbly silt, some sand, gravel and clay unconformably over stiff yellowish brown clay some silt, little gray 10YR 6/6 mottling.
		10				
		11	33			Dry crumbly ~~a~~ brownish yellow silt, some clay trace sand to 12" then a stiff silt and clay yellowish brown unconformity Some thin yellow laminae (laminated Minford)
		12				
		13	35			4" laminated silt and clay grading into slightly moist silt ~~with and~~ some clay WHR 6/11/12 with thin moist silt and clay interbedded rock fragments clay laminae, little
		14				
	3.0	15	40			20" moist ~~red~~ WHR 6/11/12 yellowish brown silt and clay laminated then 8" dry crumbly brownish yellow silt some clay, then grading into moist silt and clay some red oxidation staining
		16				
	2.5	17	38			slightly moist silt and clay brownish yellow some yellowish brown mottling grading into slightly moist silt, some clay, little sand.
		18				
	~~48~~	19	48			18" moist silt some clay brownish yellow 10YR 6/6 some yellowish brown mottling, then 18" yellowish red 5YR 5/6 silt sand and gravel, unconformably over ~~ye~~ moist brownish yellow silt and clay.
WHR 6/11/12		20				WHR

6/11/12

FBP Soil Boring Log

Soil Boring No. BKGOPT SCR	**Drilling Date:** 6/11/12	**Sheet** 2 **of** 3
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/11/12 1015
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/11/12 1211
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 58 ft
Weather: Rain 70's		

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	58		WHR 6/11/12	~~Yell~~ Brownish yellow, moist silt, some clay crumbly ~~some~~ little red oxidation staining
		22				
	3.0	23	50			Same as above
		24				
	2.5	25	56			Slightly moist, brownish yellow, silt, some clay trace sand down to 36" ~~then~~ same with little gravel and sand
		26				
2.75	~~2.75~~ WHR 6/11/12	27	54			Same as above
		28				
	3.0	29	56			Same as above down to 36" then moist brownish yellow silt, and clay, trace sand, slightly stiffer
		30				
	1.5	31	58			moist, soft, brownish yellow silt and clay 10YR 6/6 some gray mottling 10YR6/1 and ~~brow~~ yellowish Brown mottling. WHR 6/11/12
		32				
	2.25	33	58			Moist brownish yellow silt and clay slightly plastic, some gray mottling grading in to gray ~~silt~~ silt and clay little brownish yellow mottling. WHR 6/11/12
		34				
	2.25	35	54			Moist gray and brownish yellow mottled silt and clay little sand and gravel, becoming brownish yellow at 26", some gray mottling
		36				
	7.5	37	58			Same as above becoming gray @ 18" then brownish yellow and gray mottled at 36. At 42". Some ~~Some~~ ~~stro~~ strong brown sand and gray silt and clay. WHR 6/11/12 7.5YR 5/6
		38				
	1.5	39	47			Moist strong brown silt, some sand and fine gravel, little clay some brownish yellow mottling 10YR 6/6
		40				

FBP Soil Boring Log

Soil Boring No. BKG0PT5YR	**Drilling Date:** 6/11/12	**Sheet** 3 **of** 3	
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/11/12	1015
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 6/11/12	1215
Logged By: William R	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 58 ft	
Weather: Rain 70's			

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	54			Moist to Damp, strong brown 75 YR 5/8 silt, some ~~gravel~~ sand WITR little to 24 becoming brownish yellow with some strong brown mottling little gravel to bottom.
		42				
		43	52			Damp strong brown silt, same sand little gray mottling to 8" then strong brown becoming silt and sand at 30"
		44				
		45	50			Same as above
		46				
		47	44		▽	Moist to damp ~~reddish~~ yellowish ~~yellow~~ red sand, some silt, wet bottom 6" WITR 6/11/12
		48				
		49	38			Wet, yellowish red sand, little silt to 24" then yellowish brown sand, some silt wet.
		50				
		51	48			wet strong brown well sorted sand, little silt.
		52				
		53	36			10" wet strong brown sand, then, wet silt sand and gravel, Gallia.
		54				
		55	22			Wet, yellowish red 5YR 5/8 pea gravel, some sand last 5"
		56				
		57	26			wet sand, silt and cobbles, some gravel, unconformably over dry, silt some clay Yellowish ~~brown~~ brown 10YR 5/ WITR 6/11/12 weathered gray shale
		58				END OF BORING
		59				
		60				

FBP Soil Boring Log

Soil Boring No. BKGDPT 57	**Drilling Date:** 5/29/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/29/12 1600
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 5/29/12 1805
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 30 ft
Weather: Partly Sunny 80		

1820 DTW 20.81

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.75	1	19			Moist reddish brown silt, some clay, trace sand
		2				
	3.5	3	26			Moist, stiff brownish yellow silt and clay trace ~~rock fragmen~~ cobbles @ 20" WHR 5/29/12
		4				
	3475	5	24			14" Moist, stiff strong brown 7.5 YR 6/6 silt and clay some organics trace sand unconformably over yellowish brown stiff silt & clay, trace sand, stiff
		6				
	74.25	7	22			Moist, stiff brownish yellow 10YR 6/6 silt and clay, trace organics and sand
		8				
	1.25	9	23			18" Moist stiff brownish yellow 10YR 6/6 silt and Clay trace of sand overlying silt, some clay trace sand softer.
		10				
	WHR 5/29/12 ~~2.5~~	11	27			Moist, crumbly brownish yellow silt, some clay little sand, trace gravel, damp last 4"
		12				
	.25	13	27			Moist soft, brownish yellow silt, little to some clay, ~~little~~ sand, trace gravel. WHR 5/29/12
		14				
	.75	15	32			Moist soft brownish yellow silt little clay and sand, wet silt and sand seam running lengthwise ~~last~~ bottom 8" of sample tube. WHR 5/29/12
		16				
		17	36			16" wet silt some sand little clay grading into moist silt some clay, little sand to 10" then back to silt some sand little clay and seams brownish yellow and yellow 10YR 7/6 mottling
		18				
		19	36			Moist to damp silt, some sand little clay becoming silt some clay, slightly stiff @ ~~30"~~ 14" extending to 30" then wet strong brown 7.5YR 5/6 silt and sand. wet
		20			∇	

WHR 5/28/12

FBP Soil Boring Log

Soil Boring No. BVG DPT 57	Drilling Date: 5/29/12	Sheet 2 of 2
Project: Background	Project No: WBS 03.01.01.02.01	Date Started: 5/29/12 1600
Well No: NA	Drillers: M&W Drillers	Date Ended: 5/29/12 1805
Logged By: William Reid	Rig: Geoprobe 7730 DPT	Total Depth: 30 ft
Weather: Cloudy 70's		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	37			Wet silt some sand reddish yellow 7.5 YR 7/6 down to 24", then reddish yellow silt, some clay, moist to 29 then wet silt and sand to bottom.
		22				
		23	29			Wet silt, some sand with 2" silt and clay seam between 9" and 11", then wet silt and sand to 24" unconformably over moist silt sand ~~and~~ with 5/29/12 gravel, brown 7.5 YR 5/4
		24				
		25	26			Damp to wet brown 7.5 YR 5/4 silt, sand and gravel, some rock fragments and yellow 10YR 7/6 motting, 4" sand seam at 20-24
		26				
		27	30"			wet silt, sand gravel and cobbles
		28				
		29	NA			Same as above. DPT went to 29.5, changed tooling, went to 30', had gray shale.
Change tooling		30				END OF BORING
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGOPT58	**Drilling Date:** 5/31/12	**Sheet** 1 **of** 3	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/31/12	1610
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 5/31/12	1748
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 46'	
Weather: Partly Cloudy, 80			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1	22			Slightly moist, silt, some sand little clay yellowish brown 10 YR 5/4 grading to brownish yellow 10YR 6/6
		2				WTR 5/31/12
	3.0	3	28			Slight moist, ~~yellowish brown~~ brownish yellow 10YR 6/4 silt, some clay, little sand crumbly, little gravel
		4				
	4.5	5	24			slightly moist brownish yellow silt, some clay little sand, unconformably over moist, laminated clay, some silt, stiff strong brown 7.5YR 5/8, and thin yellow 10 YR 7/6 laminae
		6				
	2.5	7	28			Same as above
		8				
	3.5	9	32			same as above, 2" silt seam, yellow 10YR 7/6, at 24-26"
		10				
		11	29			Moist, stiff, clay, some silt, little sand to 8" then thin yellow silt laminae ~~to~~ in clay to 17, then 4" silt lamina, yellow to brownish yellow, then back to brownish yellow clay and silt to 23, then yellow silt to bottom. WTR 5/31/12
		12				
	2.25	13	27			laminated minford down to 12" then 6" silt and clay brownish yellow 10YR 6/6, then yellowish brown clay, some silt, stiff to bottom with thin yellow laminae
		14				WTR 5/31/12
	3.0	15	32			4" Yellowish brown ~~cla~~ sand and gravel, little silt unconformably over brownish yellow silt and clay ~~som~~ little gravel at last 4" WTR 5/31/12
		16				
	2.0	17	36			brownish yellow silt and clay, trace gravel some yellow 10YR 7/6 mottling
		18				WTR 5/31/12
	2.75	19	27			~~Mo~~ Slightly moist silt, some clay little sand to 10" then 5" seam of silt sand and gravel yellowish red 5YR 5/6, then back to brownish yellow silt ~~sand~~ some clay WTR 5/31/12
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 58	**Drilling Date:** 5/31/2012	**Sheet** 2 **of** 3
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/31/12 1610
Well No: NA	**Drillers:** MEW Drilling	**Date Ended:** 5/31/12 1745
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 46'
Weather: Partly Cloudy 80s		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	2.25	21	34			yellowish red, dry silt sand and gravel to 8" ~~then~~ yellow 10YR 7 silt, some clay trace gravel ~~then~~ oxidation staining and little gravel WIR 5/31/12 ~~fas~~ 21 to 34"
		22				
	2.5	23	40			Moist yellowish brown 10YR 5/6 silt and clay, some gray mottling at about 24 - 36" 10YR 6/1
		24				same as above
1740	3.0	25	51			
		26				Same as above
		27	46			
		28				
	0.75	29	44			Damp yellowish brown and gray mottled silt and sand
		30				Dry crumbly silt some sand little gravel grading into moist soft silt, ~~little~~ some sand WIR 5/31/12 little clay yellowish brown, some gray mottling
		31	43			
		32				
		33	42			Moist, yellowish brown silt, some clay to 15 then dry silt sand and gravel, then silt some sand to 36" then gallia.
		34			▽	Gallia, moist WIR 5/31/12 ~~gray~~ yellowish red silt sand and gravel WIR 5/31/12 wet ~~reddish~~ yellowish red silt sand and gravel to 15" then yellowish brown sand little gravel to 28 then yellowish red silt sand & gravel
		35	40			
		36				Wet yellowish brown silt sand and rock fragments to 12" then sand, some gravel becomes coarse sand to 36" then sand and gravel.
		37	40			
		38				Wet yellowish red sand and gravel, some silt, some rock fragments
		39	30			
		40				

FBP Soil Boring Log

Soil Boring No. BKG DPT 58
Drilling Date: 5/31/12
Sheet 3 **of** 3
Project: Soil Background
Project No: WBS 03.01.01.02.01
Date Started: 5/31/12 1610
Well No: NA
Drillers: M&W Drilling
Date Ended: 5/31/12 1745
Logged By: William Reed
Rig: Geoprobe 7530 DPT
Total Depth: 46'
Weather: Partly Cloudy 80

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		41	27			wet silt sand and gravel ~~red~~ yellowish red and yellow mottled, WHR 5/31/12
		42				
		43	36			same as above, some rock fragments
		44				
		45	60			Reddish brown weathered shale for 4" then gray weathered shale to bottom.
		46				
		47				END OF BORINGS
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

FBP Soil Boring Log

Soil Boring No. BKGDPT 59	**Drilling Date:** 5/29/12	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/29/12 1251
Well No: N/A	**Drillers:** M&W DRILLING	**Date Ended:** 5/29/12
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 34'

Weather: Partly sunny 80' humid Storms possible

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		1 2	12"			Moist brownish yellow silt, some clay trace sand slightly stiff
	4.0	3 4	22			Moist brownish yellow 10YR 6/6 silt and clay, trace sand stiff ~~sil slight~~ trace grey mottling WITR 5/29/12
	4.75	5 6	24			Moist stiff brownish yellow, silt and clay, some sand at bottom
		7 8	22			Moist yellowish brown 10 YR 5/8 silt and clay to 6" ~~then~~ yellowish brown damp silt, little clay to 14 Then yellowish brown silt and clay
	3.25	9 10	26			6" laminated yellow 10YR 7/6 and ~~red~~ reddish yellow WITR 5/29/12 7YR 6/6 silt and clay WITR 5/29/12 ~~fro~~ unconformably over reddish yellow silt and clay to 14 then brownish yellow silt, some clay trace organics rocks at bottom
	4.25	11 12	24			Moist yellowish brown 10YR 5/8 and yellow 10YR 7/6 Mottled silt, ~~trace~~ little clay trace sand. WITR 5/29/12
	3.75	13 14	34			Moist yellowish brown 10YR 5/8 silt, some clay trace sand and organics @ 14", oxidation staining @ 30
		15 16	33			14" Moist reddish yellow 7.5YR 6/6 grading into brownish yellow 10YR 6/8 silt, some clay little rock fragment spread throughout
	>4.75	17 18	25			Slightly moist, slightly crumbly ~~yelor~~ brownish WITR 5/29/12 yellow silt and clay, stiff, trace organics
	3.25	19 20	32			Same as above down to 12", becoming slightly softer (3.25 kg/cm²) trace rock fragments

FBP Soil Boring Log

Soil Boring No. BKGDPT59	**Drilling Date:** 5/29/12	**Sheet** 2 **of** 2	
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 5/29/12	1251
Well No: N/A	**Drillers:** M&W DRILLING	**Date Ended:** 5/29/12	
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 34'	
Weather: Partly Sunny 80			

Sample No.	Penetrometer (kg/cm^2)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
	3.0	21 22	26			~~Mois~~ Slightly moist yellowish brown silt, little clay and rock fragments to 13"; ~~then~~ brownish yellow 10YR 6/8 silt, little clay, trace sand (no rock).
		23 24	37			Same as above to 24" ~~then~~ yellowish brown 10YR 5/8 silt, some rock and sand to 35, then Strong brown silt sand and gravel (gallia?)
	0.5	25 26	34		WHR 5/29/12	2" same as above @ end 16" Moist yellowish brown silt, little sand, ~~then~~ ~~brownish yellow~~ ~~yellowish brown~~ OK (10 YR 5/6) and ~~yellowish brown~~ 10YR 6/6 ~~brownish yellow~~ OK Mottled silt, some sand and rock grading into strong brown silt sand and gravel WHR 5/29/12
		27 28	36			Moist strong brown silt, some gravel, sand and rock fragments little clay gallia-like
		29 30	38			Slightly moist, brownish yellow 10YR 6/8 silt, sand gravel and rock fragments
		31 32	42			Same as above, bottom foot gray, weathered Shale.
		33 34	60			Grey weathered shale
		35				END OF BORING
		36				
		37				
		38				
		39				
		40				

FBP Soil Boring Log

Soil Boring No. BKGDPT60	**Drilling Date:** 6/4/2012	**Sheet** 1 **of** 2
Project: Soil Background	**Project No: WBS 03.01.01.02.01**	**Date Started:** 6/4/2012 852
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/4/2012 10:04
Logged By: William Reid	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 36 ft

Weather: Partly Cloudy 60's

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
						5"
	0.75	1 2	14			Moist light brown 7.5 YR 6/3 silt, some sand little clay unconformably over reddish yellow 7.5 YR 6/8 silt, some clay little rock fragments (cobbles)
	>4.5	3 4	20		wtHR 6/4/12	Moist, brownish yellow silt, some sand, little gravel ~~rock~~ wtHR 6/4/12 ~~fragme~~ increasing to some gravel at 5" to 10". Then stiff ~~stro~~ silt, some clay sand and cobbles (rock fragments. wtHR 6/4/12
	>4.5	5 6	31			*Moist brownish yellow 10 YR 6/6 silt, some clay trace sand, some gray 10 YR 6/1 mottling to 12", ~~then~~ strong brown 7.5 YR 5/6 silt, sand, and gravel dry - Gallia-like
	2.0	7 8	30			1" Gallia-like material overlying moist, brownish yellow 10YR 6/6 silt, some clay trace sand, and gravel, becoming softer with depth, trace gray mottling, an
	2.5	9 10	26			Moist brownish yellow silt, some clay, trace sand wtHR 6/4/12 ~~overlying~~ grading into silt and gravel, some sand between 9" and 17" unconformably over yellowish brown silt and clay + little gravel and sand
	3.15	11 12	32			14" slightly moist yellowish brown silt, some clay little gravel and cobbles, unconformably over slightly moist yellowish red 5 YR 5/6 silt, some clay little gravel
	0.75	13 14	33			slightly moist yellowish brown silt, some clay and little gravel to 14", little yellow mottling 10YR 7/6 grading into reddish yellow 7.5 YR 6/6 silt, some sand, trace clay and gravel, damp.
Change tooling →		15 16	32			same as above, damper at bottom 4"
		17 18	~~58~~ 34	wtHR 6/4/12		same as above, 2" gravel and silt seam between 5" and 7".
		19 20	38			same as above to 9" then damp yellowish brown silt and sand, soft,

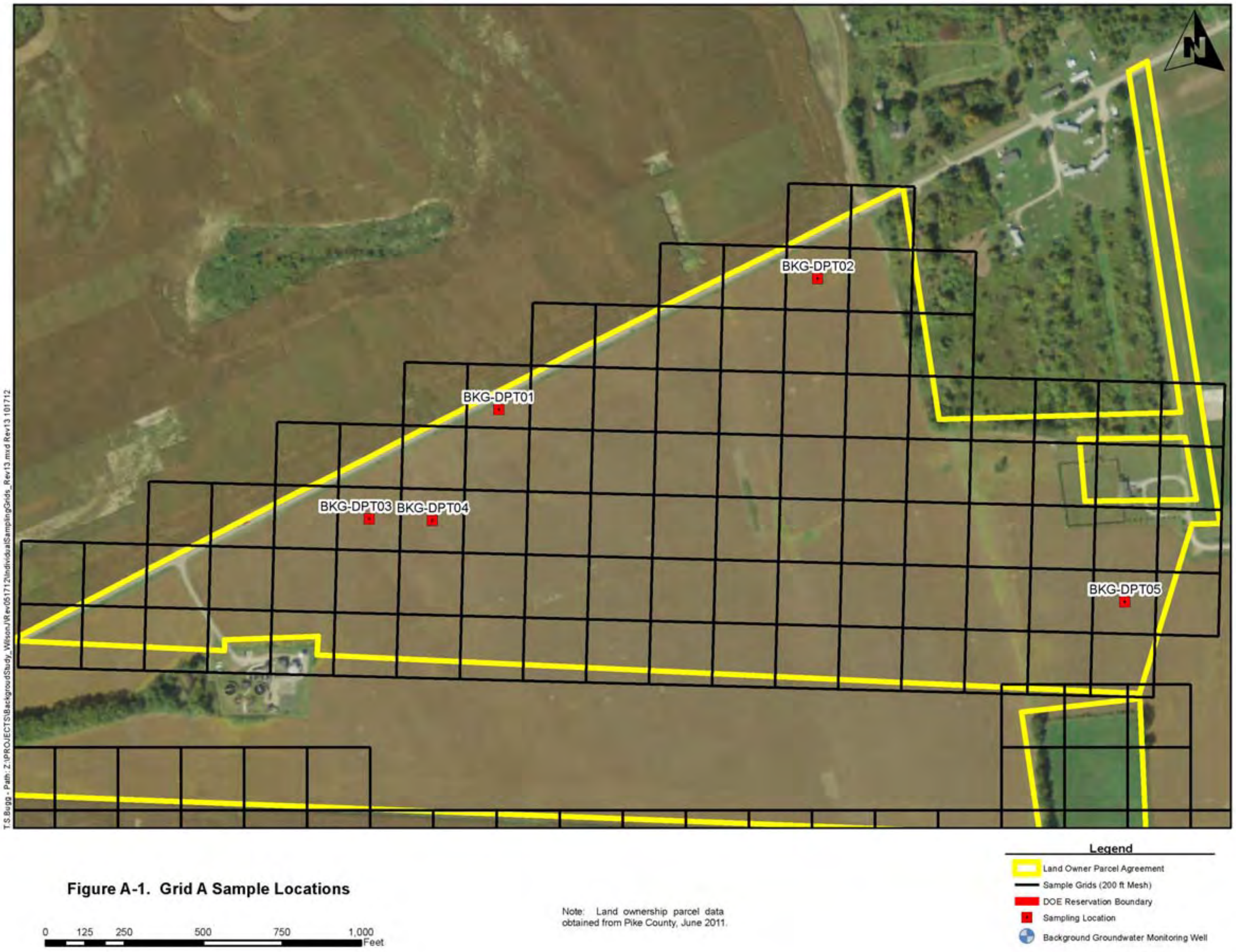
FBP Soil Boring Log

Soil Boring No. BKGDPT60	**Drilling Date:** 6/4/2012	**Sheet** 2 **of** 2 WITR 6/4/12
Project: Soil Background	**Project No:** WBS 03.01.01.02.01	**Date Started:** 6/4/2012
Well No: NA	**Drillers:** M&W Drilling	**Date Ended:** 6/4/2012 10:05
Logged By: William Reed	**Rig:** Geoprobe 7730 DPT	**Total Depth:** 36' ft
Weather: Partly cloudy 68°		

Sample No.	Penetrometer (kg/cm²)	Depth (ft)	Sample Recovery (in)	Blow Count	PID (ppm)	Description
		21	36		▽M	6" wet yellowish brown silt and sand, grading into moist to damp silt, some sand, 1" gravel seams at 19" and 31"
		22				
		23	34			Moist to damp silt, some sand Strong brown 7.5YR 5/6, soft
		24				
		25	29			Damp yellowish brown, silt, some sand, becoming silt and sand @ approximately 24"
		26				
		27	25	WITR 6/4/12		Moist yellowish brown silt, some clay, little gravel (at 6") becoming silt little sand and gravel to 23 ~~then~~ silt, some clay little gravel
		28				WITR 6/4/12 ~~Same as above~~ Moist yellowish brown 10YR 5/6 silt, some clay little sand and gravel to 26 ~~then~~ wet Strong brown silt, sand and gravel, Galla
		29	32		▽G	
		30				Wet, ~~yellowish~~ Strong brown, 7.5YR 6/6 silt, sand and gravel WITR 6/4/12
		31	19			
		32				same as above for 16"
		33	20			Yellowish brown weathered shale
		34				
		35	60			Gray shale
		36				END OF BORING
		37				
		38				
		39				
		40				

APPENDIX D: LOCATION MAPS

FIGURES



D.1. Figure A-1. Grid A Sample Locations

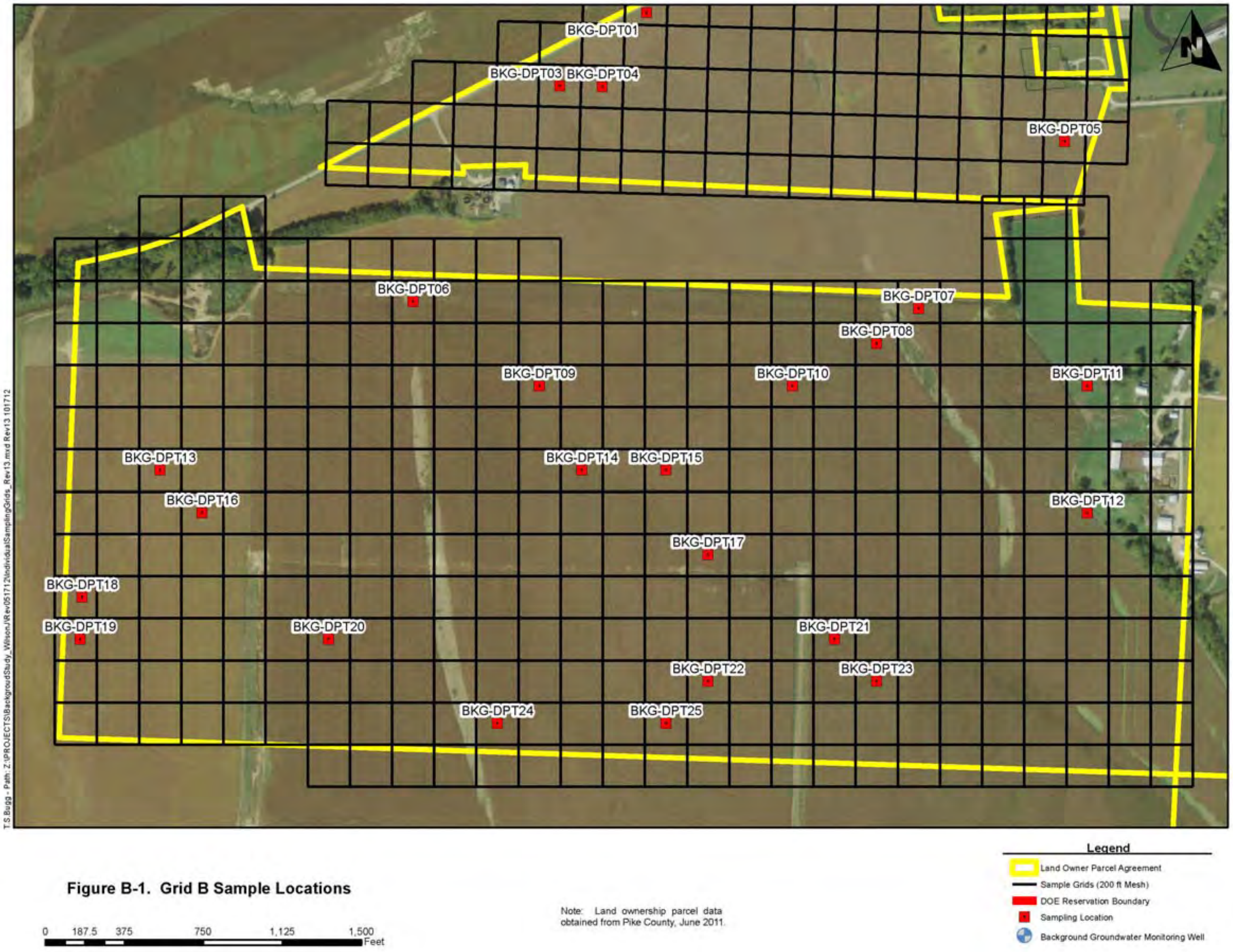


Figure B-1. Grid B Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

D.2. Figure B-1. Grid B Sample Locations

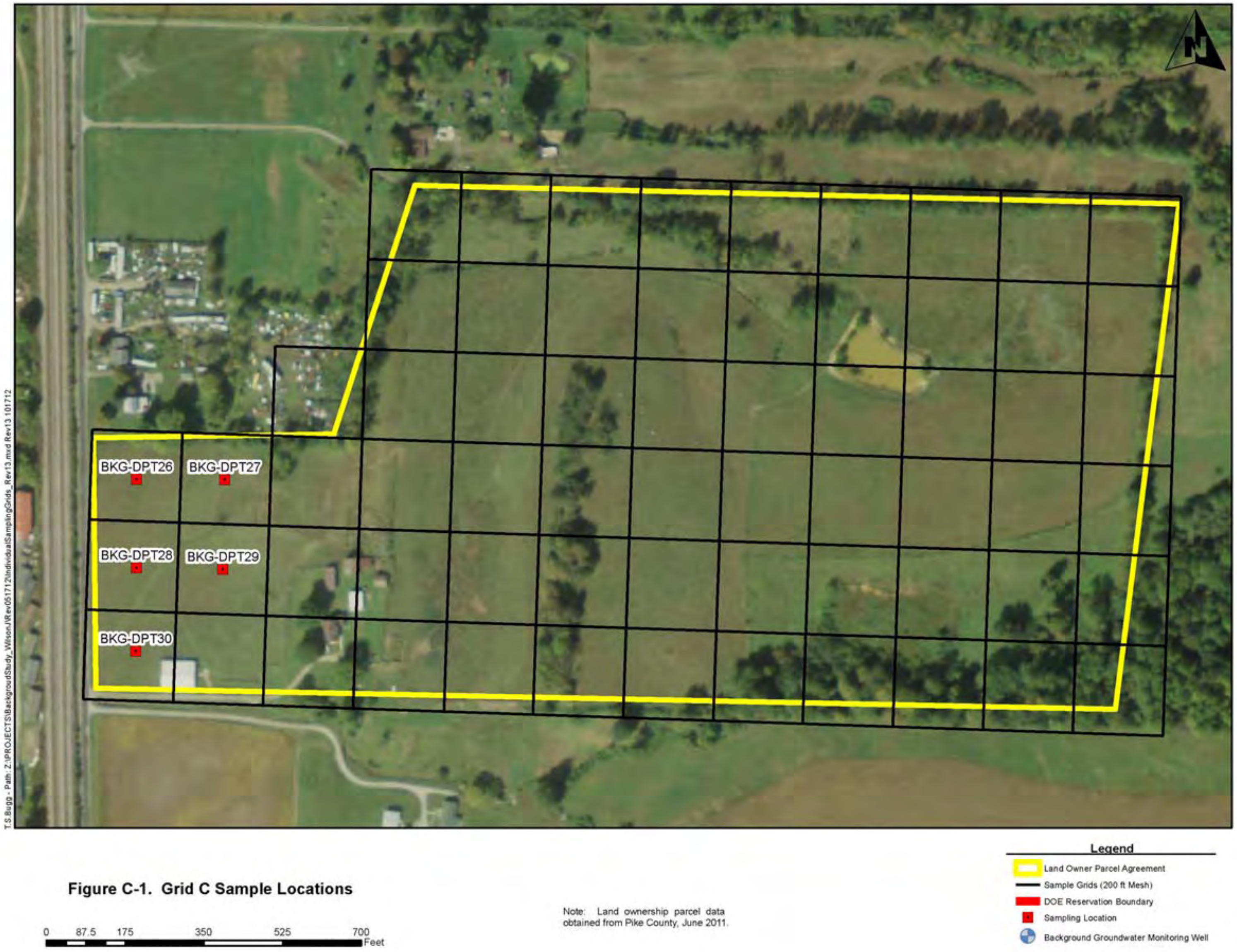


Figure C-1. Grid C Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

D.3. Figure C-1. Grid C Sample Locations

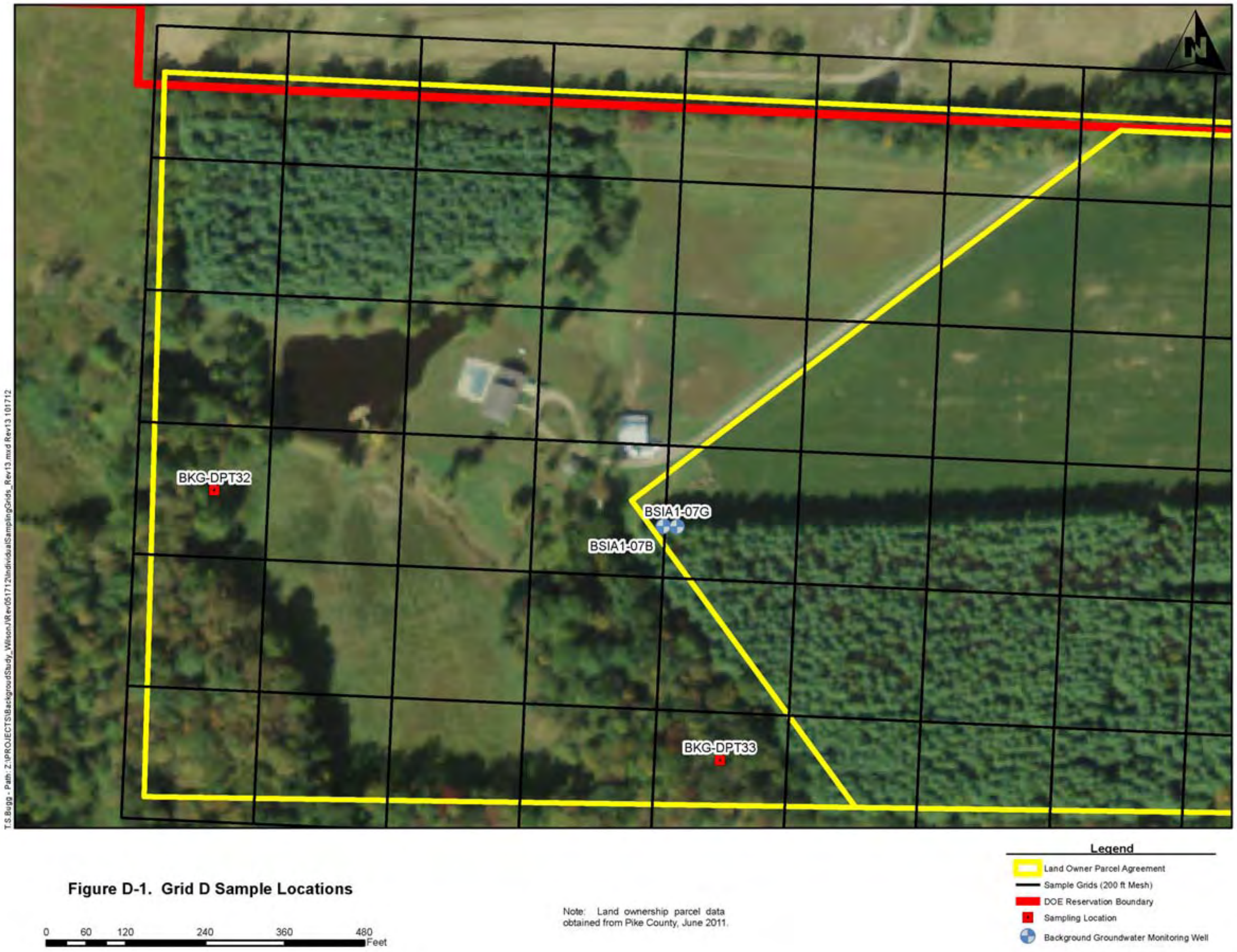


Figure D-1. Grid D Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

D.4. Figure D-1. Grid D Sample Locations

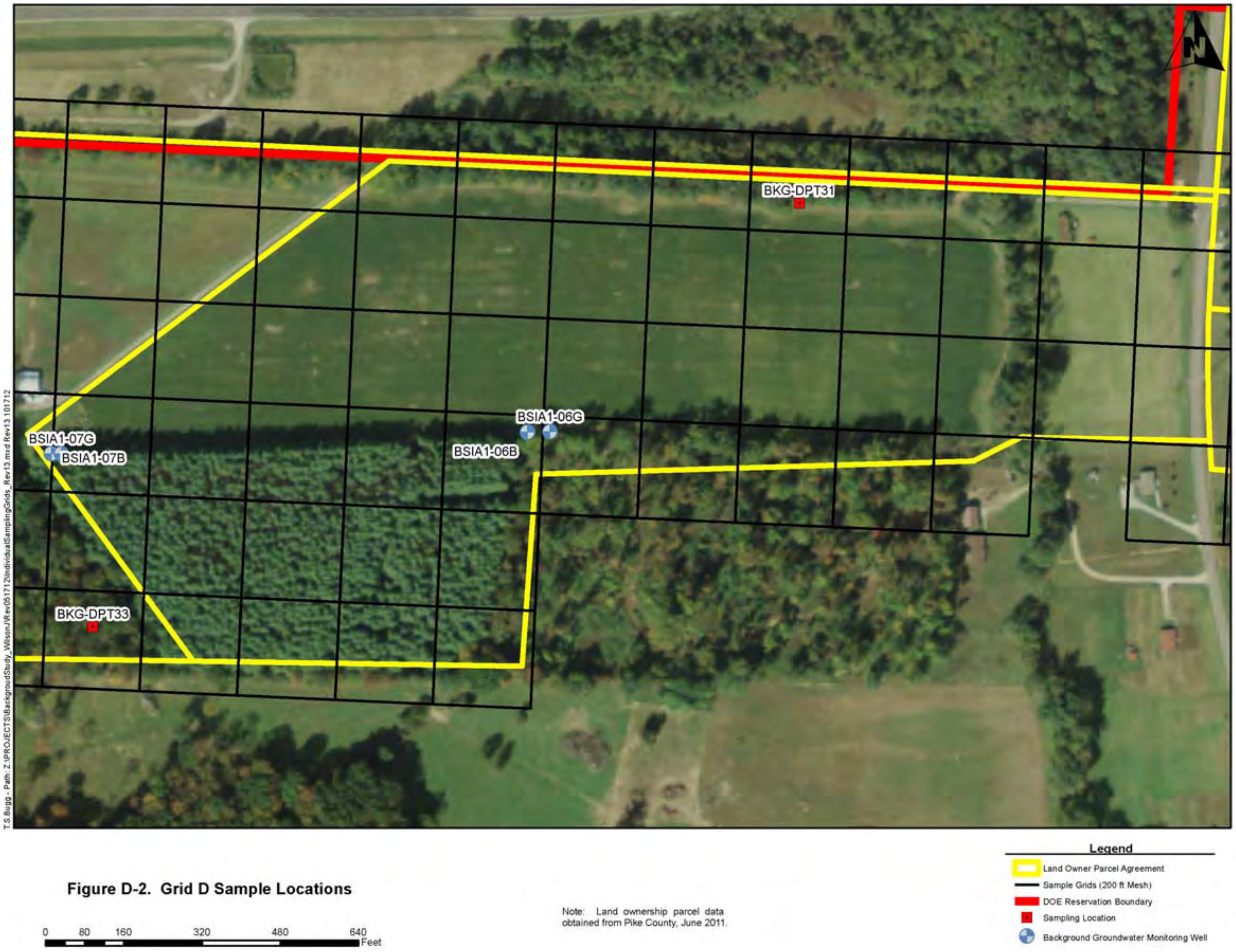


Figure D-2. Grid D Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

D.5. Figure D-2. Grid D Sample Locations

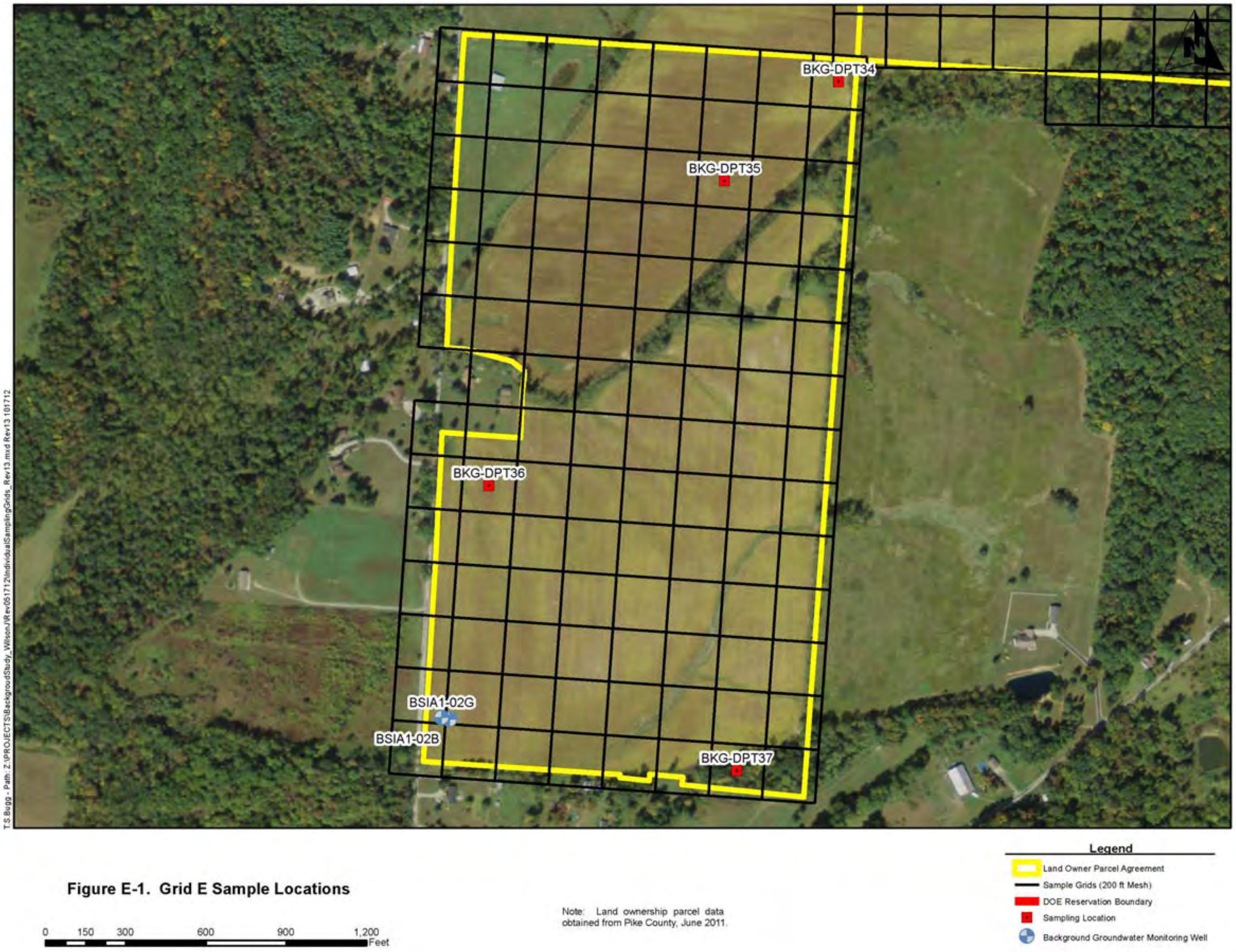
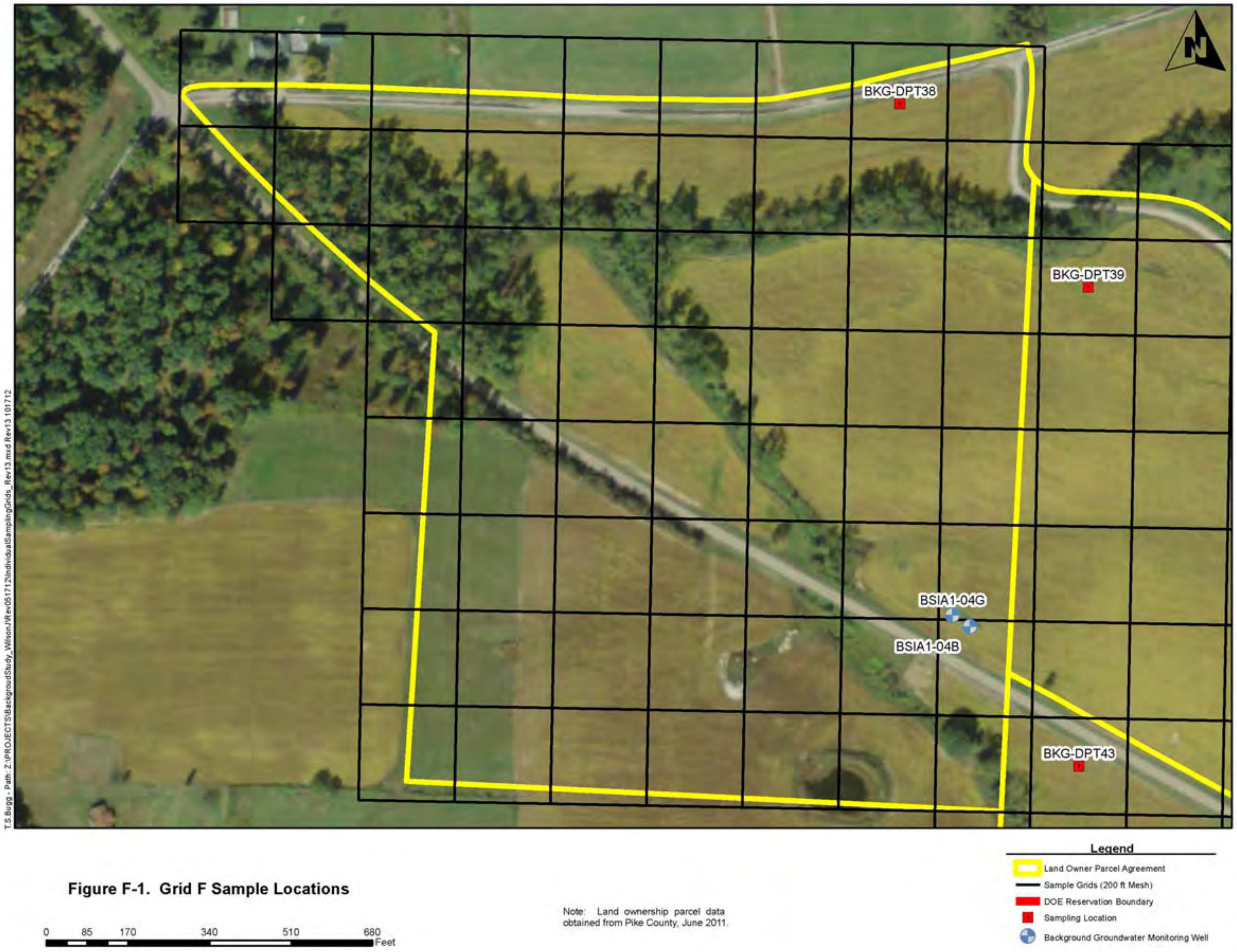


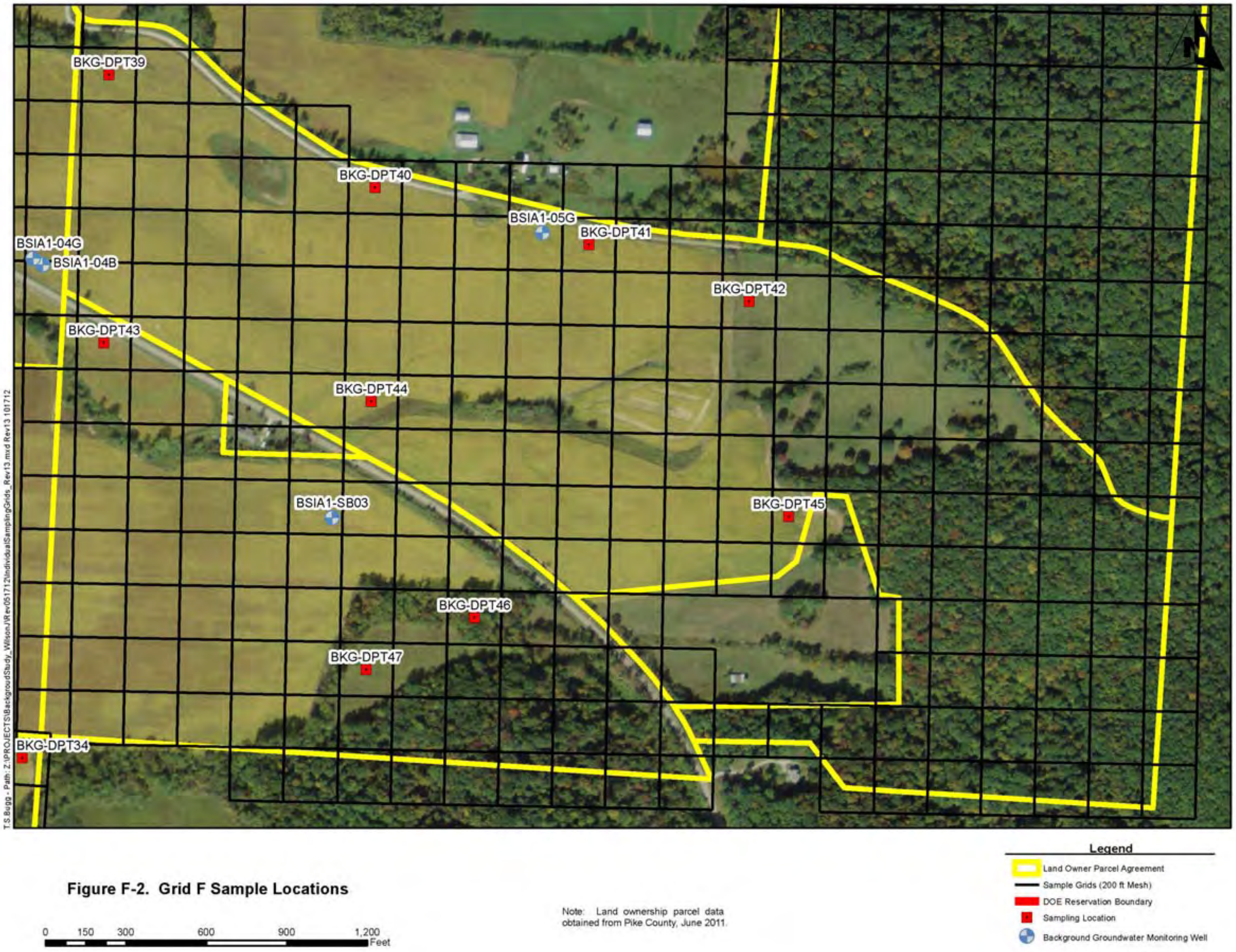
Figure E-1. Grid E Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

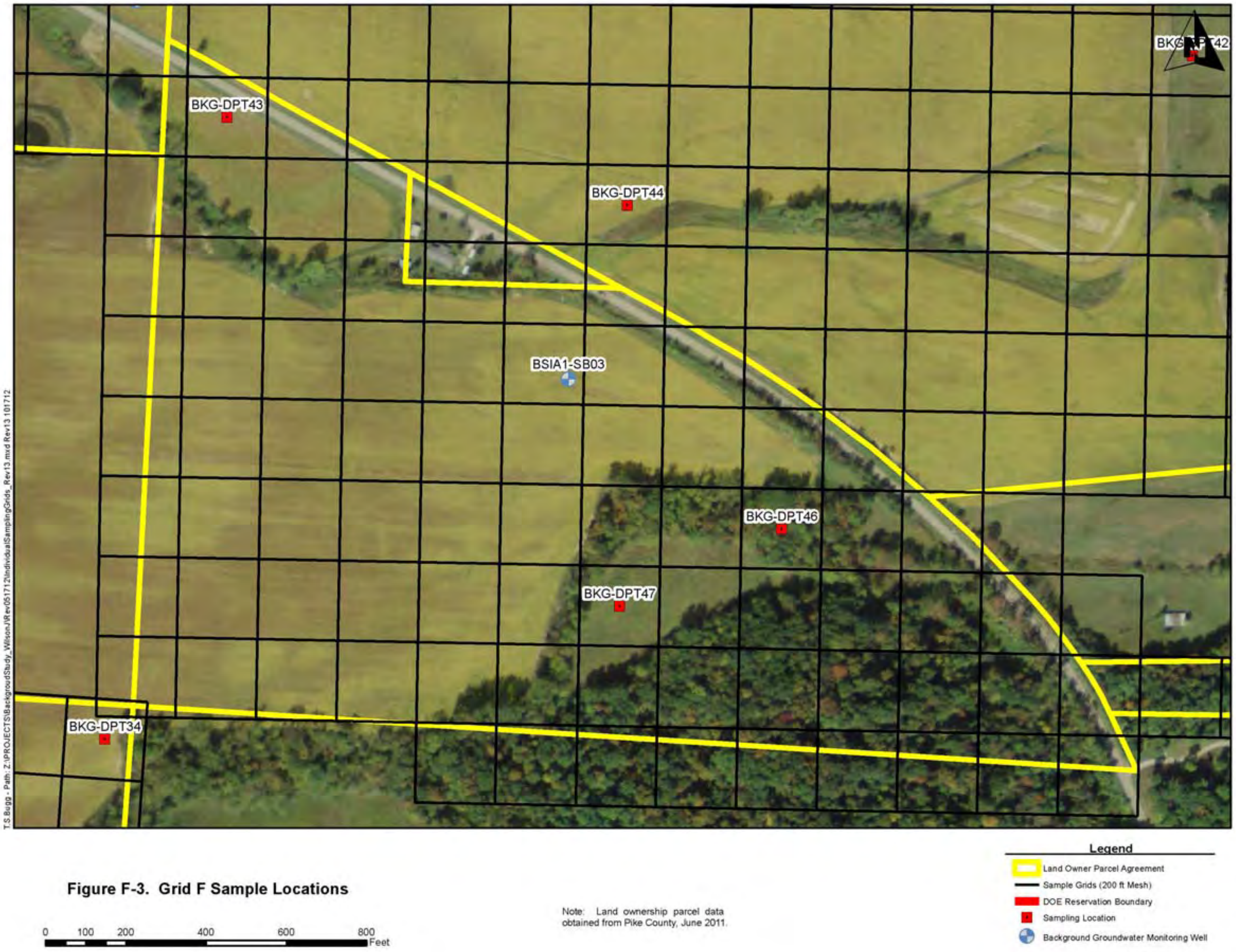
D.6. Figure E-1. Grid E Sample Locations



D.7. Figure F-1. Grid F Sample Locations



D.8. Figure F-2. Grid F Sample Locations



D.9. Figure F-3. Grid F Sample Locations

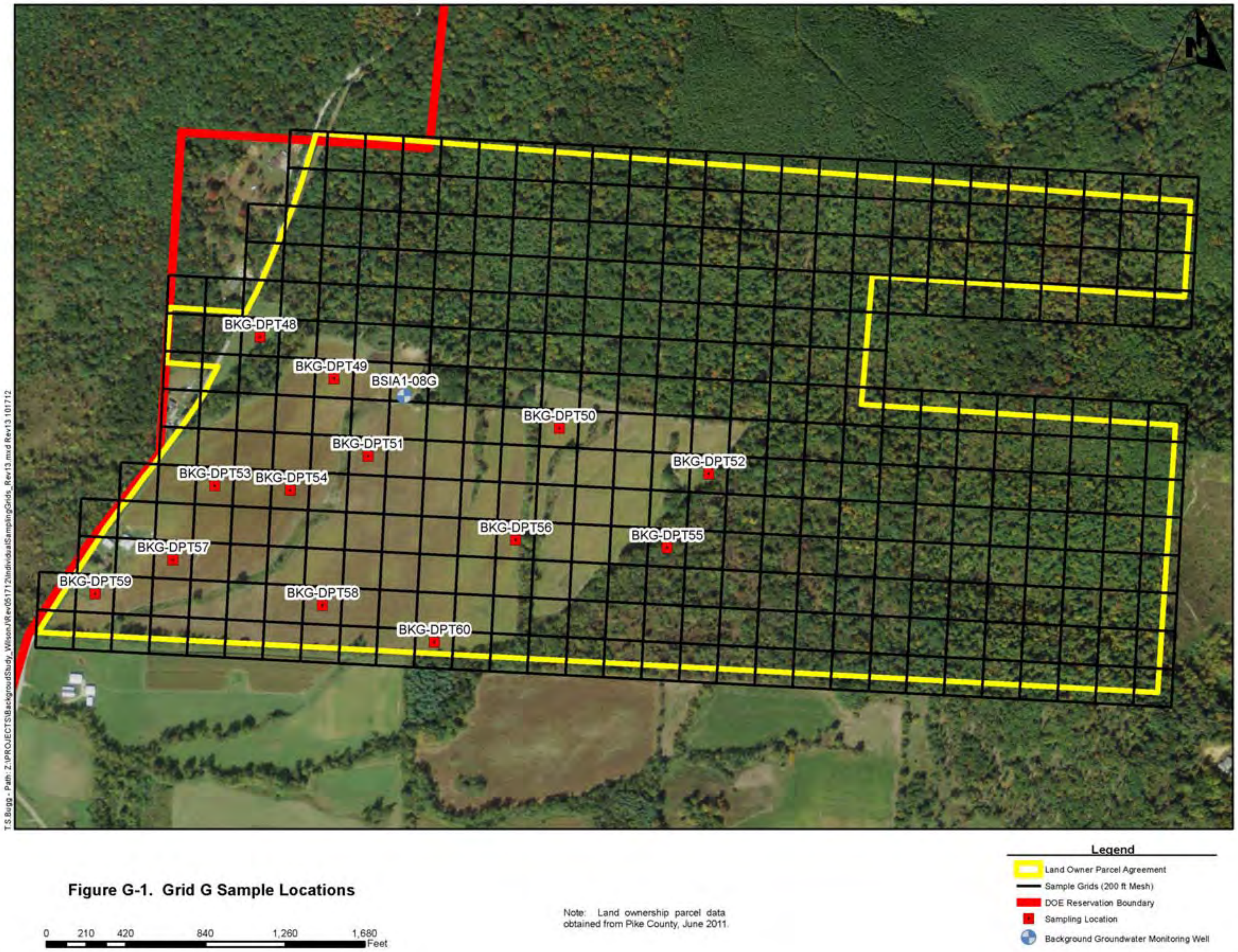
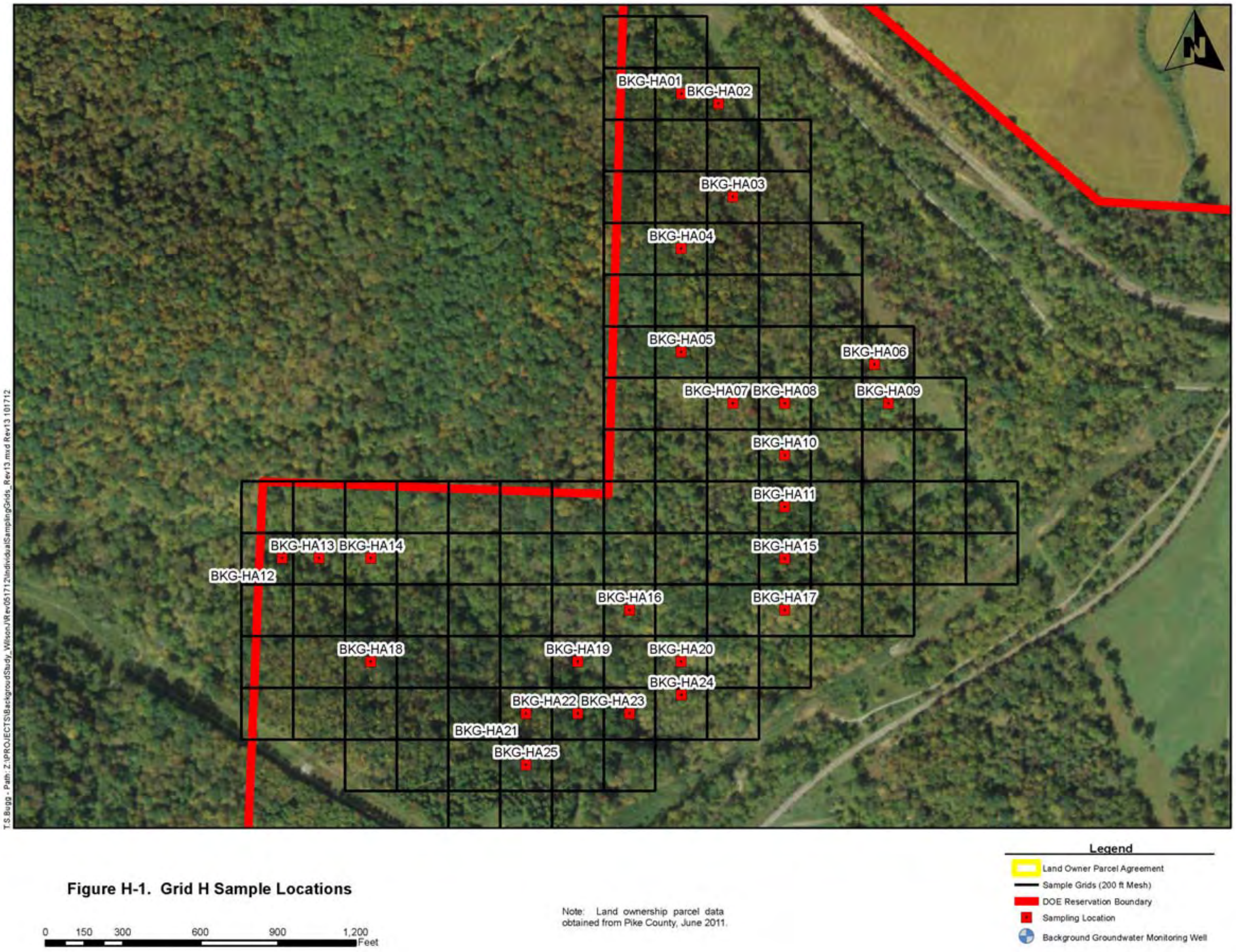


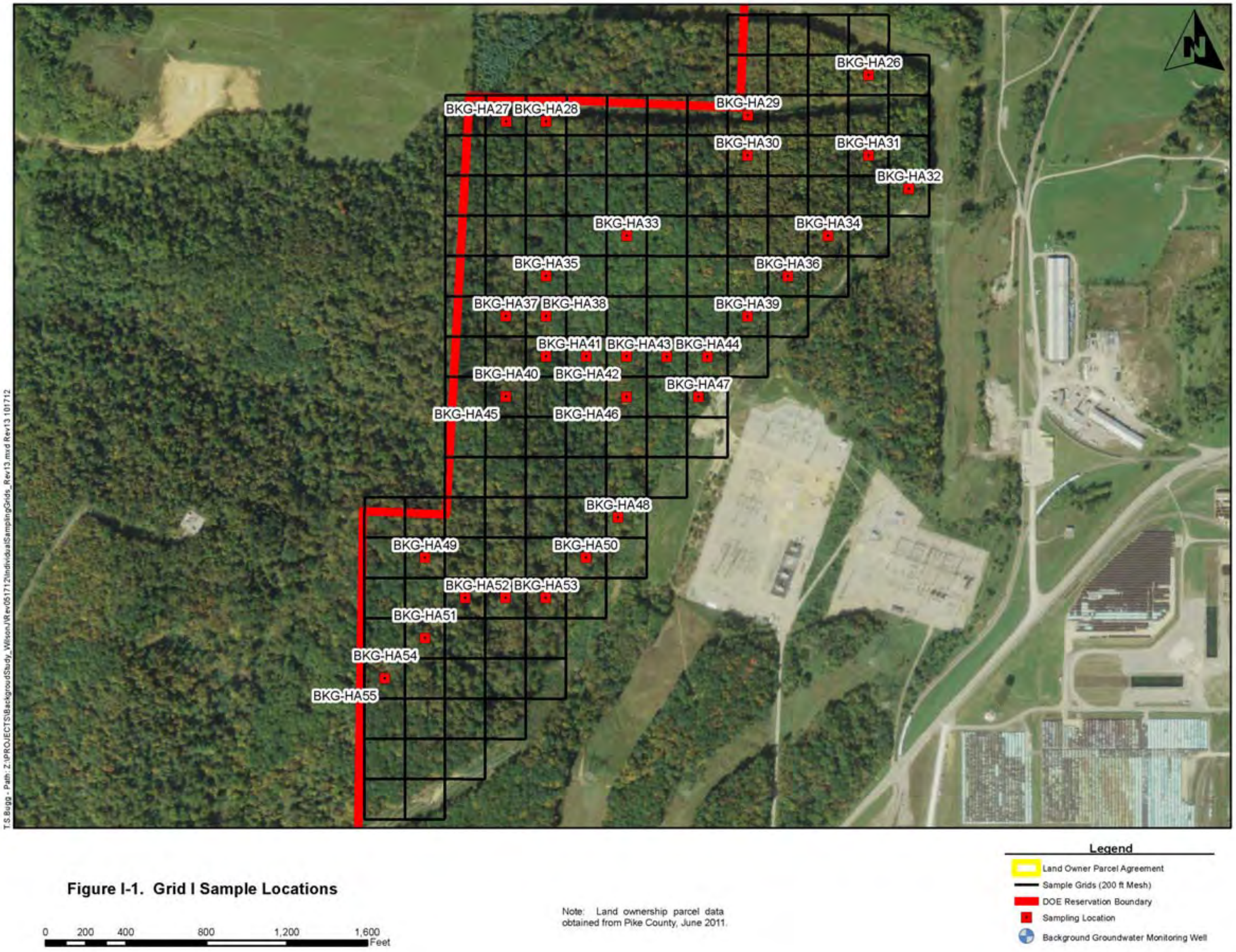
Figure G-1. Grid G Sample Locations

Note: Land ownership parcel data obtained from Pike County, June 2011.

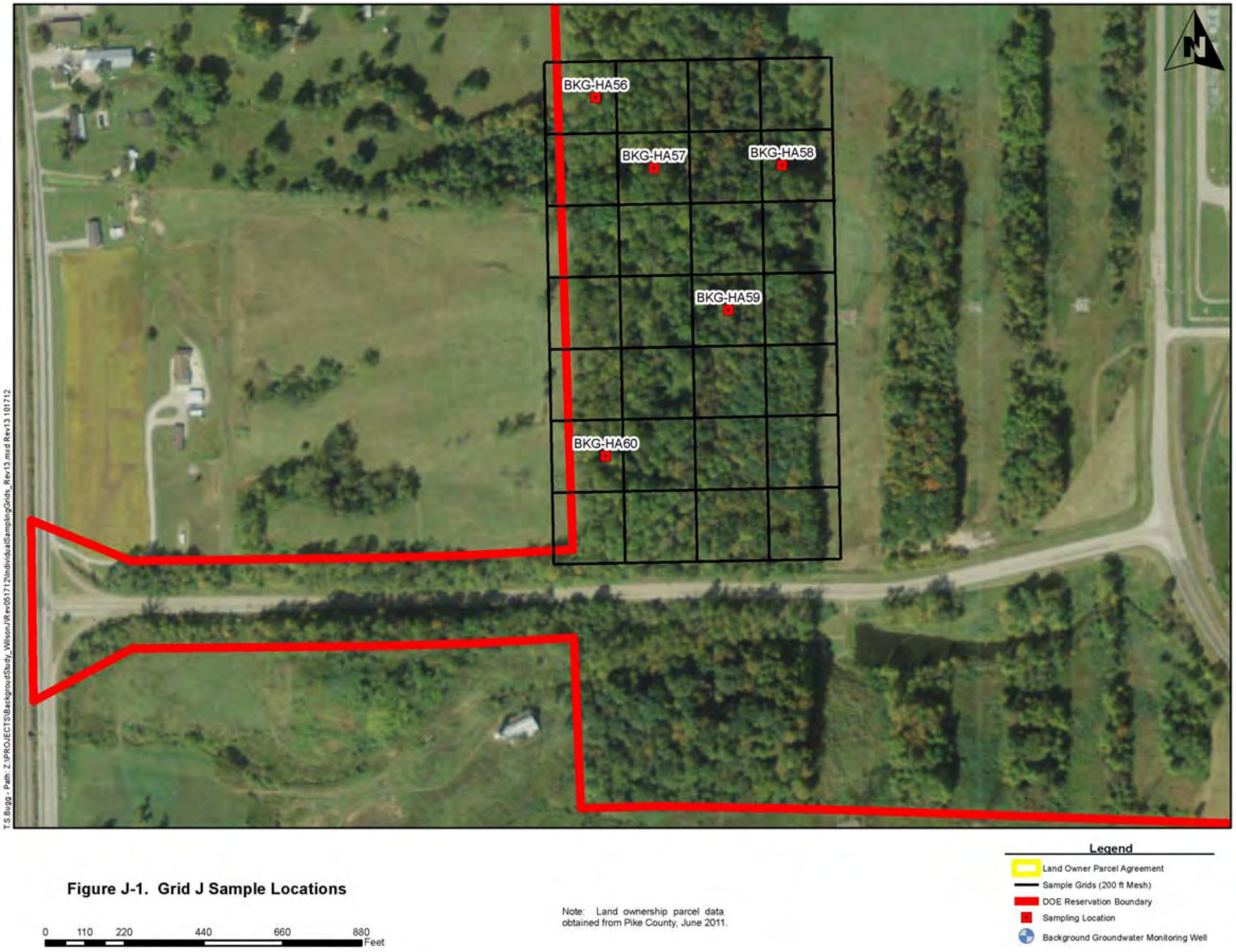
D.10. Figure G-1. Grid G Sample Locations



D.11. Figure H-1. Grid H Sample Locations



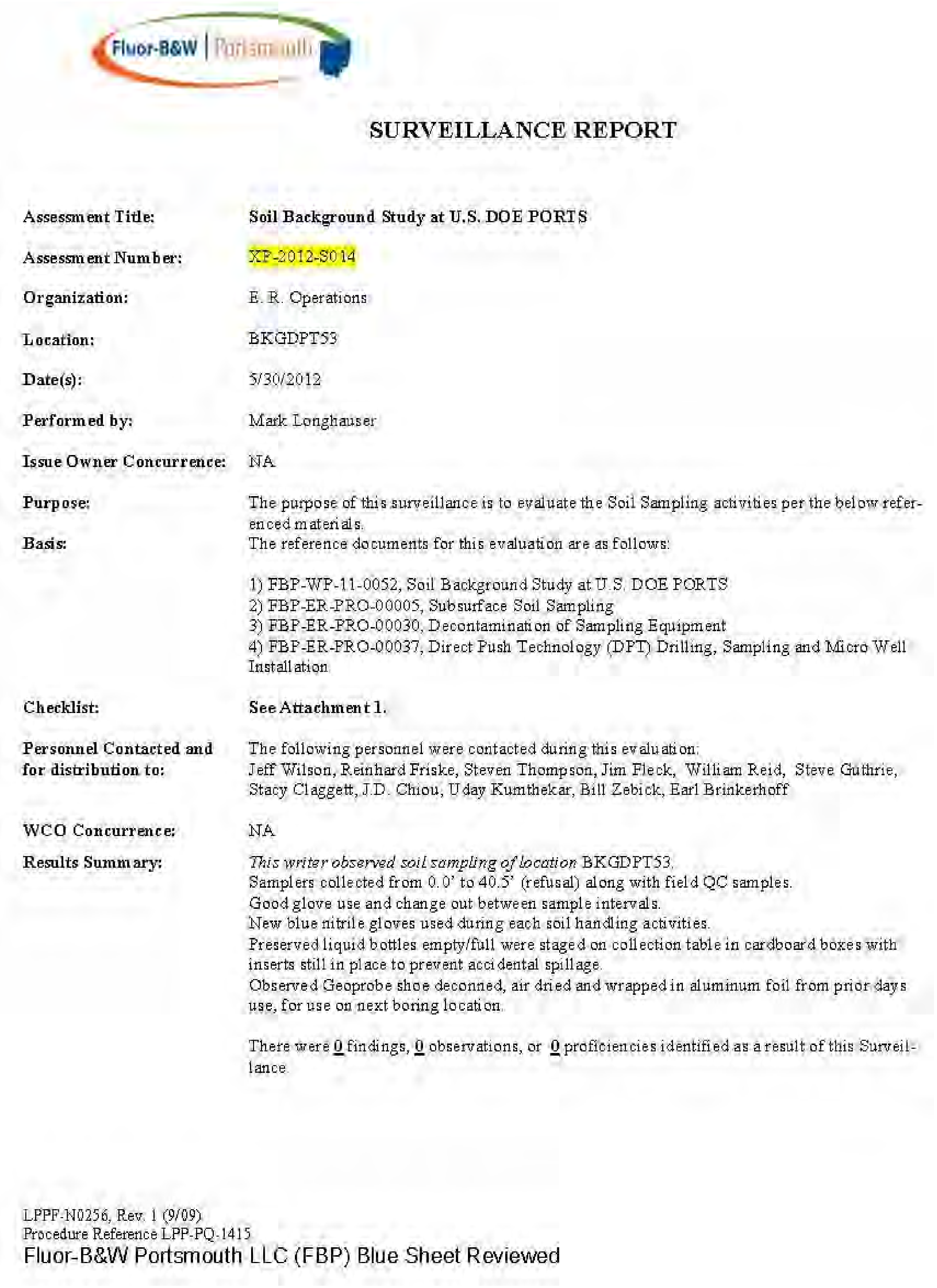
D.12. Figure I-1. Grid I Sample Locations



Note: Land ownership parcel data obtained from Pike County, June 2011.

D.13. Figure J-1. Grid J Sample Locations

APPENDIX E: SURVEILLANCE REPORT



Fluor-B&W | Portsmouth

SURVEILLANCE REPORT

Assessment Title: **Soil Background Study at U.S. DOE PORTS**

Assessment Number: XP-2012-S014

Organization: E. R. Operations

Location: BKGDPT53

Date(s): 5/30/2012

Performed by: Mark Longhauser

Issue Owner Concurrence: NA

Purpose: The purpose of this surveillance is to evaluate the Soil Sampling activities per the below referenced materials.

Basis: The reference documents for this evaluation are as follows:

1) FBP-WP-11-0052, Soil Background Study at U.S. DOE PORTS
2) FBP-ER-PRO-00005, Subsurface Soil Sampling
3) FBP-ER-PRO-00030, Decontamination of Sampling Equipment
4) FBP-ER-PRO-00037, Direct Push Technology (DPT) Drilling, Sampling and Micro Well Installation

Checklist: **See Attachment 1.**

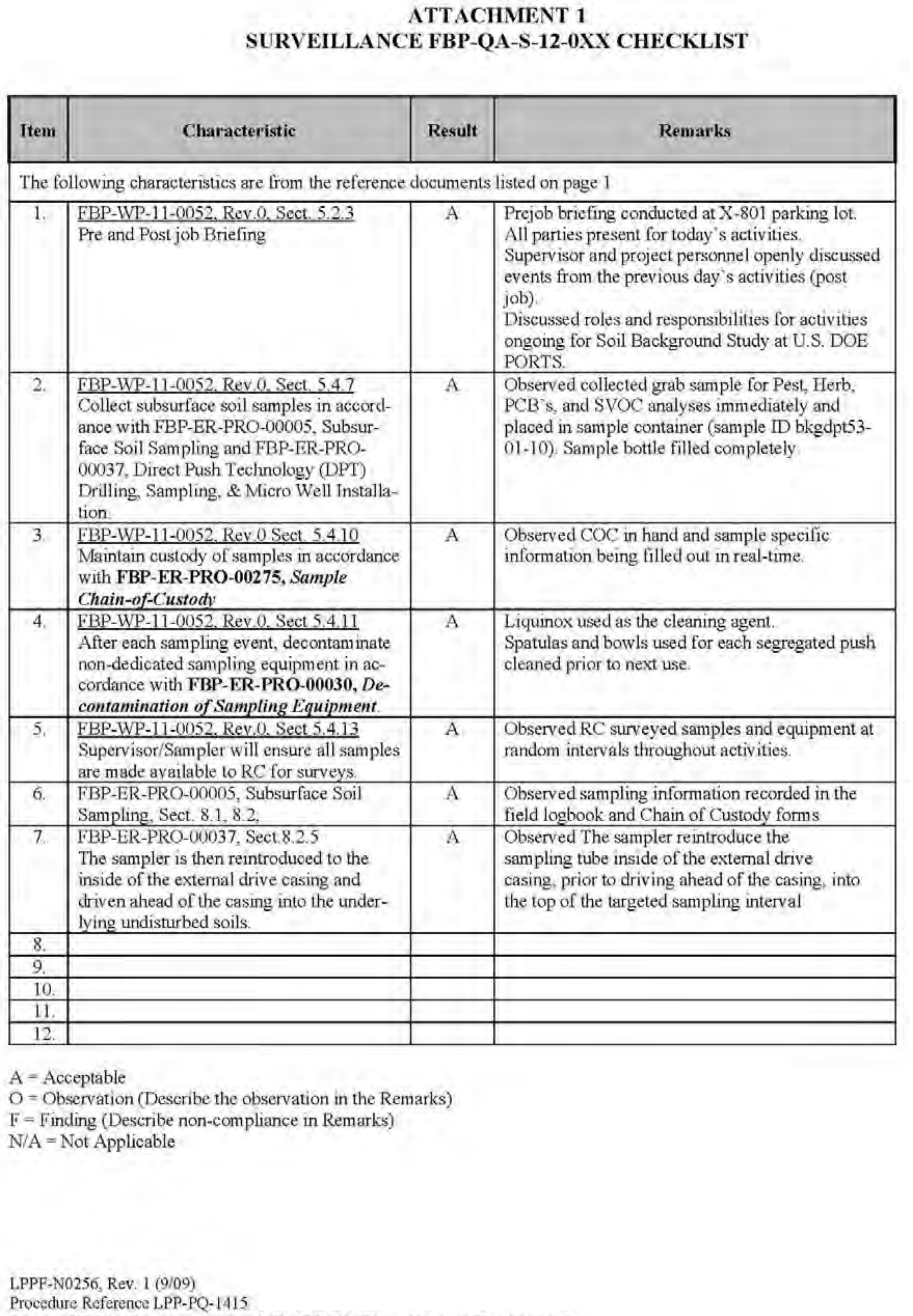
Personnel Contacted and for distribution to: The following personnel were contacted during this evaluation:
Jeff Wilson, Reinhard Friske, Steven Thompson, Jim Fleck, William Reid, Steve Guthrie, Stacy Claggett, J.D. Chiou, Uday Kumthekar, Bill Zebick, Earl Brinkerhoff

WCO Concurrence: NA

Results Summary: *This writer observed soil sampling of location* BKGDPT53.
Samplers collected from 0.0' to 40.5' (refusal) along with field QC samples.
Good glove use and change out between sample intervals.
New blue nitrile gloves used during each soil handling activities.
Preserved liquid bottles empty/full were staged on collection table in cardboard boxes with inserts still in place to prevent accidental spillage.
Observed Geoprobe shoe deconned, air dried and wrapped in aluminum foil from prior days use, for use on next boring location.

There were 0 findings, 0 observations, or 0 proficiencies identified as a result of this Surveillance.

LPPF-N0256, Rev. 1 (9/09)
Procedure Reference LPP-PQ-1415
Fluor-B&W Portsmouth LLC (FBP) Blue Sheet Reviewed



ATTACHMENT 1
SURVEILLANCE FBP-QA-S-12-0XX CHECKLIST

Item	Characteristic	Result	Remarks
The following characteristics are from the reference documents listed on page 1			
1.	FBP-WP-11-0052, Rev.0, Sect. 5.2.3 Pre and Post job Briefing	A	Prejob briefing conducted at X-801 parking lot. All parties present for today's activities. Supervisor and project personnel openly discussed events from the previous day's activities (post job). Discussed roles and responsibilities for activities ongoing for Soil Background Study at U.S. DOE PORTS.
2.	FBP-WP-11-0052, Rev.0, Sect. 5.4.7 Collect subsurface soil samples in accordance with FBP-ER-PRO-00005, Subsurface Soil Sampling and FBP-ER-PRO-00037, Direct Push Technology (DPT) Drilling, Sampling, & Micro Well Installation.	A	Observed collected grab sample for Pest, Herb, PCB's, and SVOC analyses immediately and placed in sample container (sample ID bkgdpt53-01-10). Sample bottle filled completely.
3.	FBP-WP-11-0052, Rev.0 Sect. 5.4.10 Maintain custody of samples in accordance with **FBP-ER-PRO-00275, *Sample Chain-of-Custody***	A	Observed COC in hand and sample specific information being filled out in real-time.
4.	FBP-WP-11-0052, Rev.0, Sect 5.4.11 After each sampling event, decontaminate non-dedicated sampling equipment in accordance with **FBP-ER-PRO-00030, *Decontamination of Sampling Equipment***.	A	Liquinox used as the cleaning agent. Spatulas and bowls used for each segregated push cleaned prior to next use.
5.	FBP-WP-11-0052, Rev.0, Sect 5.4.13 Supervisor/Sampler will ensure all samples are made available to RC for surveys.	A	Observed RC surveyed samples and equipment at random intervals throughout activities.
6.	FBP-ER-PRO-00005, Subsurface Soil Sampling, Sect. 8.1, 8.2,	A	Observed sampling information recorded in the field logbook and Chain of Custody forms
7.	FBP-ER-PRO-00037, Sect.8.2.5 The sampler is then reintroduced to the inside of the external drive casing and driven ahead of the casing into the underlying undisturbed soils.	A	Observed The sampler reintroduce the sampling tube inside of the external drive casing, prior to driving ahead of the casing, into the top of the targeted sampling interval
8.			
9.			
10.			
11.			
12.			

A = Acceptable
O = Observation (Describe the observation in the Remarks)
F = Finding (Describe non-compliance in Remarks)
N/A = Not Applicable

LPPF-N0256, Rev. 1 (9/09)
Procedure Reference LPP-PQ-1415
Fluor-B&W Portsmouth LLC (FBP) Blue Sheet Reviewed

APPENDIX F: FIELD CHANGE NOTICES

This page is intentionally left blank.

Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

APR 0 3 2012

PPPO-03-1434604-12

Ms. Maria Galanti
Site Coordinator
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

Dear Ms. Galanti:

TRANSMITTAL OF VARIANCE FBP-ER-RCRA-WD-PLN-0040-R2-01 TO THE SOIL BACKGROUND STUDY SAMPLING AND ANALYSIS WORK PLAN

Enclosed, please find the U.S. Department of Energy (DOE) transmittal of a variance form to the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0250&D1).

Variance FBP-ER-RCRA-WD-PLN-0040R2-01 contains four individual items. Of the four items, three are considered non-significant and one significant. The three non-significant variances include how changes to the sampling and analysis plan (SAP) will be handled (i.e., via the variance process); corrects the depth of river valley subsurface soil samples; reflects the bluesheet procedure process and provides the Fluor-B&W Portsmouth, LLC (FBP) procedure number in Table 1; and the significant variance corrects the laboratory methods for the referenced parameters in Table 2. The contract laboratories are not currently able to support the SAP specified laboratory methods for the referenced parameters.

This variance is being provided to the Ohio Environmental Protection Agency for review and approval.

If you have any questions, please contact Amy Lawson of my staff at (740) 897-2112.

Sincerely,

Joel B. Bradburne
Portsmouth Site Lead
Portsmouth/Paducah Project Office

Enclosure:
Variance FBP-ER-RCRA-WD-PLN-0040-R2-01

cc w/enclosure:
Vince.Adams@lex.doe.gov, PPPO/PORTS
Amy.Lawson@lex.doe.gov, PPPO/PORTS
Kristi.Wiehle@lex.doe.gov, PPPO/PORTS
Joel.Bradburne@lex.doe.gov, PPPO/PORTS
Jud.Lilly@lex.doe.gov, PPPO/PORTS
Rachel.Blumenfeld@lex.doe.gov, PPPO/ORO
Ray.Miskelley@lex.doe.gov, PPPO/LEX
William.Murphie@lex.doe.gov, PPPO/LEX
Jim.Sferra@epa.state.oh.us, Ohio EPA/Logan
Jamie.Jameson@fbports.com, FBP/PORTS
Dennis.Carr@fbports.com, FBP/PORTS
Jyh-Dong.Chiou@fbports.com, FBP/PORTS
Greg.Uetrecht@lex.doe.gov, HEI/PORTS
PPPO Records/LEX
PPPO.DFF&O@lex.doe.gov
RCRA Administrative Record

VARIANCE	Significant? Yes	Variance No. FBP-ER-RCRA-WD-PLN-0040-R2-01
DOE Document No.: **DOE/PPPO/03-0250&D1** FBP Document No., Rev. No.: FBP-ER-RCRA-WD-PLN-0040, Rev. 2		Page 1 of 3 Date: 03/28/12

Document Title: *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*

VARIANCE (Include justification)

REQUIREMENTS:

1. Variance Process:
   Section 5 of the referenced sampling and analysis plan (SAP) describes the sampling and analysis approach for the soil background study; however, the SAP does not define a process for submitting significant deviations and/or field changes to the Ohio Environmental Protection Agency (Ohio EPA) for concurrence.

2. Section 5.2 of the referenced SAP describes the vertical profile sampling in three sample areas west of the DOE reservation in the river valley. In these areas unsaturated subsurface soil samples (1 ft to approximately 20 ft bgs) will be collected.

3. Table 1. Fluor-B&W Portsmouth LLC (FBP) Procedure and Reference Guidelines of the referenced SAP, identifies LATA/Parallax Portsmouth, LLC (LPP) procedures will be used to perform the work.

4. Table 2. Analytical Parameters of the referenced SAP identifies that:
   Chromium (III) will be analyzed by EPA SW-846, 6010B/6020
   Chromium (VI) will be analyzed by EPA SW-846, 6010B/6020
   Cyanide, Total will be analyzed by EPA SW-846, 9016

VARIANCE:

1. Variance Process:
   Add the following section to the SAP for reference to the variance process for documenting changes to the SAP, and obtaining Ohio EPA concurrence on significant variances:

5.6 VARIANCE PROCESS

Any changes, modifications, or clarifications to this SAP will be handled through the variance process. A variance is a means to document changes to a SAP. The variance is for specific field and/or laboratory tasks supporting respective SAP implementation. Variances must not deviate from the scope of respective SAP Data Quality Objectives. A variance to a SAP approved or concurred by Ohio EPA must be classified as significant or non-significant. A significant variance is required when the activity changes SAP scope (e.g., to add or modify technical approaches or change in analyses) and as such requires concurrence from the DOE Project Manager and Ohio EPA prior to implementation. Non-significant variances provide clarification, correct errors, document re-sampling, location, etc. and as such do not require Ohio EPA concurrence. All variances to the SAP will be submitted to Ohio EPA for informational purposes, but only significant variances require concurrence from the DOE Project Manager and Ohio EPA prior to implementation.

Requested By: Jeff Wilson Date: 03/28/12

X (IF REQ'D)	VARIANCE APPROVAL	DATE	X (IF REQ'D)	VARIANCE APPROVAL	DATE
X	Quality Assurance Reinhard Friske	3/29/12	X	SAP Coordinator Jim Hey	3/28/12
X	Field Characterization Steven Thompson	3/28/12	X	Analytical Data Quality Jim Chambers	3/28/12
X	Sample Management Office Cindy Tabor	3/28/12			

REVISION REQUIRED (Document No. & Title):
[ ] YES [X] NO

DISTRIBUTION: RMDC, DOE, & Ohio EPA		
VARIANCE	Significant? Yes	Variance No. FBP-ER-RCRA-WD-PLN-0040-R2-01
DOE Document No.: **DOE/PPPO/03-0250&D1** FBP Document No., Rev. No.: FBP-ER-RCRA-WD-PLN-0040, Rev. 2		Page 2 of 3
		Date: 03/28/12
Document Title: *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*		

VARIANCE (Include justification)

2. Section 5.2 has been clarified to specify that river valley subsurface soil samples (1 ft to approximately 10 ft bgs) will be collected.

3. Table 1. FBP Procedure and Reference Guidelines, has been revised to reflect the blue sheet process and provide the FBP procedure numbers, where applicable. (See attached Table 1)

4. Table 2. Analytical Parameters have been clarified as follows:
   Chromium (III) will be calculated by EPA SW-846, 6010B/6020
   Chromium (VI) will be analyzed by EPA SW-846, 7196
   Cyanide, Total will be analyzed by EPA SW-846, 9012

   These are the appropriate methods per EPA SW-846 to determine these parameter concentrations.

JUSTIFICATION:

This variance is to document how changes to the SAP will be handled (i.e., via the variance process); correct the depth of river valley subsurface soil samples; reflect the bluesheet procedure process and provide the FBP procedure numbers in Table 1; and document the correct laboratory methods for the referenced parameters in Table 2.

Table 1. FBP Procedure and Reference Guidelines

Procedures	Reference documents
Administrative procedures	
Chain of Custody	FBP-ER-PRO-00275, Sample Chain of Custody
Variance/Change Request	SADQ Section 3.6.14
Corrective Action	FBP-QA-PRO-00018, Problem/Nonconformance Reporting
QA/QC	SADQ
Excavation/Penetration	FBP-OS-PRO-00022, Excavation/Penetration Permit
Data Verification/Validation	FBP-ER-PRO-00001, Volatile and Semivolatile Data Verification and Validation
	FBP-ER-PRO-00033, Inorganic Data Verification and Validation
	FBP-ER-PRO-00032, Pesticide and PCB Data Verification and Validation
	FBP-ER-PRO-00059, Radiochemical Data Verification and Validation
Field procedures	
Field Logbooks	FBP-ER-PRO-00027, Field Logbooks
	FBO-SM-PRO-00017, Field Logbooks and Data Forms
Drilling	ASTM D 6151, Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling
Surface and Subsurface Soil Sampling	FBP-ER-PRO-00039, Surface Soil Sampling
	FBP-ER-PRO-00005, Subsurface Soil Sampling
	FBP-ER-PRO-00037, Direct Push Technology (DPT) Drilling, Sampling, & Micro Well Installation
	ASTM D 1586, Standard Test Method for Standard Penetration Test (STP) and Split-Barrel Sampling of Soils
Rock Core Sampling	ASTM D 2113, Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigations
Lithologic Logging	FBP-ER-PRO-00042, Lithologic Logging
	ASTM D 5434, Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock
	ASTM D 2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
Decontamination	FBP-ER-PRO-00030, Decontamination of Sampling Equipment
Sample Shipping	FBP-ER-PRO-00018, Sample Shipping of Non-Hazardous Samples to Off-Site Laboratories
	FBP-WM-PRO-00009, Sample Shipping of Hazardous, Including Radioactive, Samples to Off-Site Laboratories
	ASTM D 4220, Standard Practices for Preserving and Transporting Soil Samples
Analytical procedures	
Semivolatile Organics	EPA SW-846, Method 8270
PCB	EPA SW-846, Method 8082
Pesticides	EPA SW-846, Method 8081
Chlorinated Herbicides	EPA SW-846, Method 8151
Metals	EPA SW-846, Methods 6010, 6020, 7471
Radionuclides	Alpha spectroscopy (uranium isotopics, neptunium-237, plutonium isotopics, americium-241, thorium isotopics)
	Liquid scintillation (technetium-99)

ASTM= American Society for Testing and Materials
EPA = U.S. Environmental Protection Agency
PCB = polychlorinated biphenyl
QA = quality assurance
QAPP = quality assurance program plan
QC = quality control

Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

MAY 30 2012

PPPO-03-1475324-12

Ms. Maria Galanti
Site Coordinator
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

Dear Ms. Galanti:

TRANSMITTAL OF PAGE CHANGES FOR FIELD CHANGE NOTICE FBP-ER-RCRA-WD-PLN-0040-R2-02 TO THE SOIL BACKGROUND STUDY SAMPLING AND ANALYSIS WORK PLAN

The purpose of this letter is to provide page changes associated with Field Change Notice (FCN) FBP-ER-RCRA-WD-PLN-0040-R2-02 to the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0250&D1). The enclosed information is provided as follow-up to an approved FCN; therefore, no response is necessary.

The U.S. Department of Energy (DOE) submitted FCN FBP-ER-RCRA-WD-PLN-0040-R2-02 to the Ohio Environmental Protection Agency (Ohio EPA) via e-mail on May 14, 2012, Ohio EPA approved the FCN request on May 15, 2012, pursuant to the requirements of the Ohio Consent Decree (Enclosure 1). FCN FBP-ER-RCRA-WD-PLN-0040-R2-02 revised some of the sampling locations based on field observations in Areas A, B, C, F, and G to either facilitate safe access to sampling locations or to move the locations to an area with the appropriate geologic soil type consistent with the data quality objectives of the approved work plan. Clean replacement pages and redline copies of the corresponding page changes, where appropriate, for FCN FBP-ER-RCRA-WD-PLN-0040-R2-02 are provided in Enclosure 2. Two large copies of the map (Plate 1) showing the background study sampling areas/locations are also enclosed.

If you have any questions, please contact Amy Lawson of my staff at (740) 897-2112.

Sincerely,

Joel B. Bradburne
Portsmouth Site Lead
Portsmouth/Paducah Project Office

Enclosures:

1. Field Change Notice Approval for FCN FBP-ER-RCRA-WD-PLN-0040-R2-02
2. Clean replacement and redline pages for FCN FBP-ER-RCRA-WD-PLN-0040-R2-02 (pages A-1 and B-1)
3. Plate 1, Background Study Sampling Areas/Locations on and Around the DOE Reservation

cc w/enclosures:
Vince.Adams@lex.doe.gov, PPPO/PORTS
Joel.Bradburne@lex.doe.gov, PPPO/PORTS
Amy.Lawson@lex.doe.gov, PPPO/PORTS
Kristi.Wiehle@lex.doe.gov, PPPO/PORTS
Jud.Lilly@lex.doe.gov, PPPO/PORTS
Ray.Miskelley@lex.doe.gov, PPPO/LEX
Jim.Sferra@epa.state.oh.us, Ohio EPA/Logan
Jamie.Jameson@fbports.com, FBP/PORTS
Dennis.Carr@fbports.com, FBP/PORTS
Jyh-Dong.Chiou@fbports.com, FBP/PORTS
Greg.Uetrecht@lex.doe.gov, HEI/PORTS
PPPO Records/LEX
RCRA Administrative Record

ENCLOSURE 1

Field Change Notice Approval

From: Galanti, Maria [mailto:maria.galanti@epa.state.oh.us]
Sent: Tuesday, May 15, 2012 11:00 AM
To: Lawson, Amy
Cc: Wiehle, Kristi; Stewart, Melody
Subject: RE: Field Change Request (FBP-ER-RCRA-WD-PLN-0040-R2-02) for the BKG Study Work Plan DOE/PPPO/03-0250&D1

Amy and Kristi,

Ohio EPA has completed the review of the field change request for the background study submitted to this office via e-mail on Monday, May 14, 2012. The field change requests was to move several sampling locations in Area A, Area B, Area C, Area F, and Area G to facilitate safe access to sampling locations and to locate the soil type that was the objective of the approved Work Plan. Pursuant to the requirements of the Ohio Consent Decree, Ohio EPA is approving the revised sampling location in Areas A, B, C, F and G.

If you have any questions, please do not hesitate to contact me.

Maria Galanti
Site Coordinator
Division of Environmental Response and Revitalization
maria.galanti@epa.ohio.gov
740-380-5289

From: Lawson, Amy [mailto:Amy.Lawson@lex.doe.gov]
Sent: Monday, May 14, 2012 11:01 AM
To: Galanti, Maria
Cc: Lawson, Amy; Wiehle, Kristi; Uetrecht, Greg (PPPO/ETS); Thompson, Steven (FBP); Guthrie, Steve (FBP)
Subject: Field Change Request (FBP-ER-RCRA-WD-PLN-0040-R2-02) for the BKG Study Work Plan DOE/PPPO/03-0250&D1

Maria,

The purpose of this email is to ask for your review and approval of a field change that has been classified as significant. A formal letter will be sent to you this week. The Soil Background Study Sampling and Analysis Work Plan (DOE/PPPO/03-0250&D1) established randomly selected soil sample locations to be collected over hundreds of acres of land both on and off the PORTS site. FBP mobilized for the Soil Background Study on March 29, 2012 and began marking proposed sample locations at off-site locations with uniquely identified pen-flags after access was granted to the off-site private properties. Several of the sample locations at the off-site properties were in areas with dense underbrush and mature trees, requiring a change in a number of sample locations to facilitate safe access. Upon field evaluation, FBP determined that some proposed sample locations were in areas with an elevation slightly above the elevation where the objective soil type is located. These areas had a native soil type that did not meet the objective of the Work Plan, requiring a change in these sample locations to facilitate the sampling of the correct soil type in order to meet the Work Plan objectives.

Consistent with Section 5.3 of the approved Work Plan, DOE is proposing to change select sample locations in areas A, B, C, F, and G. To accomplish these sample location changes, boundaries in sample areas A, B, C, F, and G were revised to eliminate areas with dense underbrush and mature trees and areas where the soil type did not meet the objective of the Work Plan. The sample size methodology in Section 5.5 of the Work Plan was implemented, using the remaining 200 ft x 200 ft grids in each affected sample area. To accomplish the sample location changes, new sample replacement locations were selected by a random number generator that included only available sampling grids that met the revised location criteria (no dense underbrush or mature trees and native soil type meeting work plan objectives) that were not already identified as sampling locations.

The revised sampling areas A, B, C, F, and G are fully accessible and are representative of the Lake Tight Buried Valley Aquifer sediments (Minford/Gallia materials) soil type which is the objective of the Work Plan. The following sections outline specific changes to the sample areas, revised sample area maps with revised sample locations as well as the original sample area map. Also, attached are the maps for the revised locations, there are 10 maps included and the maps are numbered starting with page 3 of 12, each file contains 2 maps.

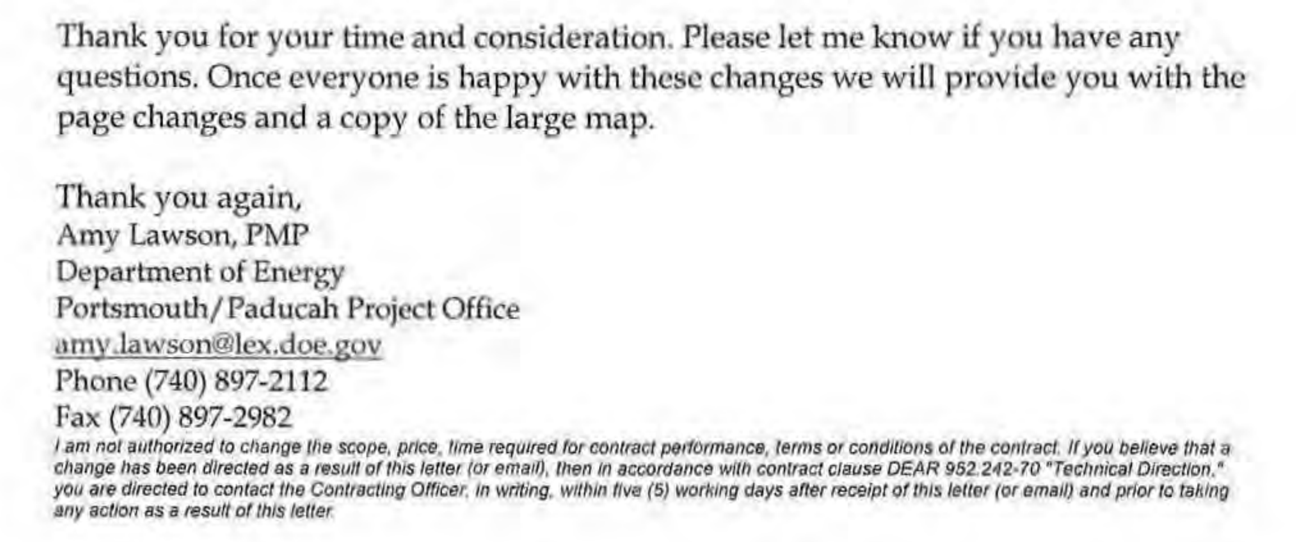
Area A: Sample location BKG-DPT02 was initially located in an area elevated approximately 20 feet above other sample locations in Area A with a soil type that did not meet the objectives of the Work Plan. This single sample location has been moved to a new location which is presented with the other sample locations in this area in Figure A-1. Figure A presents the original sample locations.

Area B: Sample location BKG-DPT12 was initially located in an area elevated approximately 20 feet above other sample locations in Area B with a soil type that did not meet the objectives of the Work Plan. This single sample location has been moved to a new location which is presented with the other sample locations in this area in Figure B-1. Figure B presents the original sample locations.

Area C: Sample locations BKG-DPT26, -DPT27, -DPT28, -DPT29, and -DPT30 were initially located in an area elevated approximately 20 feet above other sample locations in Area C with a soil type that did not meet the objectives of the Work Plan. Figure C-1 presents the revised sample locations and Figure C presents the original sample locations.

Area F: Sample locations BKG-DPT39, -DPT40, -DPT43, -DPT44, and -DPT47 were initially located in areas with dense underbrush and mature trees and with a soil type that did not meet the objectives of the Work Plan. Figure F-1 presents the revised sample locations and Figure F presents the original sample locations.

Area G: Sample locations BKG-DPT48, -DPT49, -DPT50, -DPT51, -DPT53, -DPT54, -DPT56, -DPT57, -DPT59, and –DPT60 were initially located in areas with dense underbrush and mature trees and with a soil type that did not meet the objectives of the Work Plan. Figure G-1 presents the revised sample locations and Figure G presents the original sample locations.



Thank you for your time and consideration. Please let me know if you have any questions. Once everyone is happy with these changes we will provide you with the page changes and a copy of the large map.

Thank you again,
Amy Lawson, PMP
Department of Energy
Portsmouth/Paducah Project Office
amy.lawson@lex.doe.gov
Phone (740) 897-2112
Fax (740) 897-2982

I am not authorized to change the scope, price, time required for contract performance, terms or conditions of the contract. If you believe that a change has been directed as a result of this letter (or email), then in accordance with contract clause DEAR 952.242-70 "Technical Direction," you are directed to contact the Contracting Officer, in writing, within five (5) working days after receipt of this letter (or email) and prior to taking any action as a result of this letter.

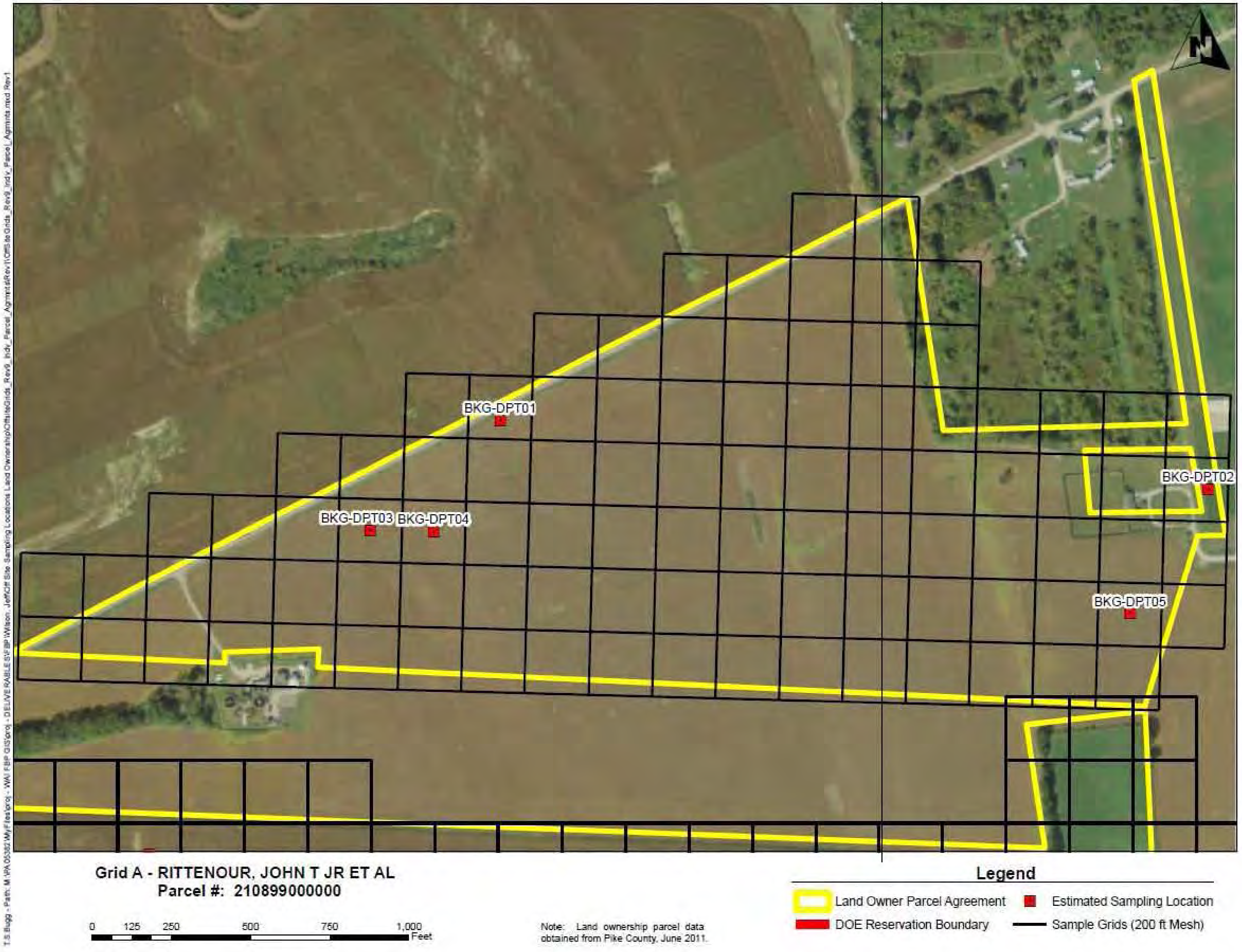
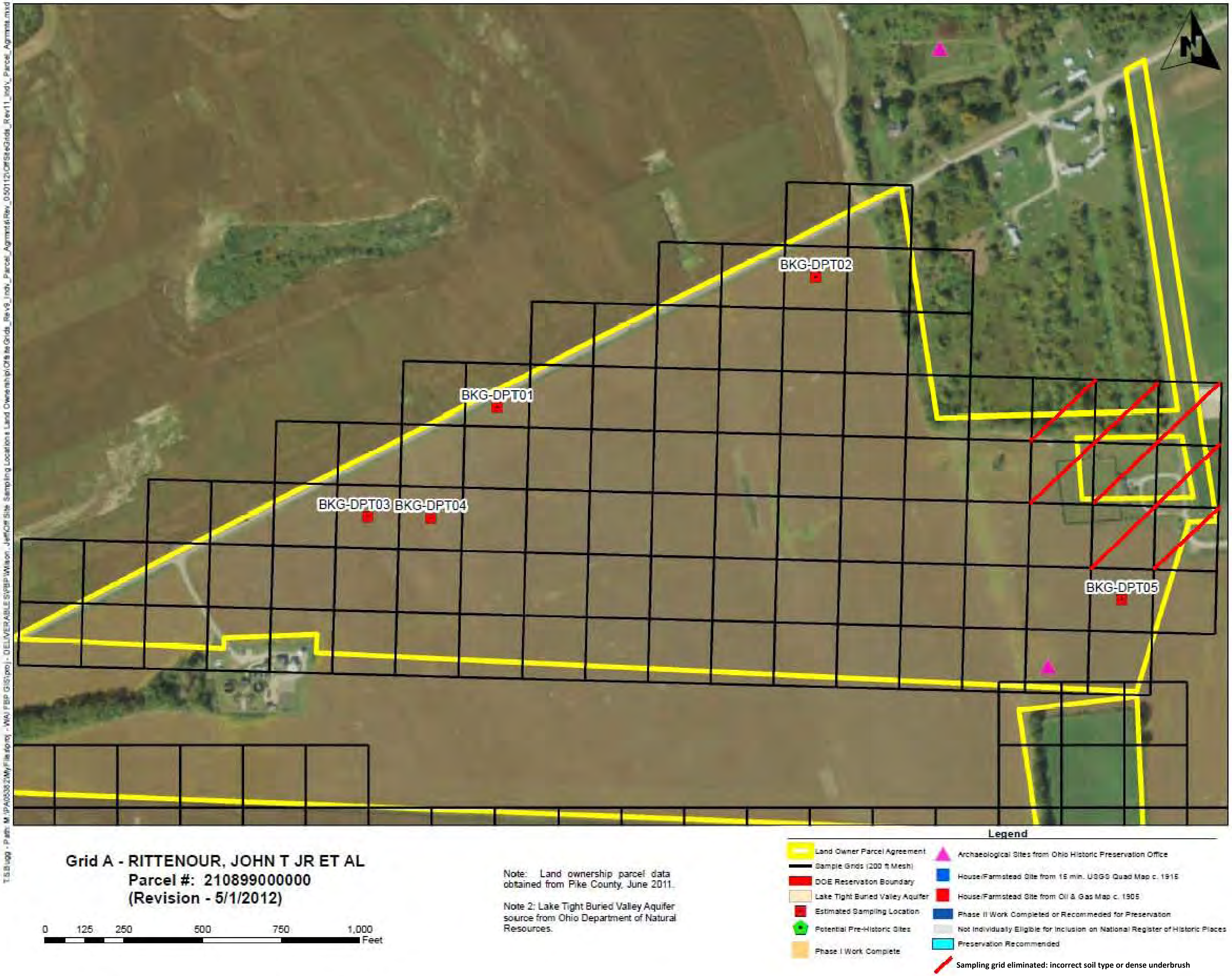


Figure A. Proposed Soil Background Study Area A Sampling Locations

3 of 12



Grid A - RITTENOUR, JOHN T JR ET AL
Parcel #: 210899000000
(Revision - 5/1/2012)

Note: Land ownership parcel data obtained from Pike County, June 2011.

Note 2: Lake Tight Buried Valley Aquifer source from Ohio Department of Natural Resources.

Legend

- 🟨 Land Owner Parcel Agreement
- ▬ Sample Grids (200 ft Mesh)
- 🟥 DOE Reservation Boundary
- ▭ Lake Tight Buried Valley Aquifer
- ▣ Estimated Sampling Location
- ⬟ Potential Pre-Historic Sites
- 🟧 Phase I Work Complete
- ▲ Archaeological Sites from Ohio Historic Preservation Office
- 🟦 House/Farmstead Site from 15 min. USGS Quad Map c. 1915
- 🟥 House/Farmstead Site from Oil & Gas Map c. 1905
- 🟦 Phase II Work Completed or Recommended for Preservation
- ⬜ Not Individually Eligible for Inclusion on National Register of Historic Places
- ▭ Preservation Recommended
- / **Sampling grid eliminated: incorrect soil type or dense underbrush**

Figure A-1. Final Soil Background Study Area A Sampling Locations

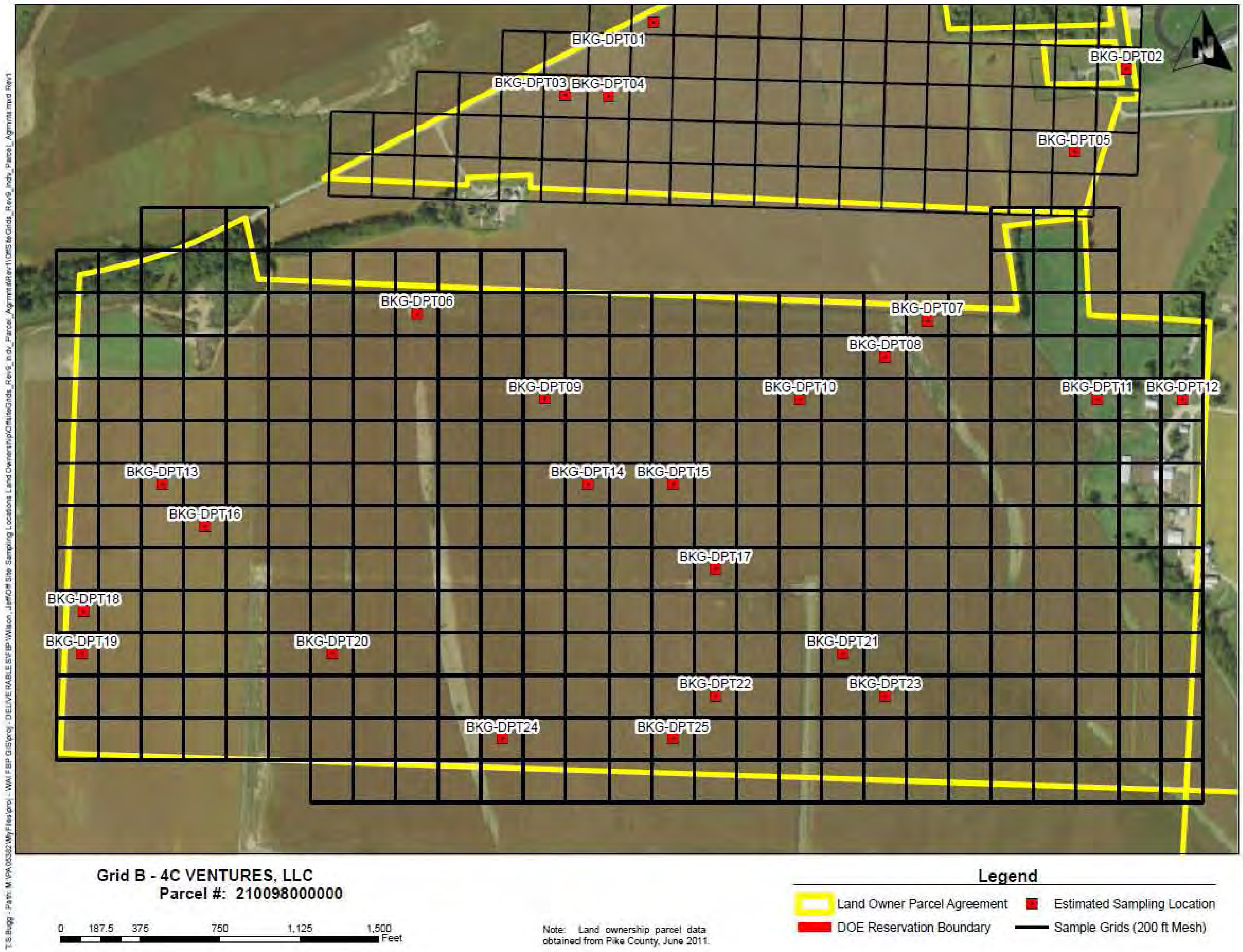


Figure B. Proposed Soil Background Study Area B Sampling Locations

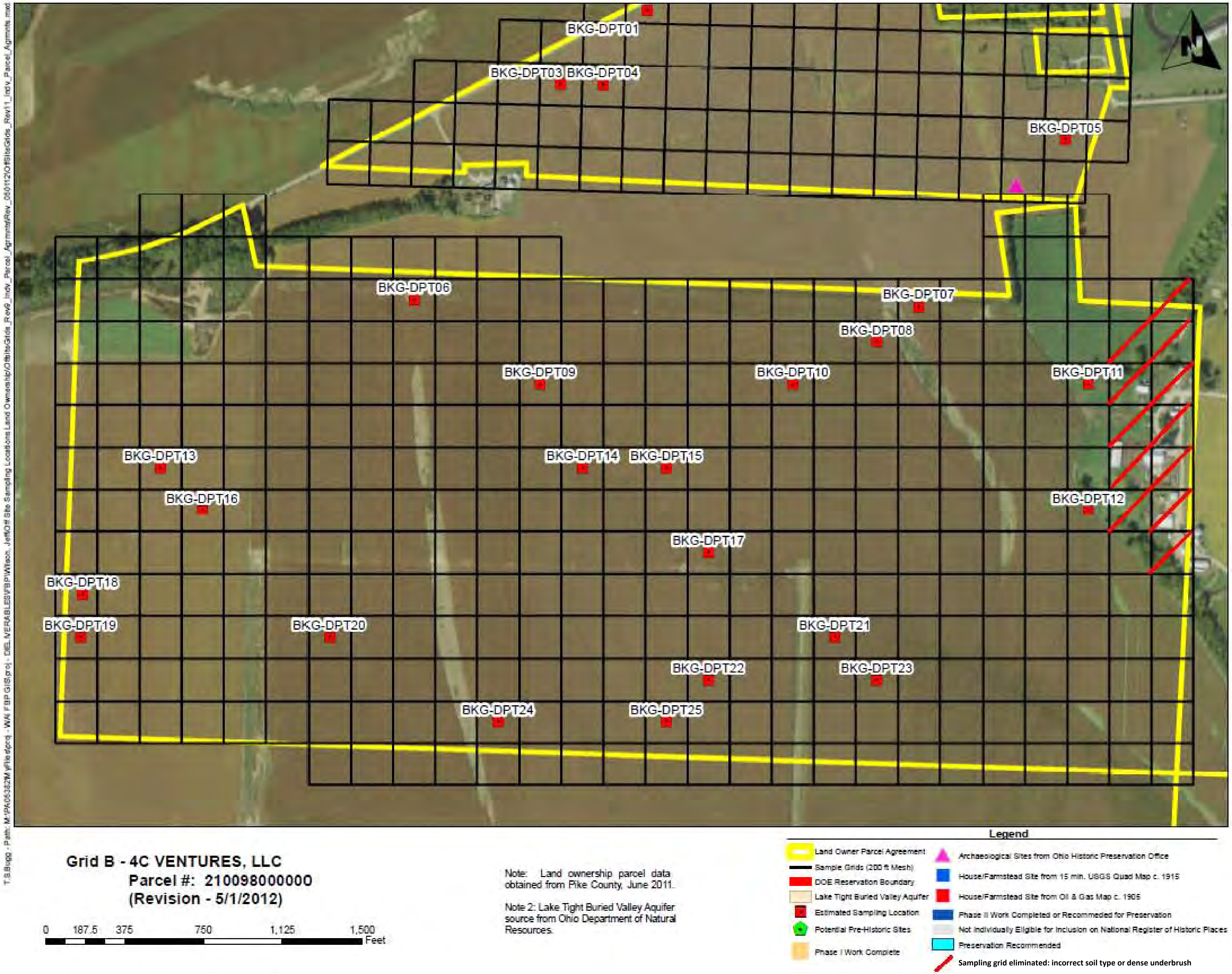


Figure B-1. Final Soil Background Study Area B Sampling Locations

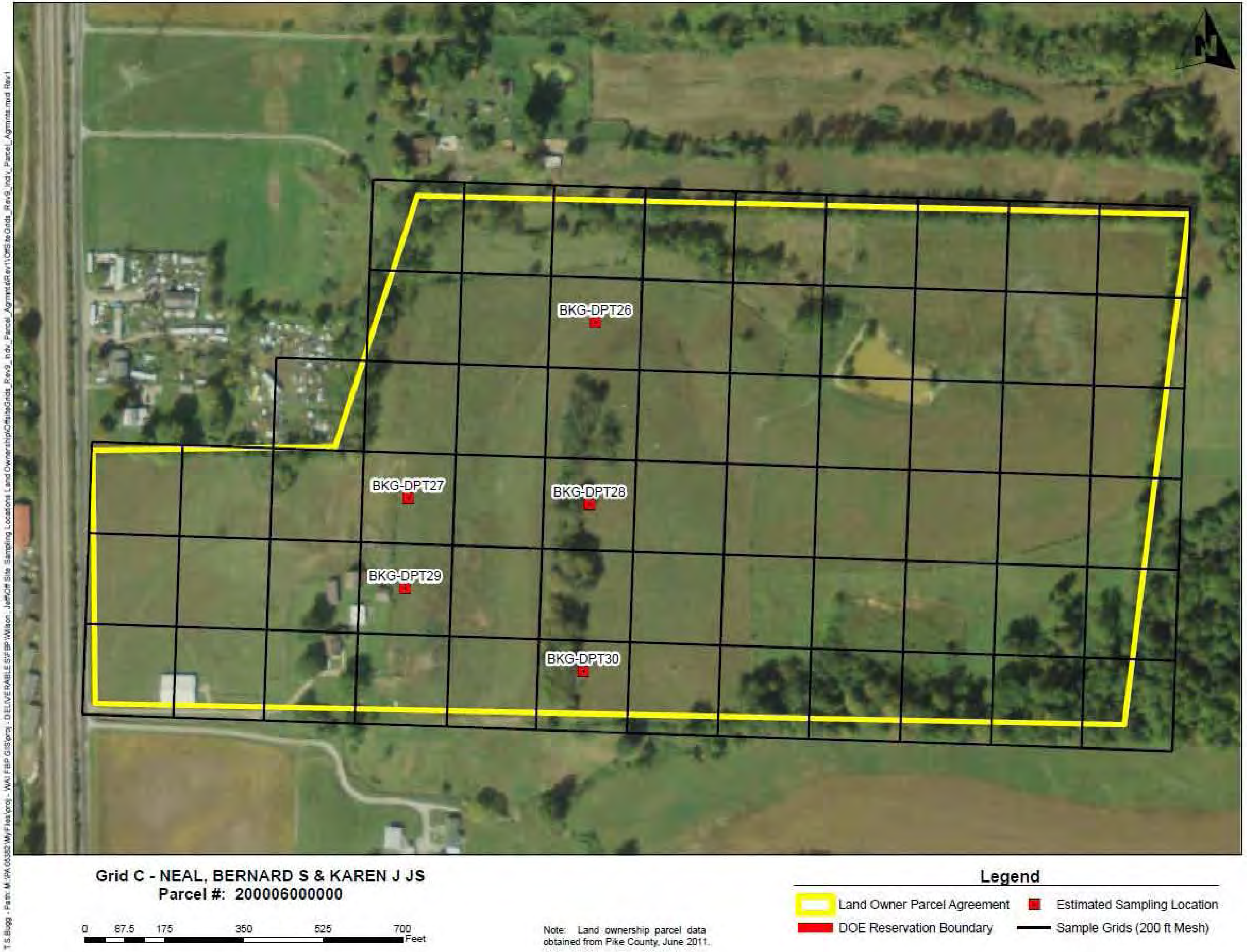


Figure C. Proposed Soil Background Study Area C Sampling Locations

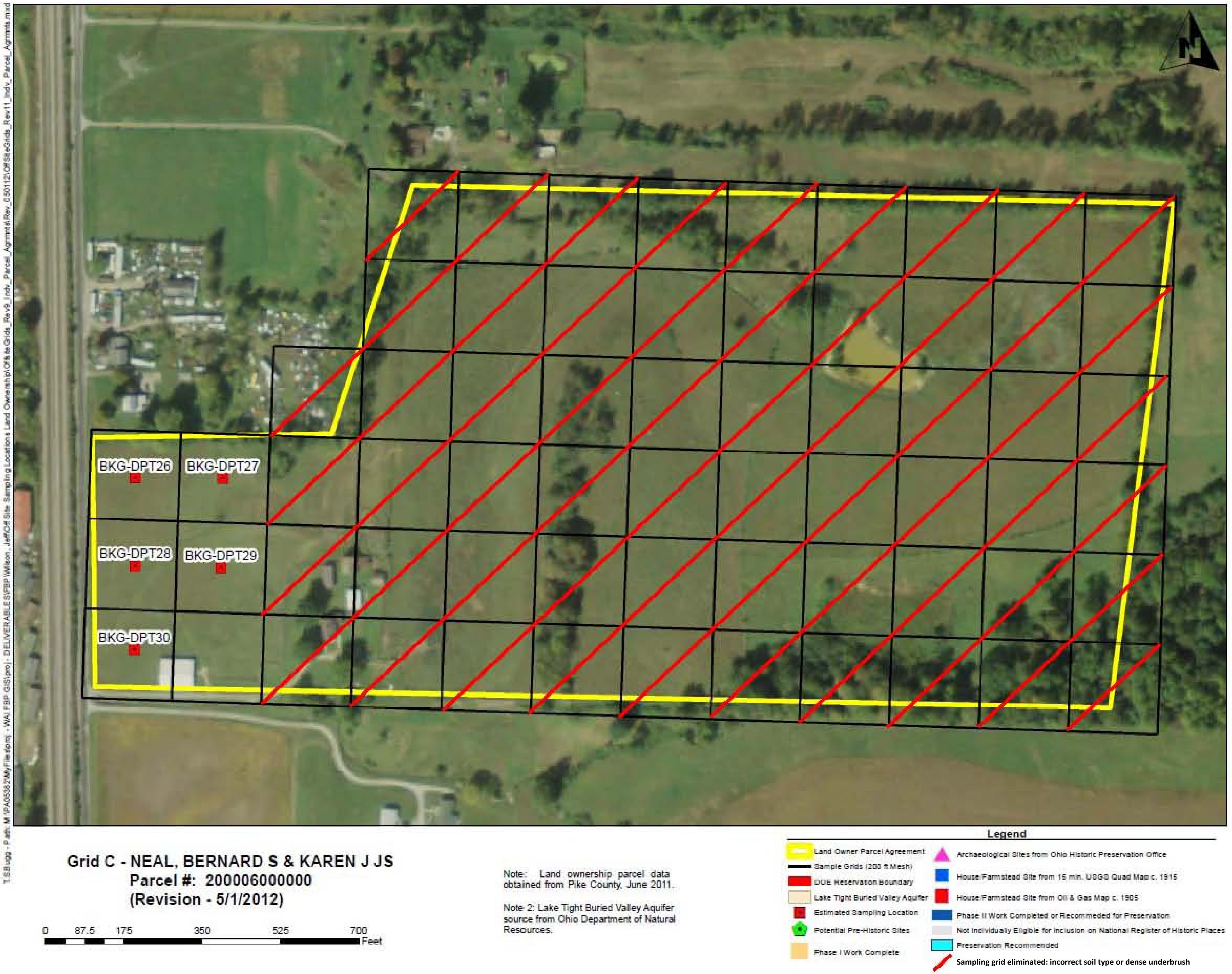


Figure C-1. Final Soil Background Study Area C Sampling Locations

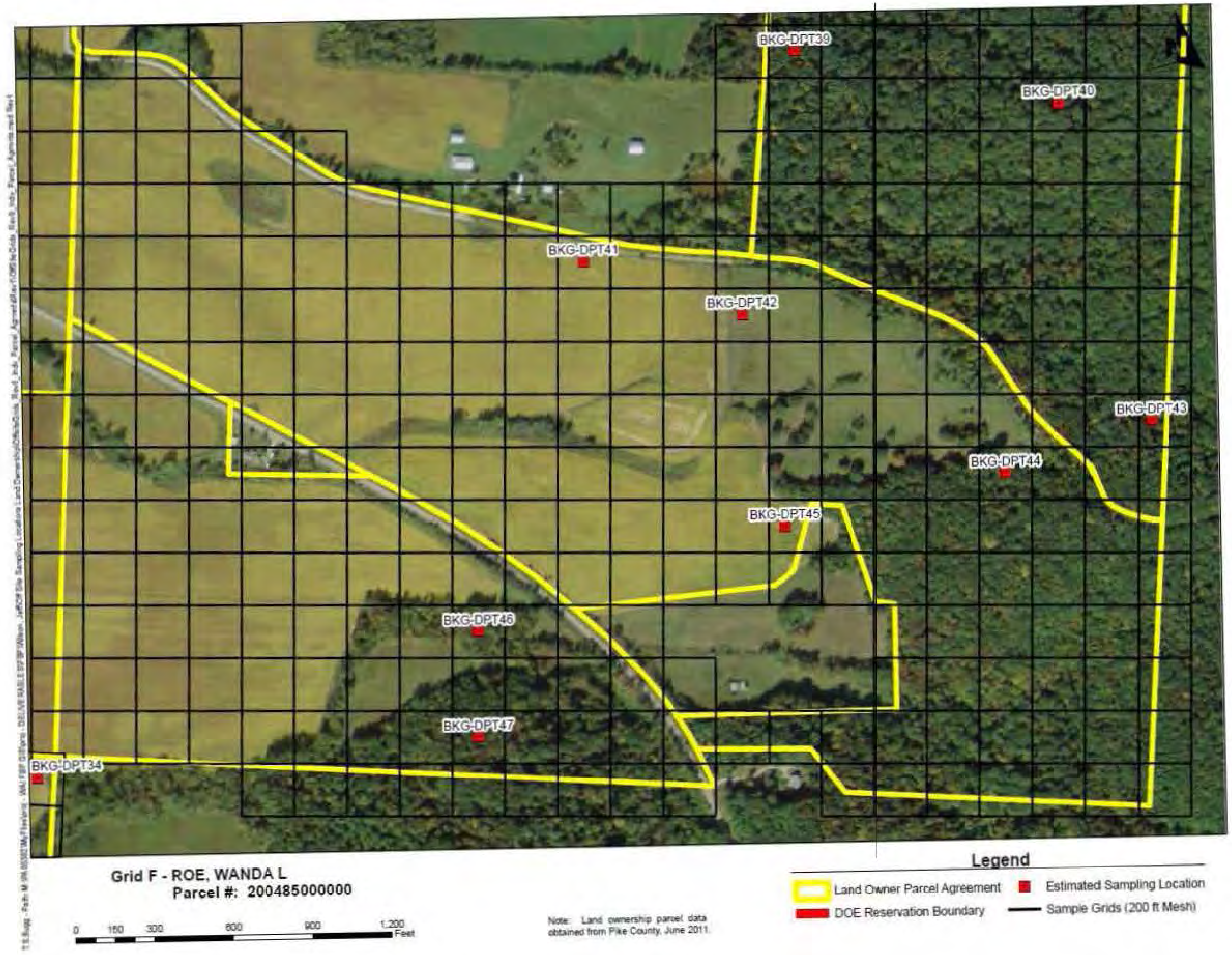


Figure F. Proposed Soil Background Study Area F Sampling Locations

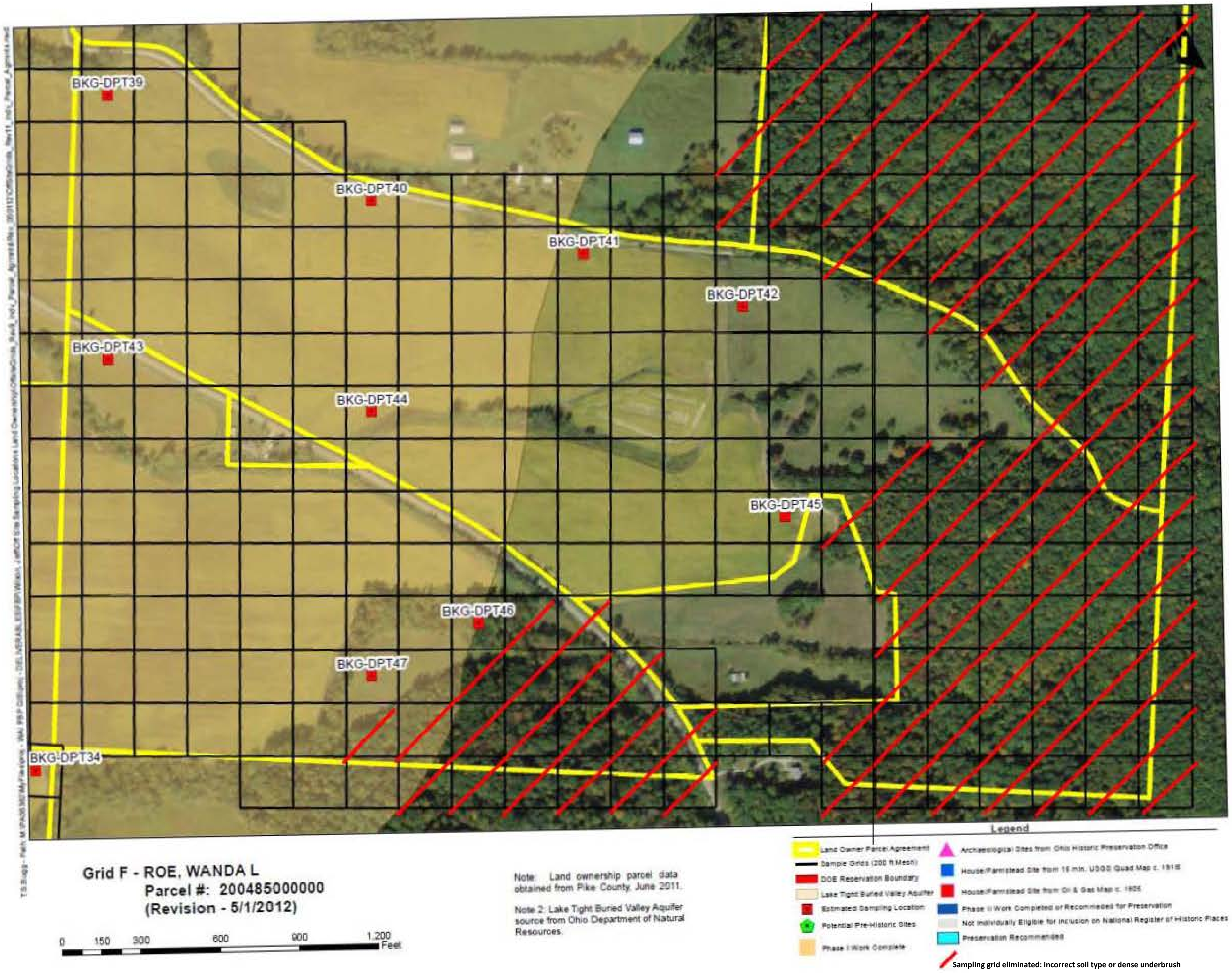


Figure F-1. Final Soil Background Study Area F Sampling Locations

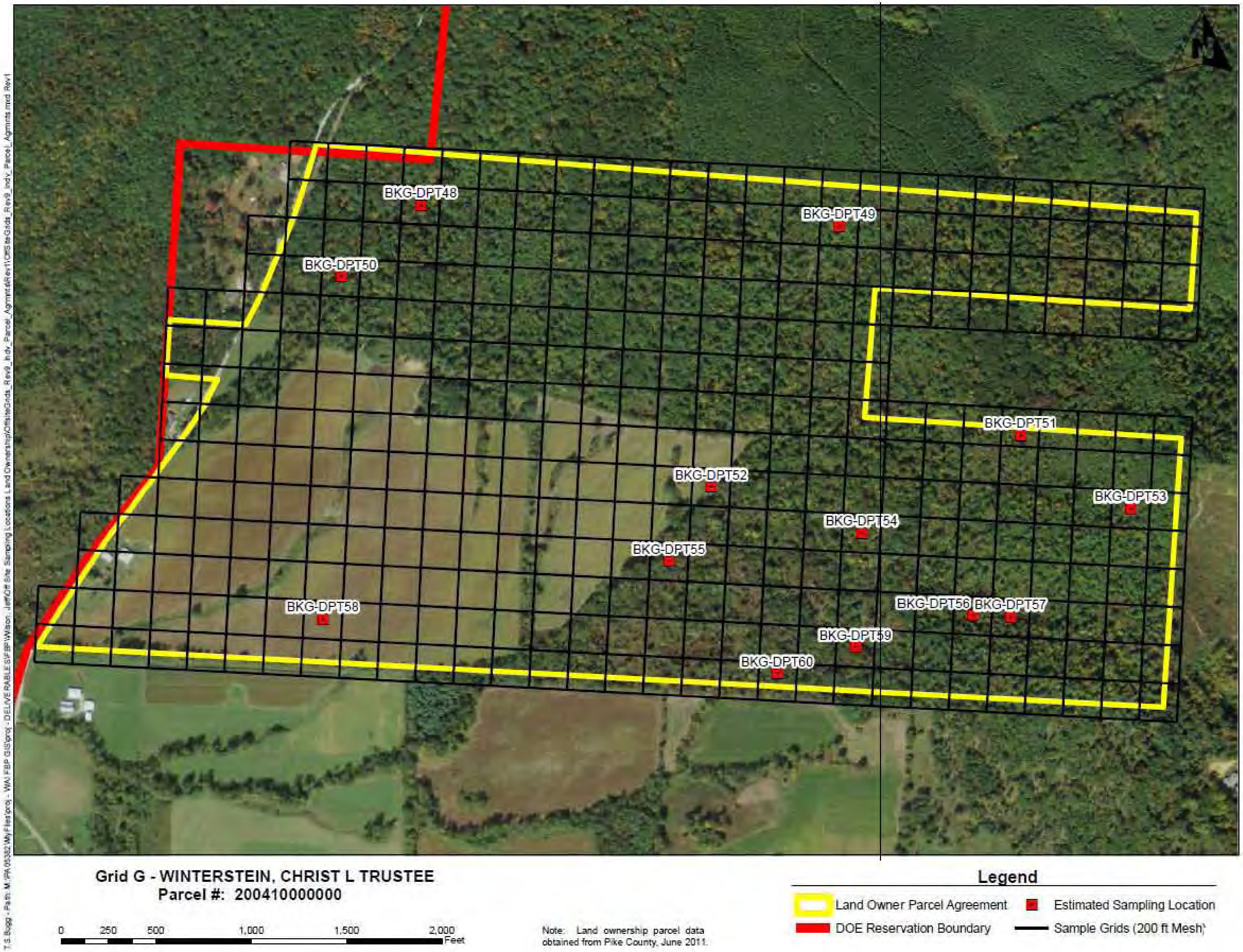


Figure G. Proposed Soil Background Study Area G Sampling Locations

11 of 12

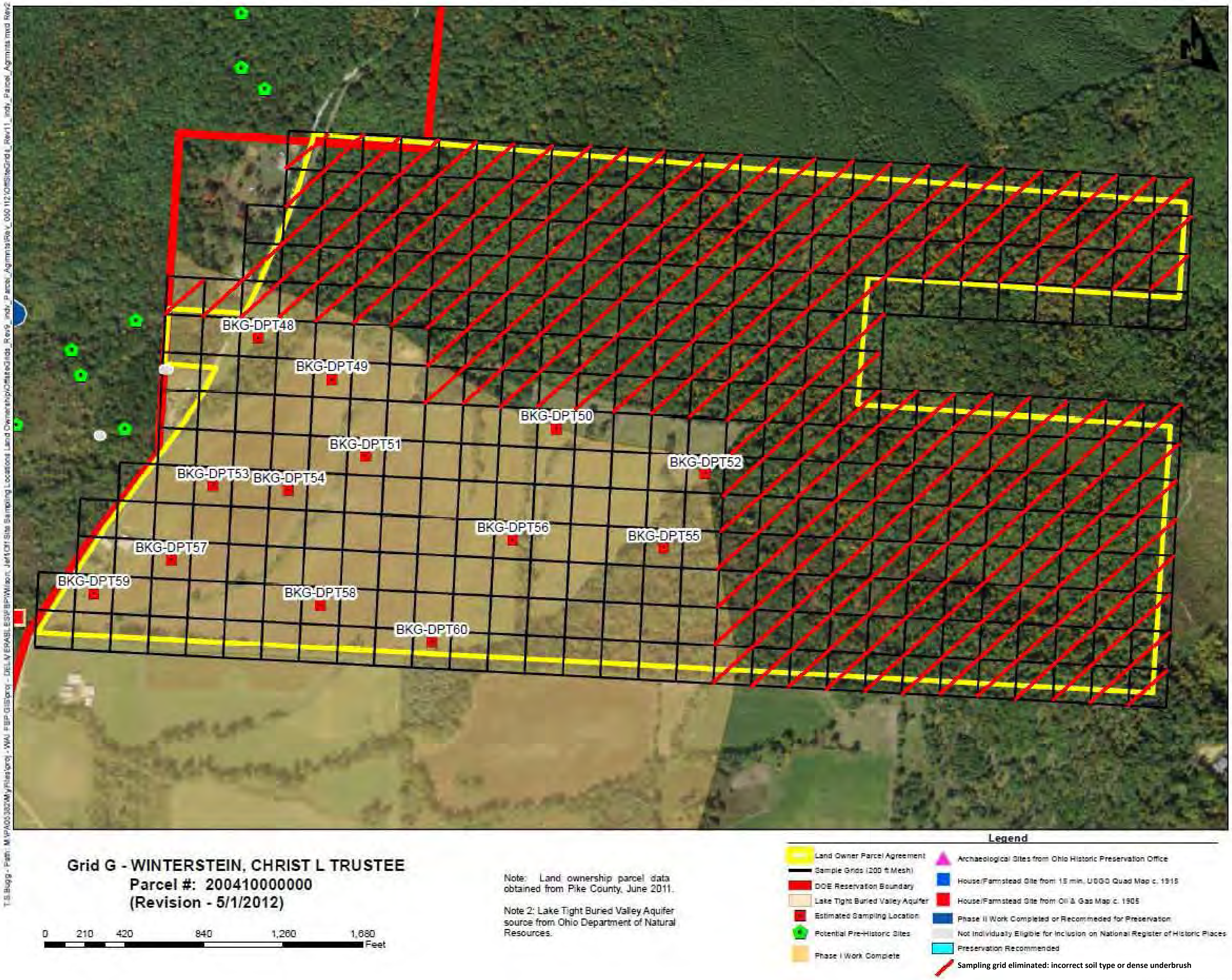


Figure G-1. Final Soil Background Study Area G Sampling Locations

12 of 12

ENCLOSURE 2

FCN FBP-ER-RCRA-WD-PLN-0040-R2-02: Clean Replacement and Redline Pages

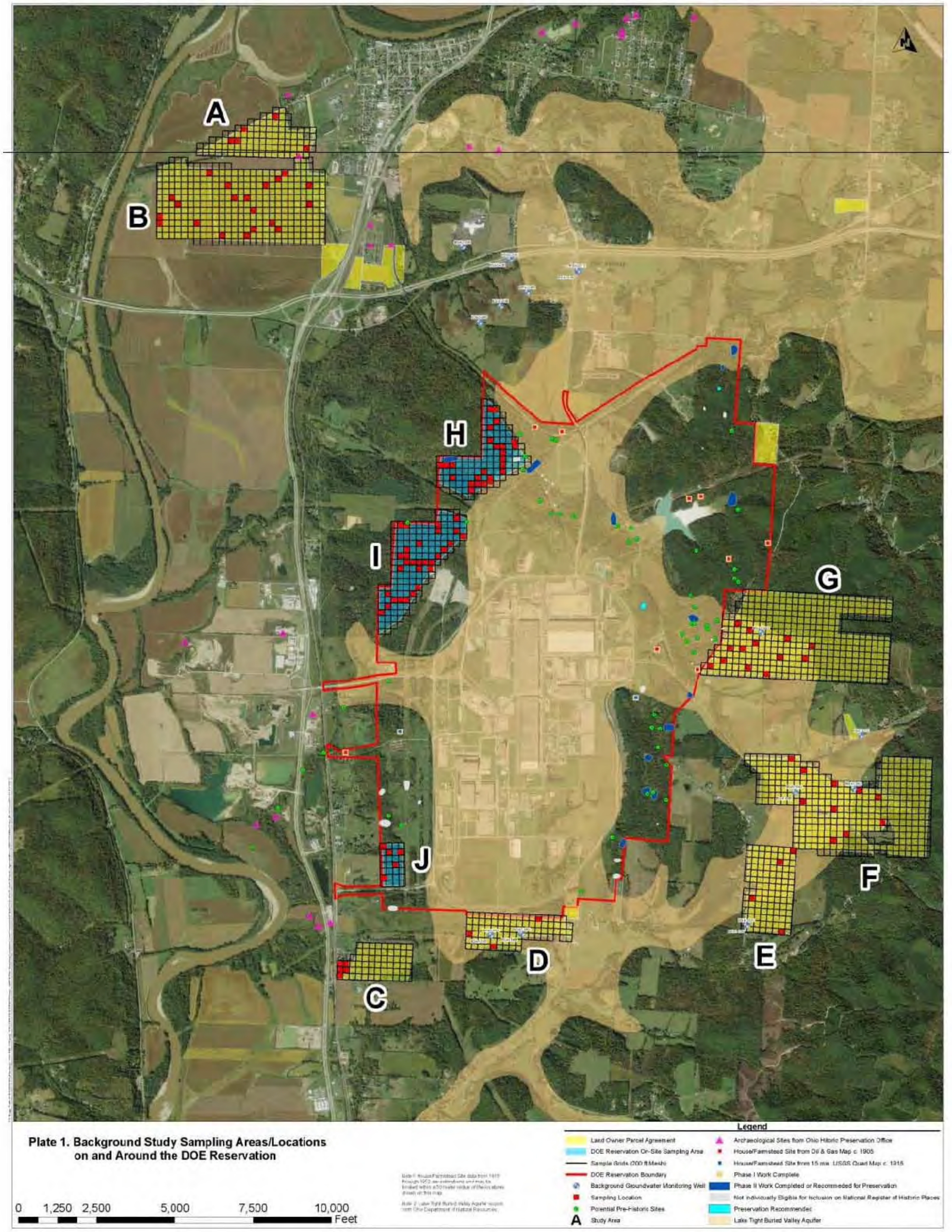


Plate 1. Background Study Sampling Areas/Locations on and Around the DOE Reservation

Summary of PORTS Soil Background Study Sampling

Sampling Area	No. of Potential Sampling Grids	No. of Proposed Sampling Grids	Proposed Sample Depths	Sample Collection Equipment
A	88	5	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated soil: 1-20’ bgs	DPT
B	327	20	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated soil: 1-20’ bgs	DPT
C	6	5	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated soil: 1-20’ bgs	DPT
D	83	3	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated Minford: 2-16’ bgs	DPT
			Saturated Minford/Gallia interface: 16-25’ bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
E	111	4	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated Minford: 2-16’ bgs	DPT
			Saturated Minford/Gallia interface: 16-25’ bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
F	237	10	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated Minford: 2-16’ bgs	DPT
			Saturated Minford/Gallia interface: 16-25’ bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
G	130	13	Surface soil: 0-1’ bgs	Hand auger or DPT
			Unsaturated Minford: 2-16’ bgs	DPT
			Saturated Minford/Gallia interface: 16-25’ bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
H	115	25	Surface soil: 0-1’ bgs	Hand auger
I	142	30	Surface soil: 0-1’ bgs	Hand auger
J	28	5	Surface soil: 0-1’ bgs	Hand auger

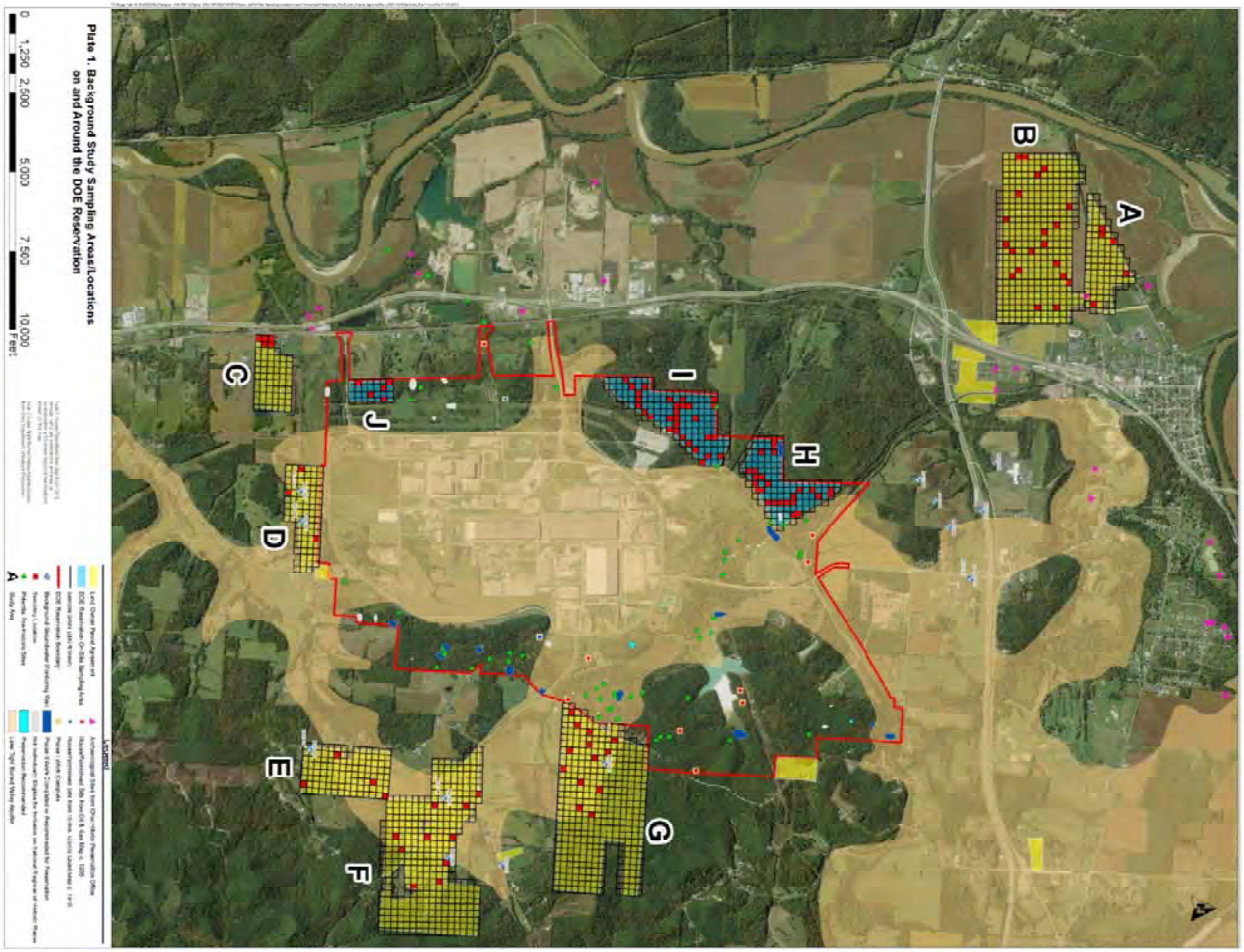
Assumptions:
1) Sampling grids are 200’ × 200’.
2) Samples will be collected at center point of grid (where possible).
3) Soil samples will be classified and described by a geologist familiar with PORTS per FBP procedure.
4) Surface samples will be collected vertically from 0-1’ bgs and composited (except VOCs).
5) In saturated conditions, no free liquids will be collected.
6) Sampling locations will be surveyed to acquire XYZ coordinates per FBP procedure.
7) QA/QC samples will be collected as follows:
- One field duplicate sample will be collected for each analytical batch or for every 20 samples, whichever is fewer. Field duplicates will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One field blank will be collected for each analytical batch or for every 20 samples whichever is fewer. Field blank samples will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One rinsate blank sample will be collected for each analytical batch or for every 20 samples whichever is fewer. Rinsate blank samples are samples of deionized ultra-filtered water that has been used to rinse decontaminated sampling equipment. The blanks will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One trip blank will be prepared for each shipment of VOC samples only. Trip blank samples will be analyzed for the same set of VOCs as the non-QA/QC samples being collected.

bgs = below ground surface
DPT = Direct Push Technology
FBP = Fluor-B&W Portsmouth LLC
PORTS = Portsmouth Gaseous Diffusion Plant

QA = Quality Assurance
QC = Quality Control
VOC = volatile organic compound

~~Master_Fcn 02~~ 5/23/2012 4:07 PM~~5/23/2012 10:54 AM~~

FBP~~Background Study D1 Rev 2 Master_Fcn 02~~~~Background Study D1 Rev 2~~



FCN FBP-ER-RCRA-WD-PLN-0040-R2-02, ~~May~~January 2012

FBP-ER-RCRA-WD-PLN-0040
Revision 2
/PPPO/03-0250&D1

Formatted: Font: 6 pt, Do not check spelling or grammar

Formatted: Font: 6 pt, Do not check spelling or grammar

Summary of PORTS Soil Background Study Sampling

Sampling Area	No. of Potential Sampling Grids	No. of Proposed Sampling Grids	Proposed Sample Depths	Sample Collection Equipment
A	88~~96~~	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 1-20' bgs	DPT
B	327~~339~~	20	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 1-20' bgs	DPT
C	~~64~~6	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 1-20' bgs	DPT
D	83	3	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
E	111	4	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
F	237~~354~~	10	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
G	130~~377~~	13	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
H	115	25	Surface soil: 0-1' bgs	Hand auger
I	142	30	Surface soil: 0-1' bgs	Hand auger
J	28	5	Surface soil: 0-1' bgs	Hand auger

Assumptions:
1) Sampling grids are 200' × 200'.
2) Samples will be collected at center point of grid (where possible).
3) Soil samples will be classified and described by a geologist familiar with PORTS per FBP procedure.
4) Surface samples will be collected vertically from 0-1' bgs and composited (except VOCs).
5) In saturated conditions, no free liquids will be collected.
6) Sampling locations will be surveyed to acquire XYZ coordinates per FBP procedure.
7) QA/QC samples will be collected as follows:

- One field duplicate sample will be collected for each analytical batch or for every 20 samples, whichever is fewer. Field duplicates will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One field blank will be collected for each analytical batch or for every 20 samples whichever is fewer. Field blank samples will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One rinsate blank sample will be collected for each analytical batch or for every 20 samples whichever is fewer. Rinsate blank samples are samples of deionized ultra-filtered water that has been used to rinse decontaminated sampling equipment. The blanks will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One trip blank will be prepared for each shipment of VOC samples only. Trip blank samples will be analyzed for the same set of VOCs as the non-QA/QC samples being collected.

bgs = below ground surface
DPT = Direct Push Technology
FBP = Fluor-B&W Portsmouth LLC
PORTS = Portsmouth Gaseous Diffusion Plant
QA = Quality Assurance
QC = Quality Control
VOC = volatile organic compound

Formatted: Font: Times New Roman

Formatted: Font: 11 pt

Formatted: Font: 6 pt, Do not check spelling or grammar

This page is intentionally left blank.

ENCLOSURE 3

Plate 1, Background Study Sampling Areas/Locations on and Around the DOE Reservation

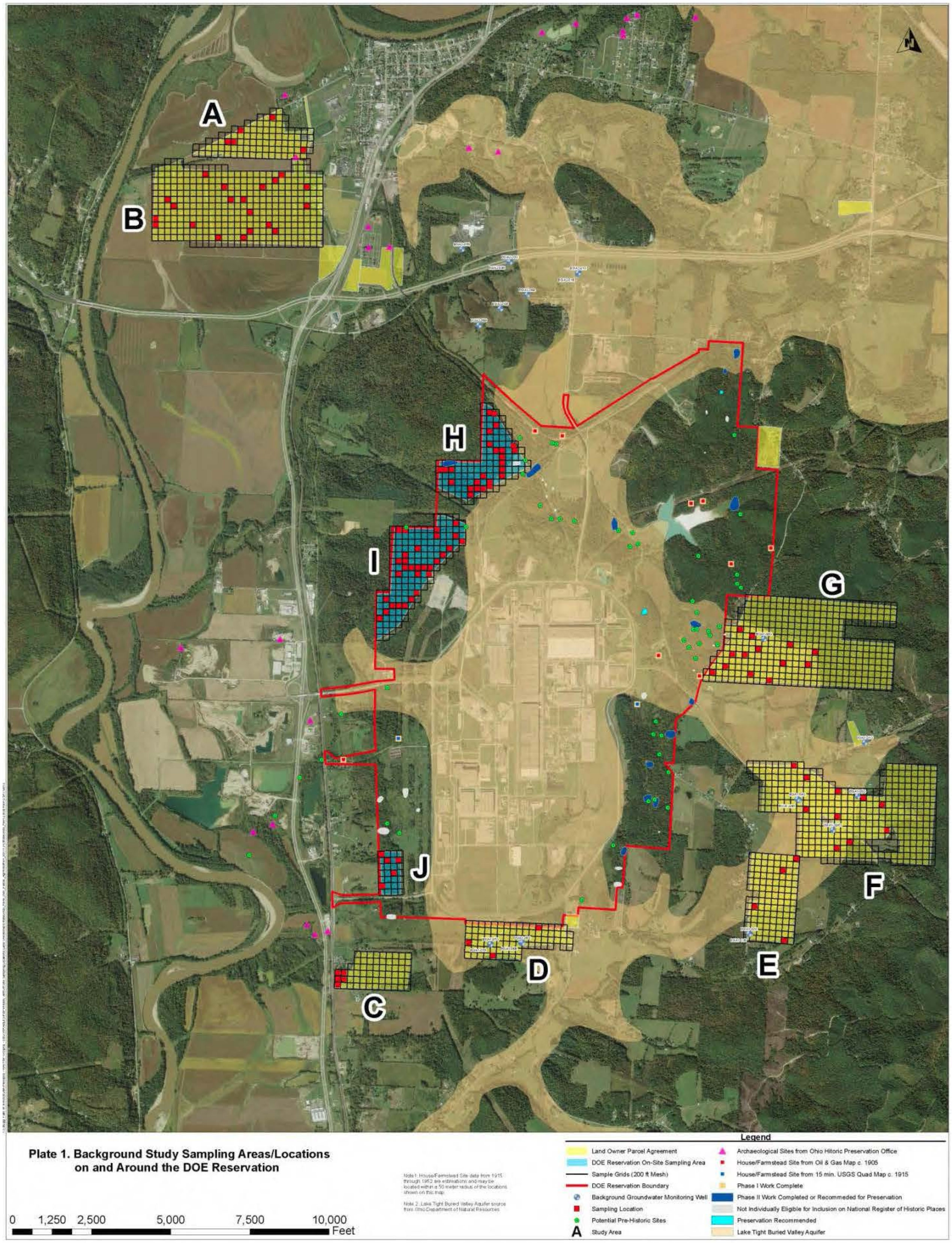


Plate 1. Background Study Sampling Areas/Locations on and Around the DOE Reservation

RECEIVED
25 JULY 2012
FBP12-001-257

Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

JUL 2 5 2012

PPPO-03-1507921-12

Ms. Maria Galanti
Site Coordinator
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

Dear Ms. Galanti:

TRANSMITTAL OF PAGE CHANGES FOR FIELD CHANGE NOTICE FBP-ER-RCRA-WD-PLN-0040-R2-03 TO THE SOIL BACKGROUND STUDY SAMPLING AND ANALYSIS WORK PLAN

The purpose of this letter is to provide page changes associated with Field Change Notice (FCN) FBP-ER-RCRA-WD-PLN-0040-R2-03 to the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0250&D1). The enclosed information is provided as follow-up to an approved FCN; therefore, no response is required.

The U.S. Department of Energy (DOE) submitted FCN FBP-ER-RCRA-WD-PLN-0040-R2-03 to the Ohio Environmental Protection Agency (Ohio EPA) via e-mail on June 27, 2012, and Ohio EPA approved the FCN request via e-mail on June 28, 2012, pursuant to the requirements of the Ohio Consent Decree (Enclosure 1). FCN FBP-ER-RCRA-WD-PLN-0040-R2-03 proposed changes to the Sampling and Analysis Plan (SAP) regarding sample collection, analytical methods, and data reporting. Clean replacement pages and redline copies of the corresponding page changes, where appropriate, for FCN FBP-ER-RCRA-WD-PLN-0040-R2-03 are provided in Enclosure 2.

If you have any questions, please contact Amy Lawson of my staff at (740) 897-2112.

Sincerely,

Joel B. Bradburne
Portsmouth Site Lead
Portsmouth/Paducah Project Office

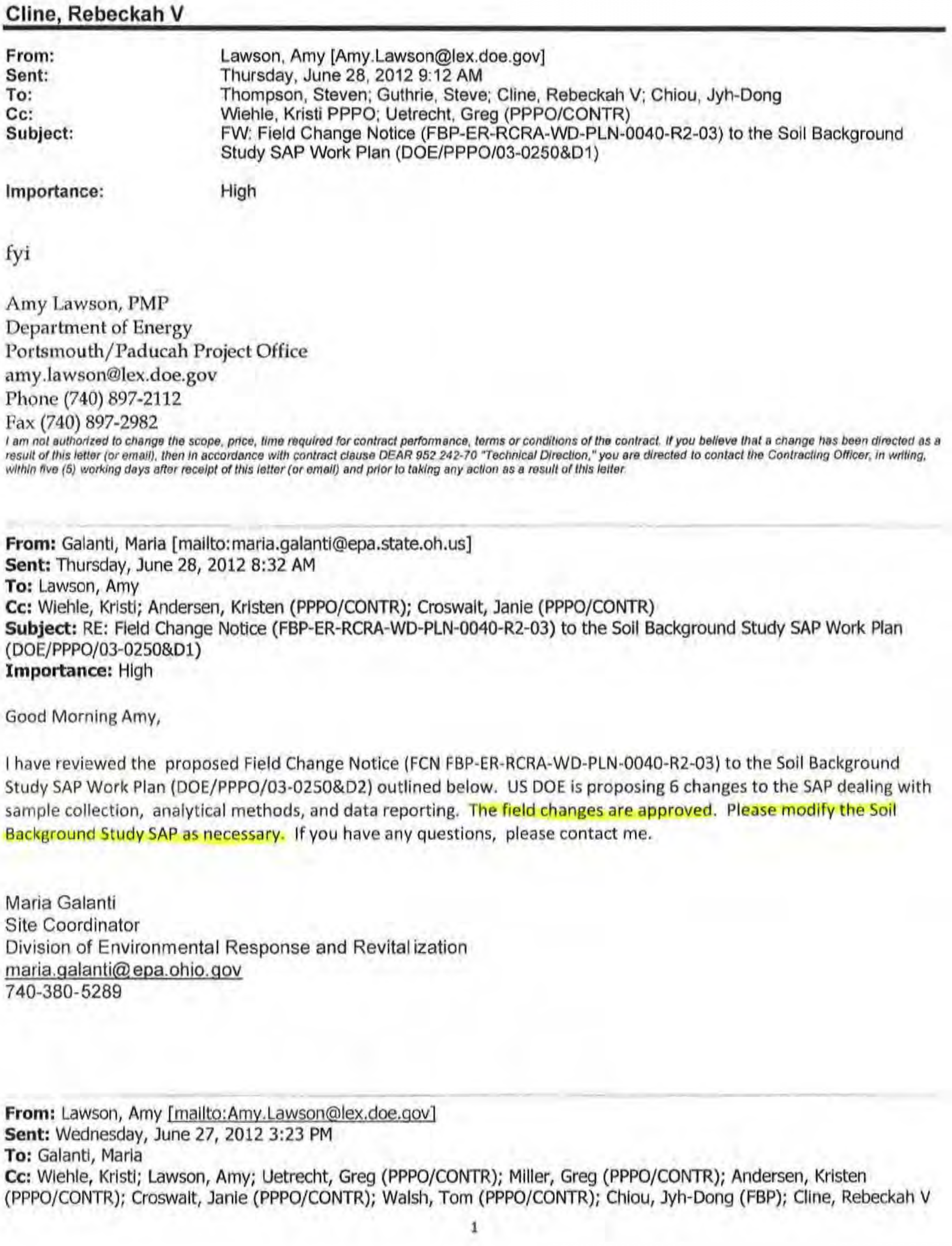
Enclosures:

1. Field Change Notice Approval for FCN FBP-ER-RCRA-WD-PLN-0040-R2-03
2. Clean replacement and redline pages for FCN FBP-ER-RCRA-WD-PLN-0040-R2-03 (pages 29, 32, 36, 37, 39, and B-1)

cc w/enclosures:
Vince.Adams@lex.doe.gov, PPPO/PORTS
Joel.Bradburne@lex.doe.gov, PPPO/PORTS
Amy.Lawson@lex.doe.gov, PPPO/PORTS
Kristi.Wiehle@lex.doe.gov, PPPO/PORTS
Jud.Lilly@lex.doe.gov, PPPO/PORTS
Jim.Sferra@epa.state.oh.us, Ohio EPA/Logan
Jamie.Jameson@fbports.com, FBP/PORTS
Dennis.Carr@fbports.com, FBP/PORTS
Jyh-Dong.Chiou@fbports.com, FBP/PORTS
Greg.Uetrecht@lex.doe.gov, HEI/PORTS
PPPO Records/LEX
RCRA Administrative Record

ENCLOSURE 1

Field Change Notice Approval



Cline, Rebeckah V

From:	Lawson, Amy [Amy.Lawson@lex.doe.gov]
Sent:	Thursday, June 28, 2012 9:12 AM
To:	Thompson, Steven; Guthrie, Steve; Cline, Rebeckah V; Chiou, Jyh-Dong
Cc:	Wiehle, Kristi PPPO; Uetrecht, Greg (PPPO/CONTR)
Subject:	FW: Field Change Notice (FBP-ER-RCRA-WD-PLN-0040-R2-03) to the Soil Background Study SAP Work Plan (DOE/PPPO/03-0250&D1)
Importance:	High

fyi

Amy Lawson, PMP
Department of Energy
Portsmouth/Paducah Project Office
amy.lawson@lex.doe.gov
Phone (740) 897-2112
Fax (740) 897-2982

From: Galanti, Maria [mailto:maria.galanti@epa.state.oh.us]
Sent: Thursday, June 28, 2012 8:32 AM
To: Lawson, Amy
Cc: Wiehle, Kristi; Andersen, Kristen (PPPO/CONTR); Croswait, Janie (PPPO/CONTR)
Subject: RE: Field Change Notice (FBP-ER-RCRA-WD-PLN-0040-R2-03) to the Soil Background Study SAP Work Plan (DOE/PPPO/03-0250&D1)
Importance: High

Good Morning Amy,

I have reviewed the proposed Field Change Notice (FCN FBP-ER-RCRA-WD-PLN-0040-R2-03) to the Soil Background Study SAP Work Plan (DOE/PPPO/03-0250&D2) outlined below. US DOE is proposing 6 changes to the SAP dealing with sample collection, analytical methods, and data reporting. The field changes are approved. Please modify the Soil Background Study SAP as necessary. If you have any questions, please contact me.

Maria Galanti
Site Coordinator
Division of Environmental Response and Revitalization
maria.galanti@epa.ohio.gov
740-380-5289

From: Lawson, Amy [mailto:Amy.Lawson@lex.doe.gov]
Sent: Wednesday, June 27, 2012 3:23 PM
To: Galanti, Maria
Cc: Wiehle, Kristi; Lawson, Amy; Uetrecht, Greg (PPPO/CONTR); Miller, Greg (PPPO/CONTR); Andersen, Kristen (PPPO/CONTR); Croswait, Janie (PPPO/CONTR); Walsh, Tom (PPPO/CONTR); Chiou, Jyh-Dong (FBP); Cline, Rebeckah V

(FBP); Thompson, Steven (FBP); Guthrie, Steve (FBP)
Subject: Field Change Notice (FBP-ER-RCRA-WD-PLN-0040-R2-03) to the Soil Background Study SAP Work Plan (DOE/PPPO/03-0250&D1)
Importance: High

Maria,

The purpose of this e-mail is to request your review and approval of a Field Change Notice (FCN FBP-ER-RCRA-WD-PLN-0040-R2-03) to the *Soil Background Study Sampling and Analysis Work Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0250&D2). The following changes are included in this FCN:

1. Revise Section 4, Step 5, second bullet, to state "Unsaturated Minford clay (discrete samples at 2-ft intervals from 1 ft to approximately 16 ft bgs)." During the Soil Background Study Data Quality Objectives (DQO) workshop with Ohio EPA in July 2011, collecting a composite soil sample from 1 – 10 ft bgs was considered. At the conclusion of the workshop, all parties agreed to collect discrete soil samples at 2-ft intervals from 1 ft to approximately 16 ft bgs and to only collect a composite sample in the deeper Gallia soils. Section 5.2 of the approved Soil Background Study Sampling and Analysis Plan (SAP) also identifies the sampling approach of collecting samples at discrete 2-ft intervals from 1 ft to 16 ft bgs.

2. Hexachlorobenzene and Pentachlorophenol are listed twice in Table 2 of the SAP. In one instance, Table 2 lists that samples will be analyzed for both constituents using Method 8270. In the second instance, Table 2 lists that samples will be analyzed for Hexachlorobenzene using Method 8081 and Pentachlorophenol using Method 8151, with more conservative reporting limits than Method 8270. Revise Table 2 to eliminate the reference to Method 8270 for these constituents. In accordance with Table 2, samples will be analyzed for Hexachlorobenzene and Pentachlorophenol using Methods 8081 and 8151, respectively.

3. Add an additional footnote to Table 2 stating "N-Nitrosodiphenylamine will be reported as Diphenylamine." N-Nitrosodiphenylamine cannot be reported; as stated in EPA Method 8270C, Revision 3, December 1996, Section 1.4.5, "N-Nitrosodiphenylamine decomposes in the gas chromatograph inlet and cannot be separated from Diphenylamine."

4. Add an additional footnote to Table 2 stating "4-Methylphenol co-elutes with 3-Methylphenol and cannot be reported separately by Method 8270; therefore, results will be reported as 3,4-Methylphenol."

5. Correct Table 2 of the SAP to identify the correct CAS number for bis(2-Chloroisopropyl)ether as 39638-32-9. The CAS number (108-60-1) currently listed in Table 2 of the SAP is actually for 2,2'-Dichlorodiisopropyl ether. While the two compounds have the same molecular formula, their structures are different; therefore, they are not synonyms and cannot share the same CAS number.

6. A clarification is needed to Item No. 2 of Variance FBP-ER-RCRA-WD-PLN-0040-R2-01 approved by Ohio EPA on April 6, 2012. Consistent with the above-referenced DQO agreement to collect discrete soil samples on 2-ft intervals, this clarification further revises Section 5.2 to specify that the unconsolidated Scioto River Valley subsurface soil samples (1ft to approximately 10 ft bgs) will be collected for lithologic description, and the approximate 8-10 ft bgs horizon/interval will be submitted for laboratory analysis.

Thank you for your time and consideration on this field change. Please let me know if you have any questions.

Thank you again,
Amy Lawson, PMP
Department of Energy
Portsmouth/Paducah Project Office
amy.lawson@lex.doe.gov
Phone (740) 897-2112
Fax (740) 897-2982

I am not authorized to change the scope, price, time required for contract performance, terms or conditions of the contract. If you believe that a change has been directed as a result of this letter (or email), then in accordance with contract clause DEAR 952.242-70 "Technical Direction," you are directed to contact the Contracting Officer, in writing, within five (5) working days after receipt of this letter (or email) and prior to taking any action as a result of this letter.

ENCLOSURE 2

FCN FBP-ER-RCRA-WD-PLN-0040-R2-03
Clean Replacement and Redline Pages

- Statistically sufficient number of soil samples from surface and subsurface formations in areas not affected by site operations

- Analytical results of COPCs in the soil samples

- Statistical analyses of the analytical results.

Step 4 - Define the boundaries of the study

Ten study areas have been identified as potential soil background sampling locations. Guidelines for selecting these ten areas include: similar environment of deposition and geologic source materials as PORTS, reasonable proximity to the PORTS facility, surface and subsurface materials located in the Scioto River Valley associated with DOE pump houses and pipe lines, and areas un-affected by PORTS or other significant sources of contamination. In addition, the western side of the DOE reservation was selected for soil background sample collection to evaluate any radiological contribution from historical nuclear testing in the western United States as determined by evaluation of recent and historical wind rose diagrams. Boundary conditions specific to the soil background study include consideration that some sampling locations may be limited by access to private properties, formation samples include the Minford, Gallia, Cuyahoga, Sunbury, and Berea formations, and no groundwater will be characterized at this time.

Step 5 - Develop the analytic approach

Several intrusive field methods will be used to obtain the required soil data to support this background study including hand auguring, direct-push technology (DPT), and other drilling methods suitable for drilling in both unconsolidated and limited bedrock formations. A follow-up technical meeting was held in September 2011 with Ohio EPA to discuss the sample approach and sample locations. Soil boring samples will consist of DPT continuous soil sampling tubes and split-spoon samples from discrete depth intervals. Seven soil sample populations are proposed for this background study:

- Surface soils (0-1 ft bgs, Minford clay)

- Unsaturated Minford clay (discrete samples at 2-ft intervals from 1 ft to approximately 16 ft bgs),

- Saturated Minford clay/silt (16 ft bgs – immediately above the Minford/Gallia (cemented – where present) interface (25 ft bgs)

- "Cemented" (where present) Gallia material and 6 in. immediately above

- Saturated Gallia material (composited). Analysis will be performed on all discrete and composited samples for COPCs in Table 2 in Section 5.4 of this work plan

- Surface soils and Subsurface soils/material in the unconsolidated, unsaturated Scioto River Valley immediately west of the DOE reservation.

Subsurface rock samples collected under the Geotechnical SAP will be analyzed to determine conditions in the Cuyahoga, Sunbury, and Berea formations. Inorganic and radiological COPCs indentified in the *Geotechnical Sampling and Analysis Plan* (DOE 2011b) Table 3 and total organic carbon will be analyzed for rock samples.

unsaturated subsurface soil sample (approximately 8 to 10 ft bgs with a lithologic description from 1 ft to approximately 10 ft bgs) will be collected. Figure 12 shows a graphic of the vertical sample profile. Appendix B presents a summary of the PORTS soil background study sampling, including the number of proposed sample grids, sample depths, and sampling equipment.

5.3 SAMPLING PROCEDURES

The primary focus of the field sampling is to collect geochemical data identified during the DQO workshop in July 2011. This section identifies the media to be sampled during the field investigation and specifies the methods for collecting and analyzing the samples. Investigation activities will use standard industry practices that are consistent with EPA procedures and protocols. Procedures and methods that will guide the Background Study are listed in Table 1. If field conditions differ from those anticipated, the sampling approach, if appropriate, will be evaluated and revisions to the sampling program will be made as needed. Additional soil borings or DPT locations may be utilized as warranted by the analysis and evaluation of field collected data with Ohio EPA approval. Any additional locations will require the approval of a field change request in accordance with Fluor B&W Portsmouth LLC (FBP) procedures and with Ohio EPA approval.

5.4 ANALYTICAL PARAMETERS

Analytical data will be generated using EPA SW-846 and Standard Methods or other well-established, approved methods for the regulatory based parameters. For radiological parameters, EPA approved methods or other well-established, approved methods shall be used. All soil samples will be analyzed for the parameters listed in Table 2. Those constituents in Table 2 that do not have a reporting limit listed will be deferred to the recommended reporting limit in the laboratory method. This list was compiled from a review of all significant PORTS COPCs, as listed in Table 3 of the *Methods for Conducting Human Health Risk Assessments and Risk Evaluations* (DOE 2011a) including inorganics and radionuclides. The extensive sample and analyte set is comprehensive in order to ensure all potential future background data requirements can be met. Collection of this comprehensive data set should not be construed to suggest that DOE will seek to establish PRGs or final cleanup levels for all analytes.

The analytical services representative will verify the analytical data to determine if data deliverables are in compliance with the laboratory statement of work. A laboratory approved per the DOE Consolidated Audit Program shall perform all analyses. The approved laboratory shall possess an appropriate license issued by the Nuclear Regulatory Commission (NRC), a license issued by an NRC-approved agreement state, or shall be a DOE facility.

To ensure the quality of analytical data, all of the samples will be analyzed at Analytical Support Level 4 (i.e., full data deliverable and full analytical quality control, 1/20 or 1/batch). Results will receive 100 percent verification and a minimum 10 percent validation on a randomly selected data set at Validation Support Level D for COPCs which are evaluated to establish clean-up levels under the Consent Decree and/or CERCLA 120(h) processes.

All data will be validated in accordance with FBP internal procedures and include examination of field measurements, sampling and handling procedures, laboratory analysis, and reporting and non-conformance.

5.5 SAMPLE SIZE

Background sample populations targeted in this study include: 1) upwind hillside surface soils; 2) non-site-impacted Minford soils; 3) non-site-impacted Gallia deposits; and 4) Scioto River Valley soils. To obtain representative samples of upwind hillside surface soils, surface soil samples will be collected in Areas H, I, and J (as shown on Plate 1); representative samples of off-site Minford and Gallia deposits

Table 2. Analytical Parameters

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
SVOC	Benzoic acid	166.5 µg/kg	65-85-0	EPA SW-846 8270	14
	Benzyl alcohol	100 µg/kg	100-51-6		14
	Bis(2-chloroethoxy)methane	100 µg/kg	111-91-1		14
	Bis(2-chloroethyl)ether	100 µg/kg	111-44-4		14
	Bis(2-chloroisopropyl)ether	100 µg/kg	39638-32-9		14
	Bis(2-ethylhexyl)phthalate	100 µg/kg	117-81-7		14
	Bromophenyl phenyl ether, 4-	100 µg/kg	101-55-3		14
	Butyl benzyl phthalate	100 µg/kg	85-68-7		14
	Chloro-3-methylphenol, 4-	100 µg/kg	59-50-7		14
	Chloroaniline, 4-	100 µg/kg	106-47-8		14
	Chloronaphthalene, 2-	10 µg/kg	91-58-7		14
	Chlorophenol, 2-	100 µg/kg	95-57-8		14
	Chlorophenyl phenyl ether, 4-	100 µg/kg	7005-72-3		14
	Cresol, o- (Methylphenol, 2-)	100 µg/kg	95-48-7		14
	Cresol, p- (Methylphenol, 4-)[b]	100 µg/kg	106-44-5		14
	Dibenzofuran	100 µg/kg	132-64-9		14
	Dichlorobenzene, 1,2-	100 µg/kg	95-50-1		14
	Dichlorobenzene, 1,3-	100 µg/kg	541-73-1		14
	Dichlorobenzene, 1,4-	100 µg/kg	106-46-7		14
	Dichlorophenol, 2,4-	100 µg/kg	120-83-2		14
	Dichorobenzidine, 3,3'-	100 µg/kg	91-94-1		14
	Diethyl phthalate	100 µg/kg	84-66-2		14
	Dimethyl phthalate	100 µg/kg	131-11-3		14
	Dimethylphenol, 2,4-	100 µg/kg	105-67-9		14
	Di-n-butyl phthalate	100 µg/kg	84-74-2		14
	Dinitro-2-methylphenol, 4,6-	100 µg/kg	534-52-1		14
	Dinitrophenol, 2,4-	100 µg/kg	51-28-5		14
	Dinitrotoluene, 2,4-	100 µg/kg	121-14-2		14
	Dinitrotoluene, 2,6-	100 µg/kg	606-20-2		14
	Di-n-octylphthalate	100 µg/kg	117-84-0		14
	Hexachlorobutadiene	100 µg/kg	87-68-3		14
	Hexachlorocyclopentadiene	100 µg/kg	77-47-4		14
	Hexachloroethane	100 µg/kg	67-72-1		14
	Isophorone	100 µg/kg	78-59-1		14
	Nitroaniline, 2-	100 µg/kg	88-74-4		14
	Nitroaniline, 3-	100 µg/kg	99-09-2		14
	Nitroaniline, 4-	100 µg/kg	100-01-6		14

Table 2. Analytical Parameters (Continued)

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
SVOC (continued)	Nitrobenzene	100 µg/kg	98-95-3	EPA SW-846 8270	14
	Nitrophenol, 2-	100 µg/kg	88-75-5		14
	Nitrophenol, 4-	100 µg/kg	100-02-7		14
	Nitroso-di-n-propylamine, N-	100 µg/kg	621-64-7		14
	Nitrosodiphenylamine, N-(Diphenylamine)[c]	100 µg/kg	86-30-6		14
	Phenol	100 µg/kg	108-95-2		14
	Trichlorobenzene, 1,2,4-	100 µg/kg	120-82-1		14
	Trichlorophenol, 2,4,5-	100 µg/kg	95-95-4		14
	Trichlorophenol, 2,4,6-	100 µg/kg	88-06-2		14
ncPAH	Acenaphthene	10 µg/kg	83-32-9	EPA SW-846 8270	14
	Acenaphthylene	10 µg/kg	208-96-8		14
	Anthracene	10 µg/kg	120-12-7		14
	Benzo(g,h,i)perylene	10 µg/kg	191-24-2		14
	Fluorene	10 µg/kg	86-73-7		14
	Fluoranthene	10 µg/kg	206-44-0		14
	Methylnaphthalene, 2-	10 µg/kg	91-57-6		14
	Naphthalene	10 µg/kg	91-20-3		14
	Phenanthrene	10 µg/kg	85-01-8		14
	Pyrene	10 µg/kg	129-00-0		14
cPAH	Benzo(a)anthracene	10 µg/kg	56-55-3	EPA SW-846 8270	14
	Benzo(a)pyrene	10 µg/kg	50-32-8		14
	Benzo(b)fluoranthene	10 µg/kg	205-99-2		14
	Benzo(k)fluoranthene	10 µg/kg	207-08-9		14
	Chrysene	10 µg/kg	218-01-9		14
	Dibenz(a,h)anthracene	10 µg/kg	53-70-3		14
	Indeno(1,2,3-cd)pyrene	10 µg/kg	193-39-5		14
PCB	Aroclor-1016	1.1 µg/kg	12674-11-2	EPA SW-846 8082	14
	Aroclor-1221	1.1 µg/kg	11104-28-2		14
	Aroclor-1232	1.1 µg/kg	11141-16-5		14
	Aroclor-1242	1.1 µg/kg	53469-21-9		14
	Aroclor-1248	1.1 µg/kg	12672-29-6		14
	Aroclor-1254	1.1 µg/kg	11097-69-1		14
	Aroclor-1260	1.1 µg/kg	11096-82-5		14
	Aroclor-1268	1.1 µg/kg	11100-14-4		14
	Aroclor, total	1.11 µg/kg	1336-36-3		14

Table 2. Analytical Parameters (Continued)

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
Metals (continued)	Silver	1 mg/kg	7440-22-4	EPA SW-846 6010B/6020	180
	Sodium	500 mg/kg	7440-23-5		180
	Thallium	20 mg/kg	7440-28-0		180
	Uranium	0.04 mg/kg	7440-61-1		180
	Vanadium	2 mg/kg	7440-62-2		180
	Zinc	20 mg/kg	7440-66-6		180
	Mercury	0.02 mg/kg	7439-97-6	Method 7471A	28
	Cyanide, Total	0.5 mg/kg	57-12-5	Method 9012	14
	Fluoride	10 mg/kg	16984-48-8	Method 9056	28
Radionuclides	Americium-241	0.10 pCi/g	14596-10-2	Alpha Spec	180
	Neptunium-237	0.10 pCi/g	13994-20-2		180
	Thorium-228	0.10 pCi/g	14274-82-9		180
	Thorium-230	0.05 pCi/g	14269-63-7		180
	Thorium-232	0.10 pCi/g	7440-29-1		180
	Plutonium-238	0.10 pCi/g	13981-16-3		180
	Plutonium-239/240	0.10 pCi/g	15117-48-3		180
	Uranium-233/234	0.10 pCi/g	13966-29-5		180
	Uranium-235/236	0.10 pCi/g	15117-96-1		180
	Uranium-238	0.10 pCi/g	24678-82-8		180
	Technetium-99	0.5 pCi/g	7440-26-8	LSC/ICP-MS	180
Chlorinated Herbicides	2,4-D	1.66 ug/kg	94-75-7	EPA SW-846 8151	14
	2,4,-DB	1.66 ug/kg	94-82-6		14
	2,4,5-TP (Silvex)	1.66 ug/kg	93-72-1		14
	2,4,5-T	1.66 ug/kg	93-76-5		14
	Dalapon	20.0 ug/kg	75-99-0		14
	Dicamba	1.66 ug/kg	1918-00-9		14
	Dichloroprop	1.66 ug/kg	120-36-5		14
	Dinoseb	1.66 ug/kg	88-85-7		14
	MCPA	230 ug/kg	94-74-6		14
	MCPP	200 ug/kg	93-65-2		14
	Pentachlorophenol	1.0 ug/kg	87-86-5		14

[a] Best available technology will be applied to achieve the lowest reporting limit possible.

[b] 4-Methylphenol coelutes with 3-Methylphenol and cannot be reported separately by Method 8270; therefore, results for 3,4-Methylphenol will be reported.

[c] N-Nitrosodiphenylamine will be reported as Diphenylamine.

CAS = Chemical Abstract Service
EPA = U.S. Environmental Protection Agency
cPAH = cancerous polycyclic aromatic hydrocarbons
ncPAH = non-cancerous polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound

Summary of PORTS Soil Background Study Sampling

Sampling Area	No. of Potential Sampling Grids	No. of Proposed Sampling Grids	Proposed Sample Depths	Sample Collection Equipment
A	88	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8-10' bgs	DPT
B	327	20	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8-10' bgs	DPT
C	6	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8-10' bgs	DPT
D	83	3	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
E	111	4	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
F	237	10	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
G	130	13	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
H	115	25	Surface soil: 0-1' bgs	Hand auger
I	142	30	Surface soil: 0-1' bgs	Hand auger
J	28	5	Surface soil: 0-1' bgs	Hand auger

Assumptions:
1) Sampling grids are 200' × 200'.
2) Samples will be collected at center point of grid (where possible).
3) Soil samples will be classified and described by a geologist familiar with PORTS per FBP procedure.
4) Surface samples will be collected vertically from 0-1' bgs and composited (except VOCs).
5) In saturated conditions, no free liquids will be collected.
6) Sampling locations will be surveyed to acquire XYZ coordinates per FBP procedure.
7) QA/QC samples will be collected as follows:

- One field duplicate sample will be collected for each analytical batch or for every 20 samples, whichever is fewer. Field duplicates will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One field blank will be collected for each analytical batch or for every 20 samples whichever is fewer. Field blank samples will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One rinsate blank sample will be collected for each analytical batch or for every 20 samples whichever is fewer. Rinsate blank samples are samples of deionized ultra-filtered water that has been used to rinse decontaminated sampling equipment. The blanks will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
- One trip blank will be prepared for each shipment of VOC samples only. Trip blank samples will be analyzed for the same set of VOCs as the non-QA/QC samples being collected.

bgs = below ground surface
DPT = Direct Push Technology
FBP = Fluor-B&W Portsmouth LLC
PORTS = Portsmouth Gaseous Diffusion Plant

QA = Quality Assurance
QC = Quality Control
VOC = volatile organic compound

- Statistically sufficient number of soil samples from surface and subsurface formations in areas not affected by site operations
- Analytical results of COPCs in the soil samples
- Statistical analyses of the analytical results.

Step 4 - Define the boundaries of the study
Ten study areas have been identified as potential soil background sampling locations. Guidelines for selecting these ten areas include: similar environment of deposition and geologic source materials as PORTS, reasonable proximity to the PORTS facility, surface and subsurface materials located in the Scioto River Valley associated with DOE pump houses and pipe lines, and areas un-affected by PORTS or other significant sources of contamination. In addition, the western side of the DOE reservation was selected for soil background sample collection to evaluate any radiological contribution from historical nuclear testing in the western United States as determined by evaluation of recent and historical wind rose diagrams. Boundary conditions specific to the soil background study include consideration that some sampling locations may be limited by access to private properties, formation samples include the Minford, Gallia, Cuyahoga, Sunbury, and Berea formations, and no groundwater will be characterized at this time.

Step 5 - Develop the analytic approach
Several intrusive field methods will be used to obtain the required soil data to support this background study including hand auguring, direct-push technology (DPT), and other drilling methods suitable for drilling in both unconsolidated and limited bedrock formations. A follow-up technical meeting was held in September 2011 with Ohio EPA to discuss the sample approach and sample locations. Soil boring samples will consist of DPT continuous soil sampling tubes and split-spoon samples from discrete depth intervals. Seven soil sample populations are proposed for this background study:

- Surface soils (0-1 ft bgs, Minford clay)
- Unsaturated Minford clay (~~1-10 ft bgs, composited and discrete samples, and~~ discrete samples at 2-ft intervals from 1 ft to approximately ~~12, 14, and~~ 16 ft bgs),
- Saturated Minford clay/silt (16 ft bgs – immediately above the Minford/Gallia (cemented – where present) interface (25 ft bgs)
- "Cemented" (where present) Gallia material and 6 in. immediately above
- Saturated Gallia material (composited). Analysis will be performed on all discrete and composited samples for COPCs in Table 2 in Section 5.4 of this work plan
- Surface soils and Subsurface soils/material in the unconsolidated, unsaturated Scioto River Valley immediately west of the DOE reservation.

Subsurface rock samples collected under the Geotechnical SAP will be analyzed to determine conditions in the Cuyahoga, Sunbury, and Berea formations. Inorganic and radiological COPCs indentified in the *Geotechnical Sampling and Analysis Plan* (DOE 2011b) Table 3 and total organic carbon will be analyzed for rock samples.

Formatted: Font: 6 pt, Do not check spelling or grammar

Formatted: Font: 6 pt, Do not check spelling or grammar unsaturated subsurface soil~~s~~ sample (approximately 8 to 10 ft bgs with a lithologic description from 1 ft to approximately 10 ft bgs) ~~(1 ft to approximately 20 ft bgs)~~ will be collected. Figure 12 shows a graphic of the vertical sample profile. Appendix B presents a summary of the PORTS soil background study sampling, including the number of proposed sample grids, sample depths, and sampling equipment.

Formatted: Font: 10 pt

5.3 SAMPLING PROCEDURES

The primary focus of the field sampling is to collect geochemical data identified during the DQO workshop in July 2011. This section identifies the media to be sampled during the field investigation and specifies the methods for collecting and analyzing the samples. Investigation activities will use standard industry practices that are consistent with EPA procedures and protocols. Procedures and methods that will guide the Background Study are listed in Table 1. If field conditions differ from those anticipated, the sampling approach, if appropriate, will be evaluated and revisions to the sampling program will be made as needed. Additional soil borings or DPT locations may be utilized as warranted by the analysis and evaluation of field collected data with Ohio EPA approval. Any additional locations will require the approval of a field change request in accordance with Fluor B&W Portsmouth LLC (FBP) procedures and with Ohio EPA approval.

5.4 ANALYTICAL PARAMETERS

Analytical data will be generated using EPA SW-846 and Standard Methods or other well-established, approved methods for the regulatory based parameters. For radiological parameters, EPA approved methods or other well-established, approved methods shall be used. All soil samples will be analyzed for the parameters listed in Table 2. Those constituents in Table 2 that do not have a reporting limit listed will be deferred to the recommended reporting limit in the laboratory method. This list was compiled from a review of all significant PORTS COPCs, as listed in Table 3 of the *Methods for Conducting Human Health Risk Assessments and Risk Evaluations* (DOE 2011a) including inorganics and radionuclides. The extensive sample and analyte set is comprehensive in order to ensure all potential future background data requirements can be met. Collection of this comprehensive data set should not be construed to suggest that DOE will seek to establish PRGs or final cleanup levels for all analytes.

Formatted: Font: 10 pt

The analytical services representative will verify the analytical data to determine if data deliverables are in compliance with the laboratory statement of work. A laboratory approved per the DOE Consolidated Audit Program shall perform all analyses. The approved laboratory shall possess an appropriate license issued by the Nuclear Regulatory Commission (NRC), a license issued by an NRC-approved agreement state, or shall be a DOE facility.

Formatted: Font: 10 pt

To ensure the quality of analytical data, all of the samples will be analyzed at Analytical Support Level 4 (i.e., full data deliverable and full analytical quality control, 1/20 or 1/batch). Results will receive 100 percent verification and a minimum 10 percent validation on a randomly selected data set at Validation Support Level D for COPCs which are evaluated to establish clean-up levels under the Consent Decree and/or CERCLA 120(h) processes.

All data will be validated in accordance with FBP internal procedures and include examination of field measurements, sampling and handling procedures, laboratory analysis, and reporting and non-conformance.

5.5 SAMPLE SIZE

Background sample populations targeted in this study include: 1) upwind hillside surface soils; 2) non-site-impacted Minford soils; 3) non-site-impacted Gallia deposits; and 4) Scioto River Valley soils. To obtain representative samples of upwind hillside surface soils, surface soil samples will be collected in Areas H, I, and J (as shown on Plate 1); representative samples of off-site Minford and Gallia deposits

Formatted: Font: 6 pt

Table 2. Analytical Parameters

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
SVOC	Benzoic acid	166.5 µg/kg	65-85-0	EPA SW-846 8270	14
	Benzyl alcohol	100 µg/kg	100-51-6		14
	Bis(2-chloroethoxy)methane	100 µg/kg	111-91-1		14
	Bis(2-chloroethyl)ether	100 µg/kg	111-44-4		14
	Bis(2-chloroisopropyl)ether	100 µg/kg	~~108-60-1~~39638-32-9		14
	Bis(2-ethylhexyl)phthalate	100 µg/kg	117-81-7		14
	Bromophenyl phenyl ether, 4-	100 µg/kg	101-55-3		14
	Butyl benzyl phthalate	100 µg/kg	85-68-7		14
	Chloro-3-methylphenol, 4-	100 µg/kg	59-50-7		14
	Chloroaniline, 4-	100 µg/kg	106-47-8		14
	Chloronaphthalene, 2-	10 µg/kg	91-58-7		14
	Chlorophenol, 2-	100 µg/kg	95-57-8		14
	Chlorophenyl phenyl ether, 4-	100 µg/kg	7005-72-3		14
	Cresol, o- (Methylphenol, 2-)	100 µg/kg	95-48-7		14
	Cresol, p- (Methylphenol, 4-)[b]	100 µg/kg	106-44-5		14
	Dibenzofuran	100 µg/kg	132-64-9		14
	Dichlorobenzene, 1,2-	100 µg/kg	95-50-1		14
	Dichlorobenzene, 1,3-	100 µg/kg	541-73-1		14
	Dichlorobenzene, 1,4-	100 µg/kg	106-46-7		14
	Dichlorophenol, 2,4-	100 µg/kg	120-83-2		14
	Dichorobenzidine, 3,3'-	100 µg/kg	91-94-1		14
	Diethyl phthalate	100 µg/kg	84-66-2		14
	Dimethyl phthalate	100 µg/kg	131-11-3		14
	Dimethylphenol, 2,4-	100 µg/kg	105-67-9		14
	Di-n-butyl phthalate	100 µg/kg	84-74-2		14
	Dinitro-2-methylphenol, 4,6-	100 µg/kg	534-52-1		14
	Dinitrophenol, 2,4-	100 µg/kg	51-28-5		14
	Dinitrotoluene, 2,4-	100 µg/kg	121-14-2		14
	Dinitrotoluene, 2,6-	100 µg/kg	606-20-2		14
	Di-n-octylphthalate	100 µg/kg	117-84-0		14
	~~Hexachlorobenzene~~	~~100 µg/kg~~	~~118-74-1~~		~~14~~
	Hexachlorobutadiene	100 µg/kg	87-68-3		14
	Hexachlorocyclopentadiene	100 µg/kg	77-47-4		14
	Hexachloroethane	100 µg/kg	67-72-1		14
	Isophorone	100 µg/kg	78-59-1		14
	Nitroaniline, 2-	100 µg/kg	88-74-4		14
	Nitroaniline, 3-	100 µg/kg	99-09-2		14
	Nitroaniline, 4-	100 µg/kg	100-01-6		14

Formatted: Superscript

Formatted: Font: 6 pt

Table 2. Analytical Parameters (Continued)

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
SVOC (continued)	Nitrobenzene	100 µg/kg	98-95-3	EPA SW-846 8270	14
	Nitrophenol, 2-	100 µg/kg	88-75-5		14
	Nitrophenol, 4-	100 µg/kg	100-02-7		14
	Nitroso-di-n-propylamine, N-	100 µg/kg	621-64-7		14
	Nitrosodiphenylamine, N- (Diphenylamine)[c]	100 µg/kg	86-30-6		14
	~~Pentachlorophenol~~	~~100 µg/kg~~	~~87-86-5~~		~~14~~
	Phenol	100 µg/kg	108-95-2		14
	Trichlorobenzene, 1,2,4-	100 µg/kg	120-82-1		14
	Trichlorophenol, 2,4,5-	100 µg/kg	95-95-4		14
	Trichlorophenol, 2,4,6-	100 µg/kg	88-06-2		14
ncPAH	Acenaphthene	10 µg/kg	83-32-9	EPA SW-846 8270	14
	Acenaphthylene	10 µg/kg	208-96-8		14
	Anthracene	10 µg/kg	120-12-7		14
	Benzo(g,h,i)perylene	10 µg/kg	191-24-2		14
	Fluorene	10 µg/kg	86-73-7		14
	Fluoranthene	10 µg/kg	206-44-0		14
	Methylnaphthalene, 2-	10 µg/kg	91-57-6		14
	Naphthalene	10 µg/kg	91-20-3		14
	Phenanthrene	10 µg/kg	85-01-8		14
	Pyrene	10 µg/kg	129-00-0		14
cPAH	Benzo(a)anthracene	10 µg/kg	56-55-3	EPA SW-846 8270	14
	Benzo(a)pyrene	10 µg/kg	50-32-8		14
	Benzo(b)fluoranthene	10 µg/kg	205-99-2		14
	Benzo(k)fluoranthene	10 µg/kg	207-08-9		14
	Chrysene	10 µg/kg	218-01-9		14
	Dibenz(a,h)anthracene	10 µg/kg	53-70-3		14
	Indeno(1,2,3-cd)pyrene	10 µg/kg	193-39-5		14
PCB	Aroclor-1016	1.1 µg/kg	12674-11-2	EPA SW-846 8082	14
	Aroclor-1221	1.1 µg/kg	11104-28-2		14
	Aroclor-1232	1.1 µg/kg	11141-16-5		14
	Aroclor-1242	1.1 µg/kg	53469-21-9		14
	Aroclor-1248	1.1 µg/kg	12672-29-6		14
	Aroclor-1254	1.1 µg/kg	11097-69-1		14
	Aroclor-1260	1.1 µg/kg	11096-82-5		14
	Aroclor-1268	1.1 µg/kg	11100-14-4		14
	Aroclor, total	1.11 µg/kg	1336-36-3		14

Formatted: Font: 6 pt

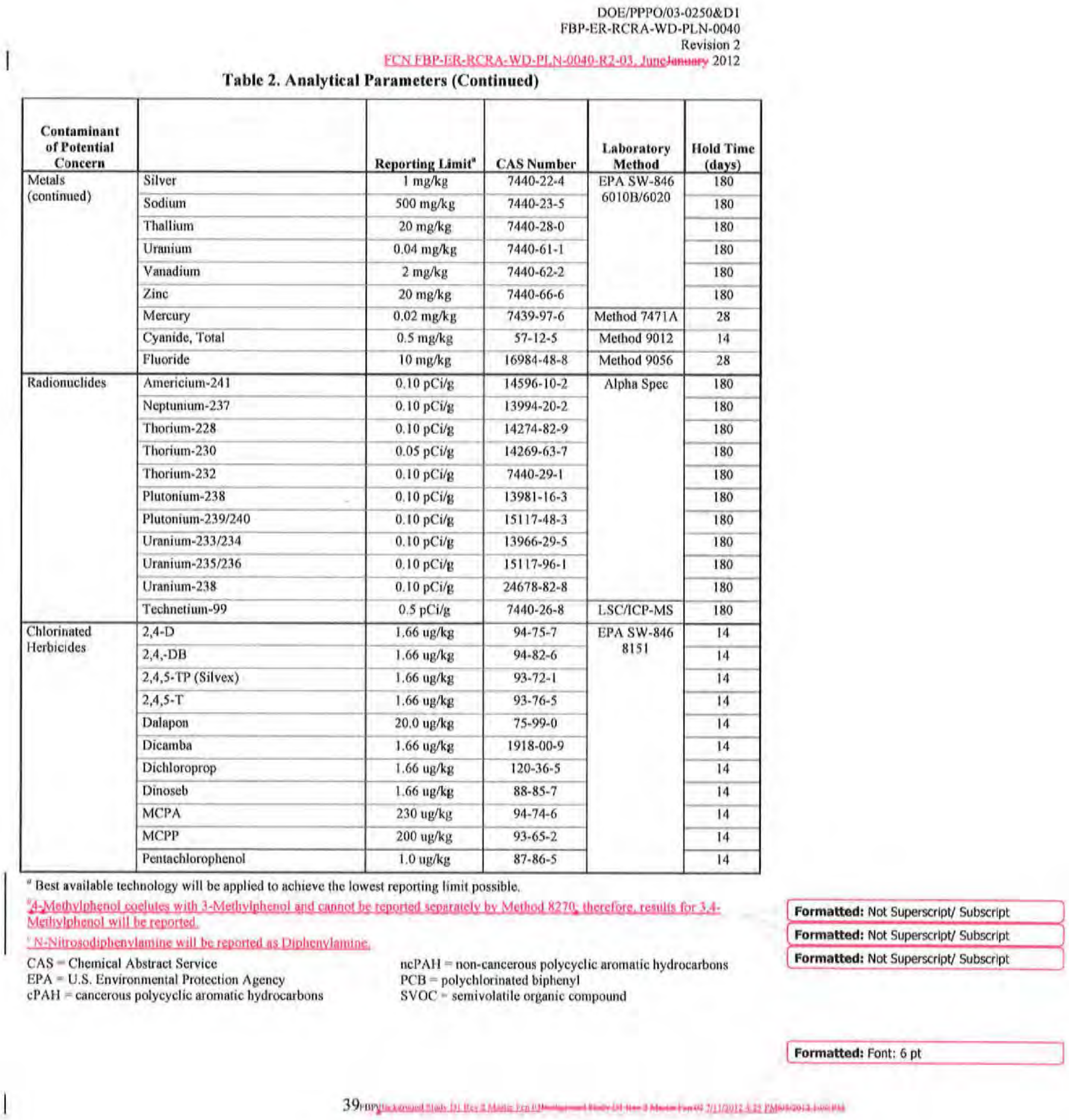


Table 2. Analytical Parameters (Continued)

Contaminant of Potential Concern		Reporting Limit[a]	CAS Number	Laboratory Method	Hold Time (days)
Metals (continued)	Silver	1 mg/kg	7440-22-4	EPA SW-846 6010B/6020	180
	Sodium	500 mg/kg	7440-23-5		180
	Thallium	20 mg/kg	7440-28-0		180
	Uranium	0.04 mg/kg	7440-61-1		180
	Vanadium	2 mg/kg	7440-62-2		180
	Zinc	20 mg/kg	7440-66-6		180
	Mercury	0.02 mg/kg	7439-97-6	Method 7471A	28
	Cyanide, Total	0.5 mg/kg	57-12-5	Method 9012	14
	Fluoride	10 mg/kg	16984-48-8	Method 9056	28
Radionuclides	Americium-241	0.10 pCi/g	14596-10-2	Alpha Spec	180
	Neptunium-237	0.10 pCi/g	13994-20-2		180
	Thorium-228	0.10 pCi/g	14274-82-9		180
	Thorium-230	0.05 pCi/g	14269-63-7		180
	Thorium-232	0.10 pCi/g	7440-29-1		180
	Plutonium-238	0.10 pCi/g	13981-16-3		180
	Plutonium-239/240	0.10 pCi/g	15117-48-3		180
	Uranium-233/234	0.10 pCi/g	13966-29-5		180
	Uranium-235/236	0.10 pCi/g	15117-96-1		180
	Uranium-238	0.10 pCi/g	24678-82-8		180
	Technetium-99	0.5 pCi/g	7440-26-8	LSC/ICP-MS	180
Chlorinated Herbicides	2,4-D	1.66 ug/kg	94-75-7	EPA SW-846 8151	14
	2,4,-DB	1.66 ug/kg	94-82-6		14
	2,4,5-TP (Silvex)	1.66 ug/kg	93-72-1		14
	2,4,5-T	1.66 ug/kg	93-76-5		14
	Dalapon	20.0 ug/kg	75-99-0		14
	Dicamba	1.66 ug/kg	1918-00-9		14
	Dichloroprop	1.66 ug/kg	120-36-5		14
	Dinoseb	1.66 ug/kg	88-85-7		14
	MCPA	230 ug/kg	94-74-6		14
	MCPP	200 ug/kg	93-65-2		14
	Pentachlorophenol	1.0 ug/kg	87-86-5		14

[a] Best available technology will be applied to achieve the lowest reporting limit possible.

[b] 4-Methylphenol coelutes with 3-Methylphenol and cannot be reported separately by Method 8270; therefore, results for 3,4-Methylphenol will be reported.

[c] N-Nitrosodiphenylamine will be reported as Diphenylamine.

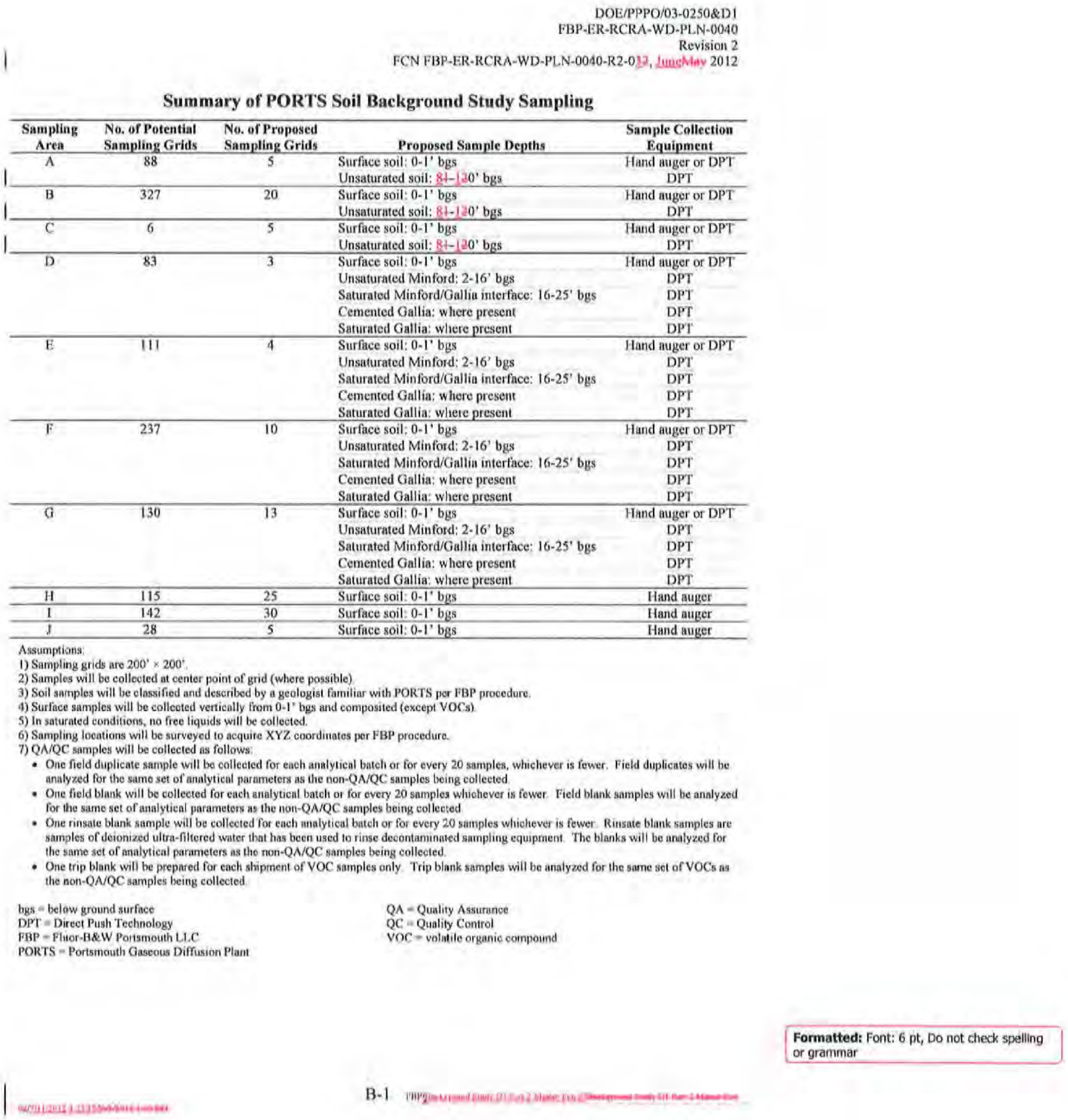
CAS = Chemical Abstract Service
EPA = U.S. Environmental Protection Agency
cPAH = cancerous polycyclic aromatic hydrocarbons
ncPAH = non-cancerous polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound

Formatted: Not Superscript/ Subscript

Formatted: Not Superscript/ Subscript

Formatted: Not Superscript/ Subscript

Formatted: Font: 6 pt



DOE/PPPO/03-0250&D1
FBP-ER-RCRA-WD-PLN-0040
Revision 2
FCN FBP-ER-RCRA-WD-PLN-0040-R2-01~~2~~, June~~May~~ 2012

Summary of PORTS Soil Background Study Sampling

Sampling Area	No. of Potential Sampling Grids	No. of Proposed Sampling Grids	Proposed Sample Depths	Sample Collection Equipment
A	88	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8~~1~~-1~~2~~0' bgs	DPT
B	327	20	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8~~1~~-1~~2~~0' bgs	DPT
C	6	5	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated soil: 8~~1~~-1~~2~~0' bgs	DPT
D	83	3	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
E	111	4	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
F	237	10	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
G	130	13	Surface soil: 0-1' bgs	Hand auger or DPT
			Unsaturated Minford: 2-16' bgs	DPT
			Saturated Minford/Gallia interface: 16-25' bgs	DPT
			Cemented Gallia: where present	DPT
			Saturated Gallia: where present	DPT
H	115	25	Surface soil: 0-1' bgs	Hand auger
I	142	30	Surface soil: 0-1' bgs	Hand auger
J	28	5	Surface soil: 0-1' bgs	Hand auger

Assumptions:
1) Sampling grids are 200' × 200'.
2) Samples will be collected at center point of grid (where possible).
3) Soil samples will be classified and described by a geologist familiar with PORTS per FBP procedure.
4) Surface samples will be collected vertically from 0-1' bgs and composited (except VOCs).
5) In saturated conditions, no free liquids will be collected.
6) Sampling locations will be surveyed to acquire XYZ coordinates per FBP procedure.
7) QA/QC samples will be collected as follows:
   - One field duplicate sample will be collected for each analytical batch or for every 20 samples, whichever is fewer. Field duplicates will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
   - One field blank will be collected for each analytical batch or for every 20 samples whichever is fewer. Field blank samples will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
   - One rinsate blank sample will be collected for each analytical batch or for every 20 samples whichever is fewer. Rinsate blank samples are samples of deionized ultra-filtered water that has been used to rinse decontaminated sampling equipment. The blanks will be analyzed for the same set of analytical parameters as the non-QA/QC samples being collected.
   - One trip blank will be prepared for each shipment of VOC samples only. Trip blank samples will be analyzed for the same set of VOCs as the non-QA/QC samples being collected.

bgs = below ground surface
DPT = Direct Push Technology
FBP = Fluor-B&W Portsmouth LLC
PORTS = Portsmouth Gaseous Diffusion Plant

QA = Quality Assurance
QC = Quality Control
VOC = volatile organic compound

Formatted: Font: 6 pt, Do not check spelling or grammar

[illegible]

B-1 [illegible]

This page is intentionally left blank.

APPENDIX G: ProUCL INPUT DATA FILES

The ProUCL input data files provided for this appendix contain analytical records for each background metal and radionuclide sample collected in Areas A, B, D, E, F, G, H, I, and J. Analytical results for samples collected in Area C have been excluded based on geological evaluation, as explained in the main body of the report.

The evaluation and selection of duplicate sample (i.e., field replicates) results was applied to the data prior to the formulation of the final input data files. Additionally, the input data files do not contain records for field blanks or rinsates. A spreadsheet for each of the following evaluated background area data sets is provided:

- Surface Soil: ABDEFGHIJ (metals)
- Surface Soil: ABDEFGHIJ (radionuclides)
- Unsaturated Minford: ABDEFG (metals)
- Unsaturated Minford: ABDEFG (radionuclides)
- Saturated Minford: EFG (metals)
- Saturated Minford: EFG (radionuclides)
- Gallia: DEFG (metals)
- Gallia: DEFG (radionuclides).

The initial two columns of each spreadsheet contain the background area designation (i.e., A, B, D, E, F, G, H, I, and J) and the project sample ID (e.g., BKGDPT01-04-10). The sample nomenclature is explained below.

Sample Nomenclature
Each project sample ID has three components:
[BKG(#1)-(#2)-(#3)]:

- The first component (#1) is associated with the sampling methodology and sample location.
- The second component (#2) identifies the sample type and analysis.
- The third component (#3) identifies the sample depth.

The following provides the details for each component:

First component (#1):
Hand Augers: HA01 through HA60
- HA01-HA25 = Area H
- HA26-HA55 = Area I
- HA56-HA60 = Area J.

Direct Push Technology: DPT01 through DPT60
- DPT01-DPT05 = Area A
- DPT06-DPT25 = Area B
- DPT26-DPT30 = Area C
- DPT31-DPT33 = Area D
- DPT34-DPT37 = Area E
- DPT38-DPT47 = Area F
- DPT48-DPT60 = Area G.

Second component (#2):

- 03 – Regular/Metals
- 04 – Regular/Radiological.

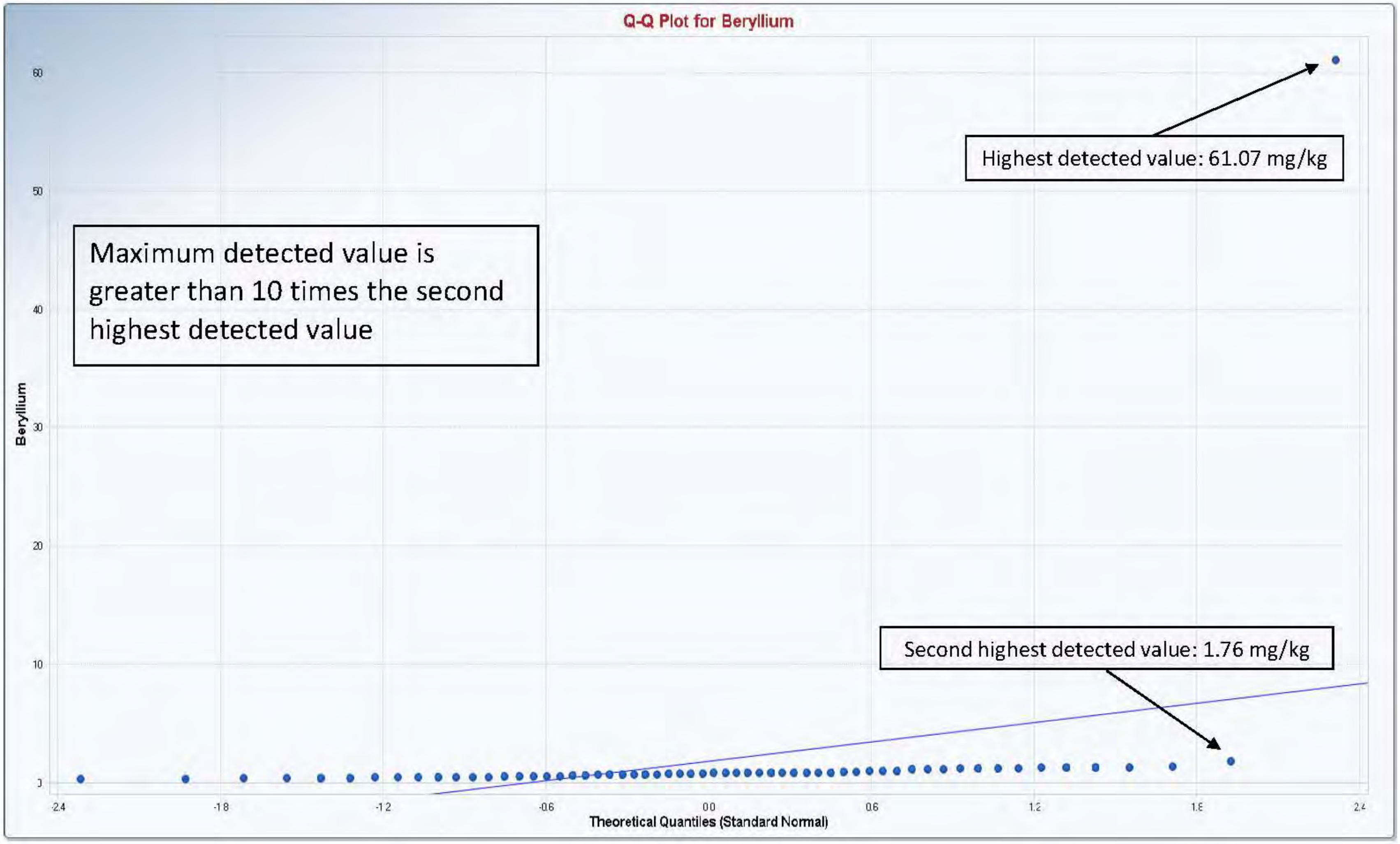
Third component (#3):

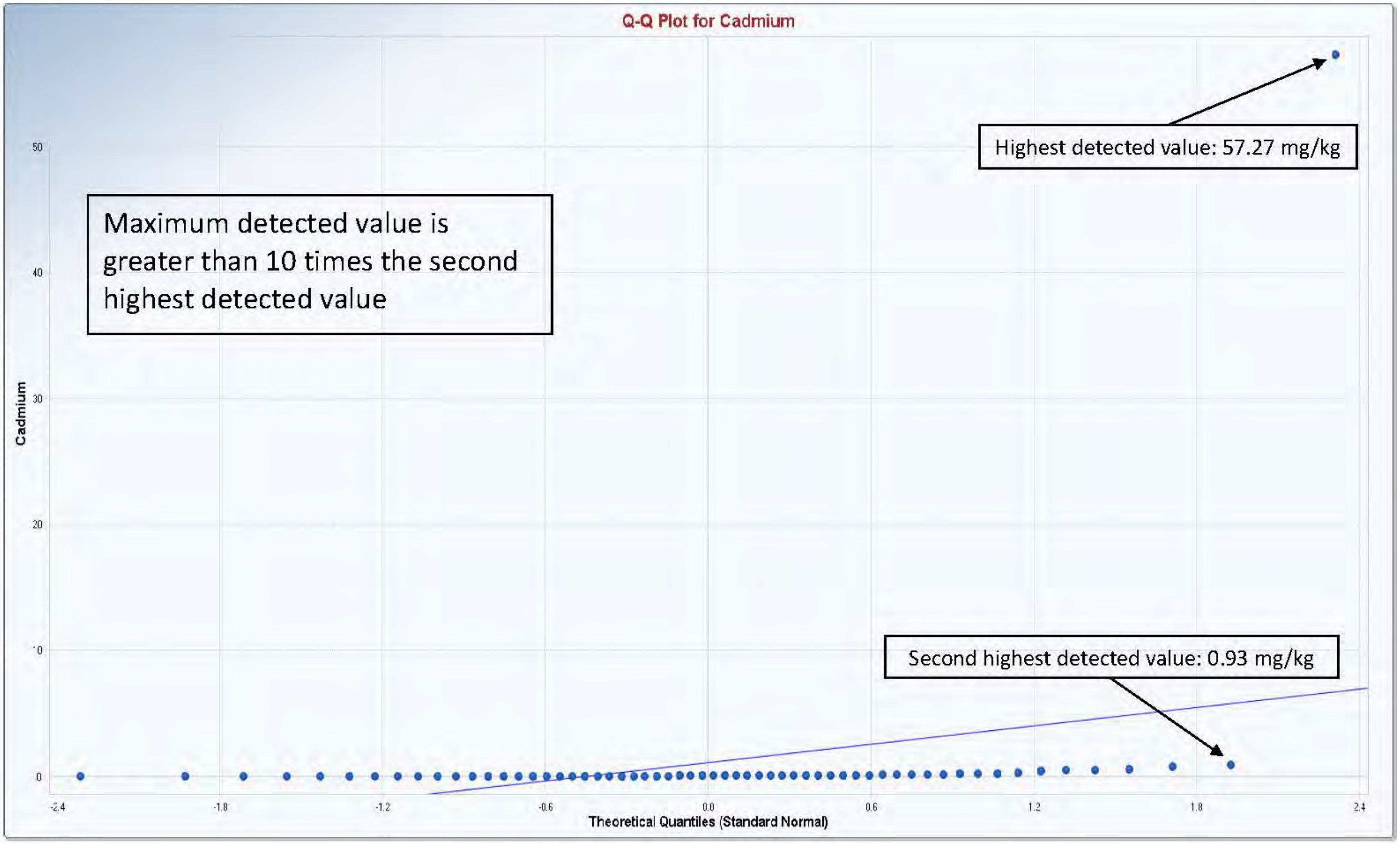
- SS = surface soil, 0 to 1 ft below ground surface (bgs)
- 2 = 2 to 4 ft bgs
- 4 = 4 to 6 ft bgs
- 6 = 6 to 8 ft bgs
- etc. through CMP = Composite Regular and CP2 = Composite Field Replicate.

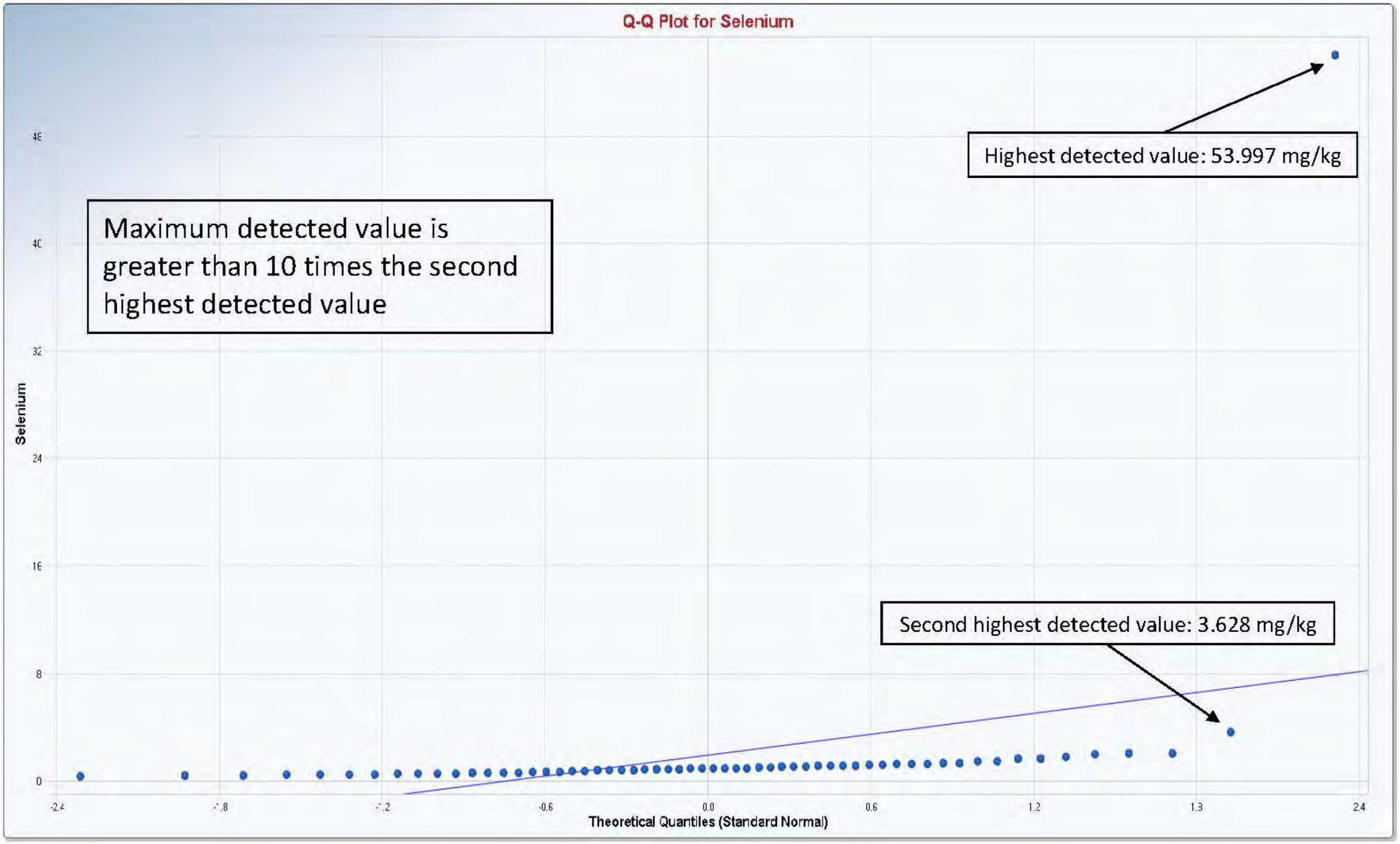
Note: The above interval logic does not apply for samples collected in Areas A, B, and C; for these samples, the third component stated as 10 represents the sampling interval 8 to 10 ft bgs.

In the data files contained in the compact disc, the project sample ID column is followed by two columns for each metal or radionuclide. The first of these two columns contains the analytical result for the metal or radionuclide and the second column contains a number code to denote whether the analyte was detected or not. A "1" in this column designates that the analyte was detected and the analytical value is a positive numerical result. A "0" in this column designates that the analyte was not detected and the analytical value is equal to the method detection limit.

APPENDIX H: OUTLIER SUPPORTING DOCUMENTATION


Q-Q Plot for Beryllium
Highest detected value: 61.07 mg/kg
Maximum detected value is greater than 10 times the second highest detected value
Second highest detected value: 1.76 mg/kg
Beryllium
60
50
40
30
20
10
0
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)

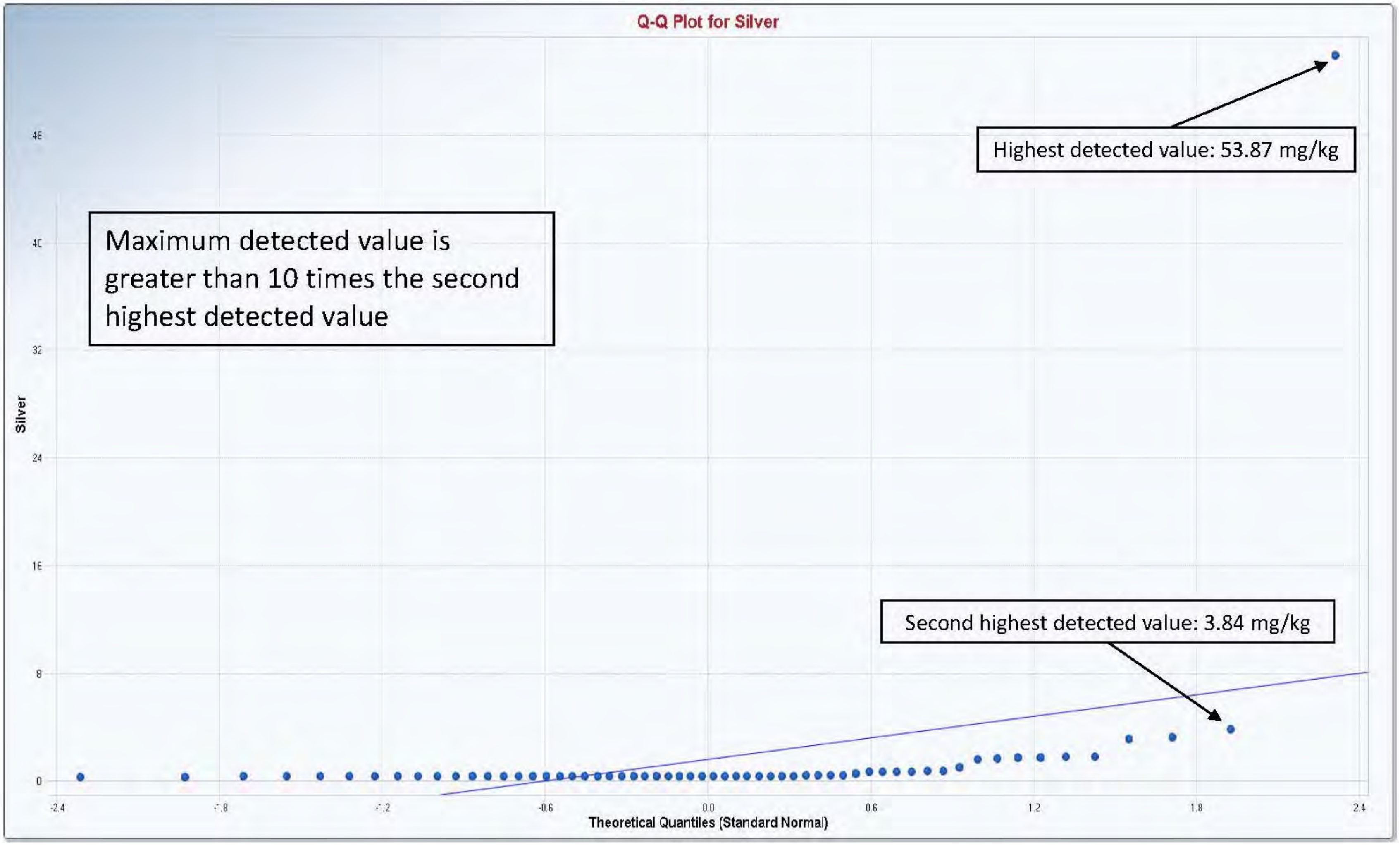

Q-Q Plot for Cadmium
Highest detected value: 57.27 mg/kg
Maximum detected value is greater than 10 times the second highest detected value
Second highest detected value: 0.93 mg/kg
Cadmium
50
40
30
20
10
0
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)



Highest detected value: 53.997 mg/kg

Maximum detected value is greater than 10 times the second highest detected value

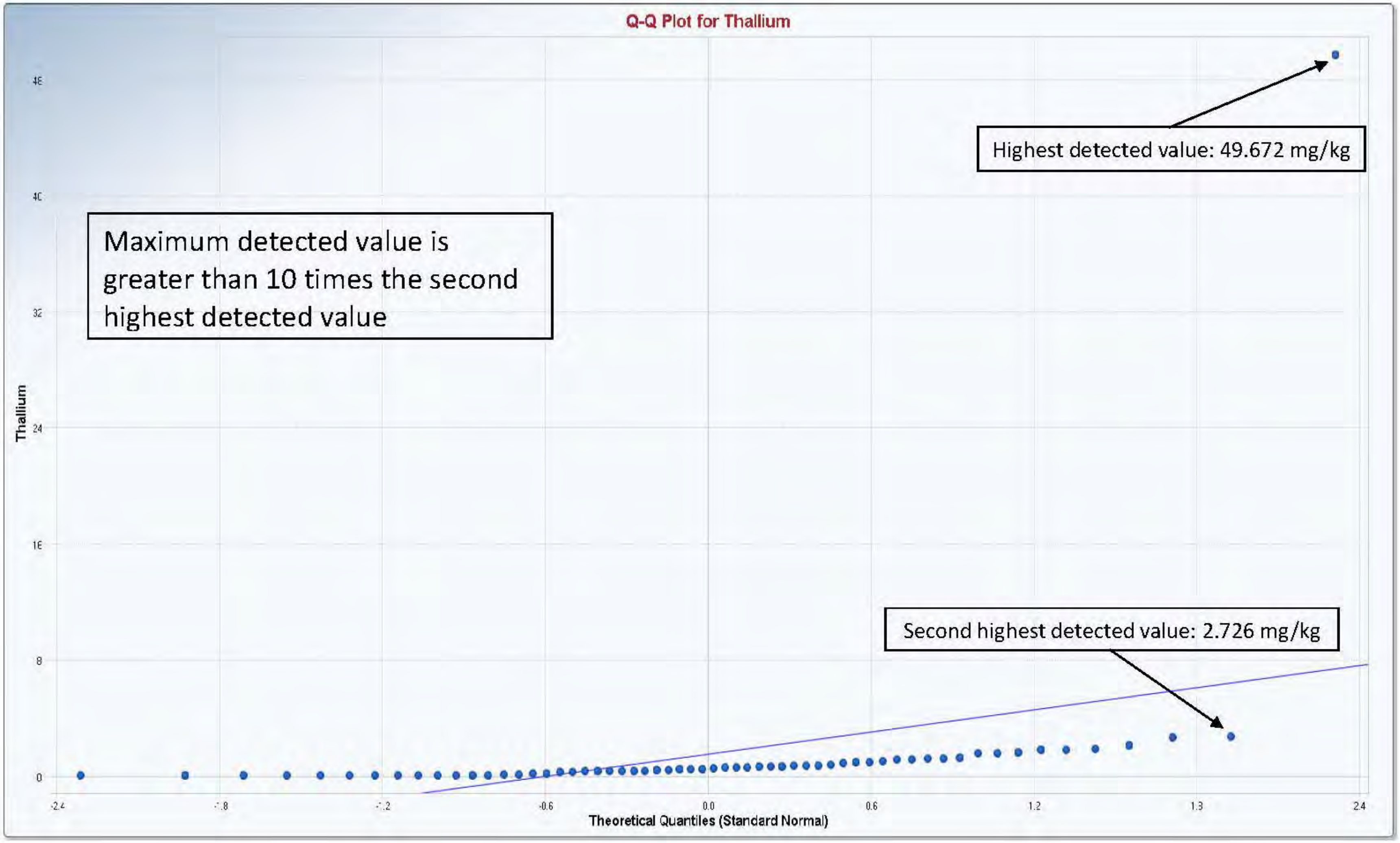
Second highest detected value: 3.628 mg/kg



Highest detected value: 53.87 mg/kg

Maximum detected value is greater than 10 times the second highest detected value

Second highest detected value: 3.84 mg/kg



Q-Q Plot for Thallium

Highest detected value: 49.672 mg/kg

Maximum detected value is greater than 10 times the second highest detected value

Second highest detected value: 2.726 mg/kg

APPENDIX I: PORTS FINAL BACKGROUND DATA TABLES

TABLES

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium
A	BKGDPT01-03-SS	12865	1	0.91	1	11.3	1	92.3	1	0.67	1
A	BKGDPT02-03-SS	15700	1	1.26	1	13	1	137.7	1	0.84	1
A	BKGDPT03-03-SS	13286	1	0.74	1	12.1	1	90	1	0.7	1
A	BKGDPT04-03-SS	9435	1	0.7	1	10.3	1	60.4	1	0.57	1
A	BKGDPT05-03-SS	10508	1	0.88	1	9.2	1	86.9	1	0.61	1
B	BKGDPT06-03-SS	12034	1	1	1	11.5	1	88.1	1	0.67	1
B	BKGDPT07-03-SS	13407	1	1.35	1	12.3	1	121.2	1	0.83	1
B	BKGDPT08-03-SS	14724	1	1.11	1	13.1	1	126.4	1	0.87	1
B	BKGDPT09-03-SS	12546	1	1.32	1	11.6	1	120.4	1	0.79	1
B	BKGDPT10-03-SS	13740	1	1.25	1	11.9	1	138.6	1	0.8	1
B	BKGDPT11-03-SS	12053	1	0.66	1	8.7	1	125.6	1	0.64	1
B	BKGDPT12-03-SS	7318	1	0.48	0	8.4	1	49.9	1	0.35	1
B	BKGDPT13-03-SS	9963	1	0.81	1	10.7	1	93	1	0.6	1
B	BKGDPT14-03-SS	9153	1	1.05	1	7	1	133.2	1	0.56	1
B	BKGDPT15-03-SS	8507	1	0.48	0	8.8	1	84.1	1	0.42	1
B	BKGDPT16-03-SS	10650	1	0.98	1	11.1	1	84.6	1	0.7	1
B	BKGDPT17-03-SS	9522	1	1.15	1	9.9	1	41.6	1	0.5	1
B	BKGDPT18-03-SS	11022	1	0.86	1	11.9	1	97.2	1	0.73	1
B	BKGDPT19-03-SS	10709	1	0.48	0	10.9	1	93.3	1	0.71	1
B	BKGDPT20-03-SS	11905	1	1.33	1	11.2	1	120.2	1	0.77	1
B	BKGDPT21-03-SS	8349	1	0.63	1	8.1	1	44.4	1	0.37	1
B	BKGDPT22-03-SS	12394	1	0.93	1	11.3	1	115.8	1	0.78	1
B	BKGDPT23-03-SS	10290	1	0.71	1	9.7	1	61.2	1	0.51	1
B	BKGDPT24-03-SS	12456	1	1.35	1	12.5	1	112.3	1	0.77	1
B	BKGDPT25-03-SS	12423	1	1.38	1	11.3	1	125.5	1	0.76	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Cadmium	D_Cadmium	Calcium	D_Calcium	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron
A	BKGDPT01-03-SS	0.24	1	3205	1	15.9	1	9.1	1	14.9	1	20234	1
A	BKGDPT02-03-SS	0.37	1	2778	1	18.7	1	12.1	1	21.4	1	24758	1
A	BKGDPT03-03-SS	0.2	1	2669	1	17.2	1	9.6	1	15.8	1	21708	1
A	BKGDPT04-03-SS	0.22	1	9758	1	12	1	7.6	1	11.5	1	17166	1
A	BKGDPT05-03-SS	0.02	0	765	1	14.2	1	9.9	1	12.4	1	17473	1
B	BKGDPT06-03-SS	0.34	1	3959	1	15.7	1	9.3	1	17.8	1	20828	1
B	BKGDPT07-03-SS	0.41	1	2718	1	13.3	1	10.9	1	22.3	1	22878	1
B	BKGDPT08-03-SS	0.29	1	1939	1	12.8	1	11.4	1	20	1	24417	1
B	BKGDPT09-03-SS	0.36	1	2509	1	11.6	1	10.3	1	20.3	1	21648	1
B	BKGDPT10-03-SS	0.4	1	2748	1	12.8	1	10.8	1	19.6	1	22700	1
B	BKGDPT11-03-SS	0.25	1	4081	1	14.6	1	10.4	1	17.6	1	17632	1
B	BKGDPT12-03-SS	0.21	1	34824	1	10.6	1	7.3	1	16.4	1	13529	1
B	BKGDPT13-03-SS	0.31	1	5600	1	8.3	1	9.1	1	17.3	1	20025	1
B	BKGDPT14-03-SS	0.27	1	2276	1	8.8	1	7.5	1	20.2	1	17070	1
B	BKGDPT15-03-SS	0.29	1	12153	1	12.2	1	8.2	1	11.8	1	16435	1
B	BKGDPT16-03-SS	0.2	1	1556	1	11.2	1	10.3	1	16.8	1	21446	1
B	BKGDPT17-03-SS	0.03	1	804	1	9.5	1	7.5	1	14.6	1	17716	1
B	BKGDPT18-03-SS	0.25	1	3474	1	10.1	1	9.8	1	18.5	1	22236	1
B	BKGDPT19-03-SS	0.24	1	22104	1	8.2	1	8.9	1	16.8	1	20331	1
B	BKGDPT20-03-SS	0.47	1	2694	1	10.8	1	10.6	1	22.2	1	22682	1
B	BKGDPT21-03-SS	0.08	1	1122	1	13.9	1	6.6	1	10.8	1	14871	1
B	BKGDPT22-03-SS	0.26	1	2382	1	12	1	10.5	1	19.8	1	21993	1
B	BKGDPT23-03-SS	0.09	1	886	1	14.1	1	7.4	1	11.6	1	16802	1
B	BKGDPT24-03-SS	0.33	1	1993	1	11.9	1	12.2	1	19.6	1	24437	1
B	BKGDPT25-03-SS	0.42	1	2485	1	11.8	1	10.6	1	21.6	1	22140	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese	Mercury	D_Mercury	Nickel	D_Nickel
A	BKGDPT01-03-SS	13.6	1	48.1	1	2421	1	557	1	0.0188	0	23.5	1
A	BKGDPT02-03-SS	15.5	1	61	1	2657	1	953	1	0.022	1	29.1	1
A	BKGDPT03-03-SS	12.8	1	50.1	1	2313	1	552	1	0.0234	0	24.8	1
A	BKGDPT04-03-SS	10.3	1	38	1	2304	1	429	1	0.0209	0	19.8	1
A	BKGDPT05-03-SS	12.6	1	38.3	1	1370	1	988	1	0.0217	0	19.1	1
B	BKGDPT06-03-SS	13	1	44.9	1	2960	1	574	1	0.0225	0	24.5	1
B	BKGDPT07-03-SS	15	1	41.3	1	2485	1	861	1	0.0236	0	26.7	1
B	BKGDPT08-03-SS	15.3	1	44.8	1	2368	1	818	1	0.0227	0	27.1	1
B	BKGDPT09-03-SS	14.1	1	41	1	2177	1	836	1	0.0197	0	24.4	1
B	BKGDPT10-03-SS	14.7	1	42.1	1	2330	1	895	1	0.0222	0	26.2	1
B	BKGDPT11-03-SS	16.6	1	36.5	1	2305	1	898	1	0.0455	1	22.7	1
B	BKGDPT12-03-SS	16.1	1	29.5	1	9071	1	448	1	0.0222	0	18.6	1
B	BKGDPT13-03-SS	14	1	31	1	4091	1	670	1	0.0239	1	22.4	1
B	BKGDPT14-03-SS	9.5	1	29.5	1	1792	1	700	1	0.0229	0	20.9	1
B	BKGDPT15-03-SS	10.1	1	34.4	1	5579	1	619	1	0.0215	1	20.6	1
B	BKGDPT16-03-SS	13.1	1	34.3	1	2169	1	733	1	0.0228	0	22.2	1
B	BKGDPT17-03-SS	9.9	1	31.4	1	1562	1	456	1	0.023	1	17	1
B	BKGDPT18-03-SS	12.5	1	35.1	1	2885	1	677	1	0.0213	0	25.6	1
B	BKGDPT19-03-SS	11.2	1	34.2	1	6761	1	629	1	0.0229	0	21.4	1
B	BKGDPT20-03-SS	14.3	1	38	1	2406	1	946	1	0.032	1	25.2	1
B	BKGDPT21-03-SS	9.6	1	30.7	1	1358	1	395	1	0.0234	0	16.4	1
B	BKGDPT22-03-SS	14.5	1	34.3	1	2017	1	844	1	0.0352	1	22.6	1
B	BKGDPT23-03-SS	9.2	1	33.6	1	1541	1	433	1	0.0301	1	19.4	1
B	BKGDPT24-03-SS	14.1	1	40.9	1	2456	1	810	1	0.0257	1	25.4	1
B	BKGDPT25-03-SS	14.4	1	38.6	1	2177	1	878	1	0.0379	1	24.4	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
A	BKGDPT01-03-SS	2292	1	0.526	1	0.65	0	50	1	0.651	1
A	BKGDPT02-03-SS	2500	1	0.785	1	0.66	0	42	1	0.808	1
A	BKGDPT03-03-SS	1910	1	0.363	1	0.67	0	39	1	0.492	1
A	BKGDPT04-03-SS	1567	1	0.309	1	0.63	0	42	1	0.541	1
A	BKGDPT05-03-SS	1594	1	0.564	1	0.65	0	29	1	0.864	1
B	BKGDPT06-03-SS	2132	1	0.569	1	0.69	0	48	1	0.557	1
B	BKGDPT07-03-SS	2706	1	0.769	1	0.69	0	40	1	0.879	1
B	BKGDPT08-03-SS	2405	1	0.612	1	0.67	1	37	1	0.671	1
B	BKGDPT09-03-SS	2263	1	0.798	1	0.7	0	35	1	0.774	1
B	BKGDPT10-03-SS	2354	1	0.828	1	0.67	0	39	1	0.876	1
B	BKGDPT11-03-SS	2569	1	0.64	1	0.71	0	42	1	1.13	1
B	BKGDPT12-03-SS	1541	1	0.395	1	0.66	0	67	1	0.431	1
B	BKGDPT13-03-SS	1632	1	0.737	1	1.52	1	36	1	0.858	1
B	BKGDPT14-03-SS	1707	1	0.561	1	0.66	0	38	1	0.736	1
B	BKGDPT15-03-SS	1655	1	0.509	1	0.63	0	51	1	0.565	1
B	BKGDPT16-03-SS	1520	1	0.828	1	0.67	0	31	1	0.887	1
B	BKGDPT17-03-SS	1224	1	0.719	1	1.43	1	23	1	0.399	1
B	BKGDPT18-03-SS	1310	1	0.619	1	0.98	1	39	1	0.846	1
B	BKGDPT19-03-SS	1442	1	0.788	1	2.67	1	54	1	0.593	1
B	BKGDPT20-03-SS	1942	1	1.039	1	1.97	1	39	1	1.199	1
B	BKGDPT21-03-SS	1487	1	0.283	1	0.65	0	30	1	0.397	1
B	BKGDPT22-03-SS	1944	1	0.999	1	1.2	1	29	1	0.999	1
B	BKGDPT23-03-SS	1437	1	0.278	1	0.66	0	29	1	0.324	1
B	BKGDPT24-03-SS	1839	1	0.778	1	1.02	1	31	1	0.917	1
B	BKGDPT25-03-SS	2620	1	0.871	1	0.76	1	35	1	1.16	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
A	BKGDPT01-03-SS	3.96	1	35.6	1	70.8	1
A	BKGDPT02-03-SS	5.24	1	41.9	1	93.7	1
A	BKGDPT03-03-SS	3.67	1	36.7	1	68.3	1
A	BKGDPT04-03-SS	2.44	1	26.8	1	54.1	1
A	BKGDPT05-03-SS	4.23	1	25.7	1	60.4	1
B	BKGDPT06-03-SS	3.81	1	34	1	77.6	1
B	BKGDPT07-03-SS	4.95	1	37.6	1	92.6	1
B	BKGDPT08-03-SS	4.47	1	38.9	1	90.1	1
B	BKGDPT09-03-SS	3.93	1	33.5	1	86.7	1
B	BKGDPT10-03-SS	4.53	1	35.5	1	89.4	1
B	BKGDPT11-03-SS	2.83	1	30.2	1	92.8	1
B	BKGDPT12-03-SS	3.46	1	17.2	1	88.7	1
B	BKGDPT13-03-SS	3.37	1	28.6	1	79.2	1
B	BKGDPT14-03-SS	2.68	1	26.6	1	86	1
B	BKGDPT15-03-SS	3.46	1	23.7	1	60.2	1
B	BKGDPT16-03-SS	3.64	1	31	1	76.1	1
B	BKGDPT17-03-SS	2.89	1	27.2	1	48.1	1
B	BKGDPT18-03-SS	4.41	1	30.2	1	78.4	1
B	BKGDPT19-03-SS	3.52	1	29.4	1	74.8	1
B	BKGDPT20-03-SS	4.29	1	32	1	92.1	1
B	BKGDPT21-03-SS	2.71	1	23.9	1	45	1
B	BKGDPT22-03-SS	4.23	1	33.4	1	77.8	1
B	BKGDPT23-03-SS	2.68	1	26.4	1	52.6	1
B	BKGDPT24-03-SS	3.99	1	35.5	1	84.5	1
B	BKGDPT25-03-SS	4.56	1	31.7	1	85.7	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238
A	BKGDPT01-04-SS	0.022	0	0.035	0	0.018	0
A	BKGDPT02-04-SS	0.034	0	0.048	0	0.021	0
A	BKGDPT03-04-SS	0.041	0	0.035	0	0.005	0
A	BKGDPT04-04-SS	0.036	0	0.028	0	0.015	0
A	BKGDPT05-04-SS	0.035	0	0.03	0	0.023	0
B	BKGDPT06-04-SS	0.048	0	0.081	0	0.017	0
B	BKGDPT07-04-SS	0.062	0	0.028	0	0.006	0
B	BKGDPT08-04-SS	0.052	0	0.033	0	0.027	0
B	BKGDPT09-04-SS	0.032	0	0.058	0	0.028	0
B	BKGDPT10-04-SS	0.024	0	0.037	0	0.024	0
B	BKGDPT11-04-SS	0.144	0	0.027	0	0.018	0
B	BKGDPT12-04-SS	0.058	0	0.043	0	0.037	0
B	BKGDPT13-04-SS	0.026	0	0.067	0	0.028	0
B	BKGDPT14-04-SS	0.038	0	0.047	0	0.021	0
B	BKGDPT15-04-SS	0.065	0	0.019	0	0.015	0
B	BKGDPT16-04-SS	0.015	0	0.042	0	0.015	0
B	BKGDPT17-04-SS	0.034	0	0.037	0	0.015	0
B	BKGDPT18-04-SS	0.012	0	0.022	0	0.029	0
B	BKGDPT19-04-SS	0.027	0	0.027	0	0.039	0
B	BKGDPT20-04-SS	0.023	0	0.046	0	0.019	0
B	BKGDPT21-04-SS	0.08	0	0.024	0	0.025	0
B	BKGDPT22-04-SS	0.029	0	0.039	0	0.022	0
B	BKGDPT23-04-SS	0.061	0	0.03	0	0.102	0
B	BKGDPT24-04-SS	0.031	0	0.037	0	0.011	0
B	BKGDPT25-04-SS	0.014	0	0.055	0	0.011	0

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)
-- Technetium-99 not available for this sample

AREA_LETTER	PROJ_SAMPLE_ID	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99	Thorium-228	D_Thorium-228
A	BKGDPT01-04-SS	0.007	0	0.428	0	1	1
A	BKGDPT02-04-SS	0.017	0	0.489	0	1.12	1
A	BKGDPT03-04-SS	0.013	0	0.488	0	0.86	1
A	BKGDPT04-04-SS	0.018	0	0.445	0	0.71	1
A	BKGDPT05-04-SS	0.03	0	0.469	0	1.02	1
B	BKGDPT06-04-SS	0.014	0	0.474	0	1.02	1
B	BKGDPT07-04-SS	0.021	0	0.515	0	0.8	1
B	BKGDPT08-04-SS	0.027	0	0.49	0	1.02	1
B	BKGDPT09-04-SS	0.016	0	0.461	0	1.11	1
B	BKGDPT10-04-SS	0.024	0	0.465	0	1.05	1
B	BKGDPT11-04-SS	0.022	0	0.524	0	0.82	1
B	BKGDPT12-04-SS	0.037	0	0.469	0	0.53	1
B	BKGDPT13-04-SS	0.018	0	0.482	0	0.77	1
B	BKGDPT14-04-SS	0.016	0	0.43	0	0.68	1
B	BKGDPT15-04-SS	0.018	0	0.531	0	0.84	1
B	BKGDPT16-04-SS	0.012	0	0.43	0	0.92	1
B	BKGDPT17-04-SS	0.018	0	0.434	0	0.64	1
B	BKGDPT18-04-SS	0.021	0	0.47	0	1.18	1
B	BKGDPT19-04-SS	0.026	0	0.456	0	0.7	1
B	BKGDPT20-04-SS	0.014	0	0.475	0	1.03	1
B	BKGDPT21-04-SS	0.032	0	--	--	0.67	1
B	BKGDPT22-04-SS	0.02	0	0.474	0	1.13	1
B	BKGDPT23-04-SS	0.059	0	0.444	0	0.64	1
B	BKGDPT24-04-SS	0.004	0	0.461	0	1.03	1
B	BKGDPT25-04-SS	0.014	0	0.513	0	0.95	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)
-- Technetium-99 not available for this sample

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234
A	BKGDPT01-04-SS	1.73	1	0.97	1	1.2	1
A	BKGDPT02-04-SS	2.22	1	1.09	1	1.44	1
A	BKGDPT03-04-SS	1.66	1	1.06	1	1.09	1
A	BKGDPT04-04-SS	1.21	1	0.6	1	0.68	1
A	BKGDPT05-04-SS	1.63	1	0.95	1	1.28	1
B	BKGDPT06-04-SS	2.02	1	0.98	1	1.09	1
B	BKGDPT07-04-SS	2.09	1	0.99	1	1.43	1
B	BKGDPT08-04-SS	2.4	1	1.16	1	1.67	1
B	BKGDPT09-04-SS	2.05	1	1.01	1	1.21	1
B	BKGDPT10-04-SS	2.19	1	1.06	1	1.31	1
B	BKGDPT11-04-SS	1.69	1	0.89	1	0.94	1
B	BKGDPT12-04-SS	1.75	1	0.55	1	1.09	1
B	BKGDPT13-04-SS	1.85	1	0.95	1	0.98	1
B	BKGDPT14-04-SS	1.09	1	0.58	1	0.72	1
B	BKGDPT15-04-SS	1.79	1	0.81	1	1.03	1
B	BKGDPT16-04-SS	1.52	1	0.83	1	1.16	1
B	BKGDPT17-04-SS	1.25	1	0.65	1	0.78	1
B	BKGDPT18-04-SS	2.08	1	1.23	1	1.37	1
B	BKGDPT19-04-SS	1.61	1	0.66	1	1.02	1
B	BKGDPT20-04-SS	1.79	1	1.09	1	1.35	1
B	BKGDPT21-04-SS	1.17	1	0.52	1	0.71	1
B	BKGDPT22-04-SS	1.91	1	1.06	1	1.32	1
B	BKGDPT23-04-SS	1.26	1	0.76	1	0.88	1
B	BKGDPT24-04-SS	2.11	1	1.07	1	1.46	1
B	BKGDPT25-04-SS	2.02	1	0.98	1	1.46	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)
-- Technetium-99 not available for this sample

AREA_LETTER	PROJ_SAMPLE_ID	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
A	BKGDPT01-04-SS	0.072	1	1.33	1
A	BKGDPT02-04-SS	0.112	1	1.76	1
A	BKGDPT03-04-SS	0.071	1	1.23	1
A	BKGDPT04-04-SS	0.034	1	0.82	1
A	BKGDPT05-04-SS	0.069	1	1.42	1
B	BKGDPT06-04-SS	0.088	0	1.28	1
B	BKGDPT07-04-SS	0.113	1	1.66	1
B	BKGDPT08-04-SS	0.101	1	1.5	1
B	BKGDPT09-04-SS	0.047	1	1.32	1
B	BKGDPT10-04-SS	0.049	1	1.52	1
B	BKGDPT11-04-SS	0.028	0	0.95	1
B	BKGDPT12-04-SS	0.054	1	1.16	1
B	BKGDPT13-04-SS	0.063	1	1.13	1
B	BKGDPT14-04-SS	0.065	1	0.9	1
B	BKGDPT15-04-SS	0.069	0	1.16	1
B	BKGDPT16-04-SS	0.066	0	1.22	1
B	BKGDPT17-04-SS	0.088	1	0.97	1
B	BKGDPT18-04-SS	0.066	1	1.48	1
B	BKGDPT19-04-SS	0.044	1	1.18	1
B	BKGDPT20-04-SS	0.085	1	1.44	1
B	BKGDPT21-04-SS	0.062	1	0.91	1
B	BKGDPT22-04-SS	0.1	1	1.42	1
B	BKGDPT23-04-SS	0.068	1	0.9	1
B	BKGDPT24-04-SS	0.099	1	1.34	1
B	BKGDPT25-04-SS	0.067	1	1.53	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)
-- Technetium-99 not available for this sample

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium
D	BKGDPT31-03-SS	14958	1	1.42	1	11.8	1	61.3	1	0.62	1	0.02	0
D	BKGDPT32-03-SS	19197	1	1.1	1	15.2	1	76.9	1	0.61	1	0.02	0
D	BKGDPT33-03-SS	18354	1	1.29	1	13.5	1	73.5	1	0.66	1	0.03	0
E	BKGDPT34-03-SS	15348	1	0.71	1	8.7	1	105.5	1	0.73	1	0.02	0
E	BKGDPT35-03-SS	12515	1	0.31	0	9.5	1	90	1	0.7	1	0.03	0
E	BKGDPT36-03-SS	12424	1	2.24	1	6.4	1	85.5	1	0.82	1	0.02	0
E	BKGDPT37-03-SS	19059	1	1.31	1	13.6	1	55.6	1	0.7	1	0.03	0
F	BKGDPT38-03-SS	6263	1	0.37	0	6	1	48.6	1	0.36	1	0.13	1
F	BKGDPT39-03-SS	8007	1	0.75	1	21.9	1	89.3	1	1.23	1	0.19	1
F	BKGDPT40-03-SS	8114	1	0.84	1	14.9	1	83.6	1	0.79	1	0.19	1
F	BKGDPT41-03-SS	9043	1	0.38	0	11.3	1	71.7	1	0.58	1	0.19	1
F	BKGDPT42-03-SS	7986	1	0.95	1	9.9	1	41.3	1	0.49	1	0.18	1
F	BKGDPT43-03-SS	22760	1	1.49	1	6.1	1	64.9	1	0.64	1	0.02	0
F	BKGDPT44-03-SS	7166	1	0.4	0	6.1	1	60.3	1	0.47	1	0.14	1
F	BKGDPT45-03-SS	8249	1	0.38	1	7	1	67.2	1	0.53	1	0.14	1
F	BKGDPT46-03-SS	8833	1	0.51	1	13.5	1	68.1	1	0.91	1	0.15	1
F	BKGDPT47-03-SS	9527	1	0.94	1	15.3	1	63.2	1	0.76	1	0.15	1
G	BKGDPT48-03-SS	7912	1	1.82	0	20.9	1	67.9	1	0.99	1	0.14	1
G	BKGDPT49-03-SS	11183	1	1.15	1	20.3	1	47.8	1	0.53	1	0.19	1
G	BKGDPT50-03-SS	10105	1	0.35	0	4.2	1	67.8	1	0.57	1	0.1	1
G	BKGDPT51-03-SS	7802	1	0.37	0	6.9	1	81.2	1	0.79	1	0.14	1
G	BKGDPT52-03-SS	9532	1	0.77	1	34.2	1	71.6	1	1.09	1	0.19	1
G	BKGDPT53-03-SS	18182	1	0.31	1	10.1	1	63.4	1	0.43	1	0.02	0
G	BKGDPT54-03-SS	8566	1	0.37	0	6.2	1	81.5	1	0.51	1	0.11	1
G	BKGDPT55-03-SS	7326	1	0.35	1	19.8	1	109.2	1	0.92	1	0.19	1
G	BKGDPT56-03-SS	5967	1	0.37	0	7.1	1	96	1	0.7	1	0.14	1
G	BKGDPT57-03-SS	13007	1	0.85	1	7.7	1	79.7	1	0.7	1	0.02	0
G	BKGDPT58-03-SS	9379	1	0.38	0	8.5	1	67.4	1	0.45	1	0.17	1
G	BKGDPT59-03-SS	16509	1	0.83	1	7.9	1	76.4	1	0.58	1	0.02	0
G	BKGDPT60-03-SS	6388	1	0.39	0	7.6	1	83.9	1	0.81	1	0.14	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Calcium	D_Calcium	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium
D	BKGDPT31-03-SS	574	1	18.9	1	10.8	1	13.5	1	25814	1	14	1	67.4	1
D	BKGDPT32-03-SS	1028	1	16.4	1	10.1	1	18.2	1	32120	1	20.7	1	100.3	1
D	BKGDPT33-03-SS	356	1	20.8	1	15.7	1	17.7	1	27848	1	21.5	1	75.3	1
E	BKGDPT34-03-SS	1025	1	12.6	1	12.9	1	6.4	1	20144	1	17	1	59.4	1
E	BKGDPT35-03-SS	1201	1	15.1	1	10.8	1	8.2	1	20694	1	15.5	1	53.4	1
E	BKGDPT36-03-SS	905	1	9	1	8.8	1	5	1	13520	1	14.7	1	32.3	1
E	BKGDPT37-03-SS	402	1	18.1	1	6.7	1	10.8	1	34017	1	15.3	1	99.2	1
F	BKGDPT38-03-SS	1338	1	10.8	1	6.9	1	6.2	1	16378	1	13.7	1	6.6	1
F	BKGDPT39-03-SS	523	1	25.7	1	24	1	11.2	1	40661	1	27	1	14.2	1
F	BKGDPT40-03-SS	743	1	14.1	1	18	1	9.9	1	25164	1	18.4	1	14.7	1
F	BKGDPT41-03-SS	875	1	29.9	1	11.8	1	7.9	1	18570	1	18	1	9.2	1
F	BKGDPT42-03-SS	448	1	21.9	1	14	1	7.1	1	64885	1	16	1	15.4	1
F	BKGDPT43-03-SS	345	1	21.1	1	7.1	1	14.3	1	26392	1	11.8	1	65.3	1
F	BKGDPT44-03-SS	1204	1	8.2	1	9.7	1	5.7	1	13098	1	13.9	1	7.7	1
F	BKGDPT45-03-SS	1304	1	13.5	1	8	1	7.3	1	14531	1	12.2	1	14	1
F	BKGDPT46-03-SS	120	1	13.9	1	14.1	1	9.2	1	27048	1	20.7	1	16.9	1
F	BKGDPT47-03-SS	290	1	12.7	1	16.5	1	10.1	1	40777	1	17.4	1	16.4	1
G	BKGDPT48-03-SS	2235	1	18.1	1	17.9	1	12.3	1	128668	1	21.1	1	17.5	1
G	BKGDPT49-03-SS	2193	1	23.3	1	6.9	1	10.5	1	43387	1	21.2	1	12.4	1
G	BKGDPT50-03-SS	944	1	10.9	1	8.7	1	5.9	1	39930	1	19.8	1	6.2	1
G	BKGDPT51-03-SS	1331	1	12.7	1	12.9	1	6.3	1	16606	1	20.4	1	7.9	1
G	BKGDPT52-03-SS	591	1	31.2	1	29.5	1	9.6	1	67485	1	49.6	1	17.1	1
G	BKGDPT53-03-SS	850	1	16.1	1	6.5	1	5.9	1	23445	1	14.4	1	60.3	1
G	BKGDPT54-03-SS	878	1	11.5	1	8.9	1	5.6	1	16129	1	14.5	1	9.7	1
G	BKGDPT55-03-SS	784	1	17.6	1	15.7	1	9.8	1	23820	1	20.2	1	9.9	1
G	BKGDPT56-03-SS	745	1	12.1	1	10.2	1	6	1	12693	1	18.1	1	9	1
G	BKGDPT57-03-SS	735	1	15.5	1	23.7	1	9.7	1	15990	1	24.2	1	40.2	1
G	BKGDPT58-03-SS	856	1	15.6	1	7	1	9.7	1	16706	1	14.1	1	9.8	1
G	BKGDPT59-03-SS	820	1	14.2	1	12	1	7.2	1	21344	1	15.4	1	44.1	1
G	BKGDPT60-03-SS	978	1	10.6	1	9.3	1	6.8	1	12085	1	16	1	14.1	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Magnesium	D_Magnesium	Manganese	D_Manganese	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium
D	BKGDPT31-03-SS	1882	1	451	1	0.0315	1	18.8	1	995	1
D	BKGDPT32-03-SS	2472	1	548	1	0.04	1	15.8	1	1280	1
D	BKGDPT33-03-SS	2291	1	524	1	0.0516	1	17	1	1241	1
E	BKGDPT34-03-SS	1271	1	1047	1	0.0217	0	11.7	1	984	1
E	BKGDPT35-03-SS	1178	1	870	1	0.0243	0	11	1	1012	1
E	BKGDPT36-03-SS	900	1	765	1	0.035	1	8.8	1	597	1
E	BKGDPT37-03-SS	1460	1	170	1	0.0224	0	11.7	1	1472	1
F	BKGDPT38-03-SS	837	1	474	1	0.0255	1	6.2	1	382	1
F	BKGDPT39-03-SS	987	1	1777	1	0.0289	1	17.9	1	441	1
F	BKGDPT40-03-SS	1018	1	732	1	0.0241	1	13.7	1	639	1
F	BKGDPT41-03-SS	1188	1	471	1	0.0434	1	9.5	1	427	1
F	BKGDPT42-03-SS	961	1	1013	1	0.0392	1	10.5	1	505	1
F	BKGDPT43-03-SS	2312	1	81	1	0.066	1	15.4	1	1586	1
F	BKGDPT44-03-SS	873	1	798	1	0.0234	1	7.1	1	441	1
F	BKGDPT45-03-SS	1259	1	333	1	0.026	1	9.4	1	445	1
F	BKGDPT46-03-SS	1212	1	926	1	0.0314	1	12.3	1	623	1
F	BKGDPT47-03-SS	1262	1	1169	1	0.0205	1	13.5	1	584	1
G	BKGDPT48-03-SS	2980	1	1806	1	0.0242	1	14	1	1102	1
G	BKGDPT49-03-SS	1265	1	252	1	0.04	1	9.8	1	458	1
G	BKGDPT50-03-SS	1222	1	307	1	0.0302	1	9.5	1	448	1
G	BKGDPT51-03-SS	1258	1	1392	1	0.0317	1	10.1	1	473	1
G	BKGDPT52-03-SS	1105	1	1088	1	0.0453	1	25.4	1	540	1
G	BKGDPT53-03-SS	2069	1	330	1	0.0236	0	12.1	1	1376	1
G	BKGDPT54-03-SS	1088	1	1207	1	0.0195	1	9	1	388	1
G	BKGDPT55-03-SS	990	1	1202	1	0.0244	1	13	1	370	1
G	BKGDPT56-03-SS	732	1	1186	1	0.0286	1	10	1	418	1
G	BKGDPT57-03-SS	1241	1	1456	1	0.0224	0	11	1	888	1
G	BKGDPT58-03-SS	1110	1	209	1	0.0294	1	9.7	1	334	1
G	BKGDPT59-03-SS	1840	1	513	1	0.0233	0	13.3	1	1356	1
G	BKGDPT60-03-SS	802	1	1141	1	0.0238	1	11.4	1	427	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium	Total Uranium	D_Total Uranium
D	BKGDPT31-03-SS	0.223	0	0.65	0	28	1	0.162	1	3.73	1
D	BKGDPT32-03-SS	0.801	1	0.63	0	35	1	0.267	1	3.28	1
D	BKGDPT33-03-SS	0.447	1	0.69	0	36	1	0.303	1	3.31	1
E	BKGDPT34-03-SS	1.463	1	0.63	0	29	1	0.984	1	2.95	1
E	BKGDPT35-03-SS	1.338	1	0.67	0	26	1	0.854	1	3.34	1
E	BKGDPT36-03-SS	0.778	1	0.65	0	29	1	0.619	1	2.68	1
E	BKGDPT37-03-SS	0.528	1	0.68	0	32	1	0.139	0	3.64	1
F	BKGDPT38-03-SS	0.371	0	0.31	1	19	1	0.163	1	2.83	1
F	BKGDPT39-03-SS	0.358	1	3.36	1	28	1	0.132	1	3.13	1
F	BKGDPT40-03-SS	0.427	1	1.92	1	24	1	0.133	1	2.83	1
F	BKGDPT41-03-SS	0.367	1	0.4	1	26	1	0.211	1	3.13	1
F	BKGDPT42-03-SS	0.348	1	0.55	0	14	1	0.155	1	3.19	1
F	BKGDPT43-03-SS	0.579	1	0.65	1	121	1	0.132	0	3.28	1
F	BKGDPT44-03-SS	0.402	0	0.42	1	30	1	0.168	1	3.01	1
F	BKGDPT45-03-SS	0.36	1	1.04	1	29	1	0.208	1	3.22	1
F	BKGDPT46-03-SS	0.328	0	2.1	1	27	1	0.117	1	3.10	1
F	BKGDPT47-03-SS	0.39	0	3.14	1	30	1	0.117	1	3.25	1
G	BKGDPT48-03-SS	0.345	1	11.85	1	130	1	0.148	1	3.40	1
G	BKGDPT49-03-SS	0.369	0	3.69	1	40	1	0.189	1	3.81	1
G	BKGDPT50-03-SS	0.366	0	1.01	1	10	1	0.123	1	4.23	1
G	BKGDPT51-03-SS	0.702	1	0.11	0	40	1	0.162	1	3.37	1
G	BKGDPT52-03-SS	0.36	0	5.5	1	32	1	0.168	1	3.31	1
G	BKGDPT53-03-SS	0.561	1	0.66	0	58	1	0.135	0	2.89	1
G	BKGDPT54-03-SS	0.364	0	0.67	1	46	1	0.143	1	3.40	1
G	BKGDPT55-03-SS	0.354	0	2.08	1	27	1	0.134	1	2.92	1
G	BKGDPT56-03-SS	0.378	1	0.39	1	18	1	0.17	1	3.43	1
G	BKGDPT57-03-SS	1.468	1	0.66	0	31	1	1.706	1	2.80	1
G	BKGDPT58-03-SS	0.381	1	0.11	0	22	1	0.252	1	2.68	1
G	BKGDPT59-03-SS	0.443	1	0.66	0	37	1	0.136	0	2.62	1
G	BKGDPT60-03-SS	0.396	1	0.12	0	23	1	0.153	1	3.07	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Vanadium	D_Vanadium	Zinc	D_Zinc
D	BKGDPT31-03-SS	34.4	1	55	1
D	BKGDPT32-03-SS	42.5	1	66.1	1
D	BKGDPT33-03-SS	40.6	1	68.7	1
E	BKGDPT34-03-SS	28.8	1	37.3	1
E	BKGDPT35-03-SS	32	1	38.2	1
E	BKGDPT36-03-SS	29.1	1	30.8	1
E	BKGDPT37-03-SS	43.4	1	39.7	1
F	BKGDPT38-03-SS	23.2	1	21.2	1
F	BKGDPT39-03-SS	39.5	1	40.8	1
F	BKGDPT40-03-SS	31.7	1	37.2	1
F	BKGDPT41-03-SS	26.5	1	24	1
F	BKGDPT42-03-SS	88.4	1	30.8	1
F	BKGDPT43-03-SS	47.3	1	35.1	1
F	BKGDPT44-03-SS	19.5	1	21.7	1
F	BKGDPT45-03-SS	24.5	1	24.4	1
F	BKGDPT46-03-SS	29.5	1	45.1	1
F	BKGDPT47-03-SS	56.7	1	47.6	1
G	BKGDPT48-03-SS	51.8	1	161.4	1
G	BKGDPT49-03-SS	45.2	1	36.9	1
G	BKGDPT50-03-SS	51.3	1	31.5	1
G	BKGDPT51-03-SS	26.5	1	25.6	1
G	BKGDPT52-03-SS	68	1	53.9	1
G	BKGDPT53-03-SS	41	1	43.4	1
G	BKGDPT54-03-SS	25	1	29.4	1
G	BKGDPT55-03-SS	28.8	1	32.9	1
G	BKGDPT56-03-SS	20.2	1	27.5	1
G	BKGDPT57-03-SS	30.4	1	31.9	1
G	BKGDPT58-03-SS	25.2	1	24.1	1
G	BKGDPT59-03-SS	36.2	1	41.5	1
G	BKGDPT60-03-SS	19.9	1	24.7	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238
D	BKGDPT31-04-SS	0.017	0	0.029	0	0.017	0
D	BKGDPT32-04-SS	0.012	0	0.059	0	0.011	0
D	BKGDPT33-04-SS	0.025	0	0.027	0	0.017	0
E	BKGDPT34-04-SS	0.015	0	0.056	0	0.016	0
E	BKGDPT35-04-SS	0.017	0	0.052	0	0.026	0
E	BKGDPT36-04-SS	0.014	0	0.024	0	0.071	0
E	BKGDPT37-04-SS	0.018	0	0.029	0	0.015	0
F	BKGDPT38-04-SS	0.06	0	0.037	0	0.042	0
F	BKGDPT39-04-SS	0.023	0	0.027	0	0.036	0
F	BKGDPT40-04-SS	0.031	0	0.022	0	0.032	0
F	BKGDPT41-04-SS	0.055	0	0.028	0	0.041	0
F	BKGDPT42-04-SS	0.011	0	0.022	0	0.021	0
F	BKGDPT43-04-SS	0.029	0	0.016	0	0.027	0
F	BKGDPT44-04-SS	0.036	0	0.019	0	0.029	0
F	BKGDPT45-04-SS	0.014	0	0.02	0	0.02	0
F	BKGDPT46-04-SS	0.016	0	0.02	0	0.032	0
F	BKGDPT47-04-SS	0.005	0	0.029	0	0.031	0
G	BKGDPT48-04-SS	0.044	0	0.039	0	0.022	0
G	BKGDPT49-04-SS	0.031	0	0.021	0	0.014	0
G	BKGDPT50-04-SS	0.02	0	0.034	0	0.048	0
G	BKGDPT51-04-SS	0.036	0	0.021	0	0.021	0
G	BKGDPT52-04-SS	0.032	0	0.017	0	0.019	0
G	BKGDPT53-04-SS	0.029	0	0.053	0	0.047	0
G	BKGDPT54-04-SS	0.024	0	0.035	0	0.046	0
G	BKGDPT55-04-SS	0.015	0	0.043	0	0.023	0
G	BKGDPT56-04-SS	0.014	0	0.023	0	0.039	0
G	BKGDPT57-04-SS	0.006	0	0.066	0	0.029	0
G	BKGDPT58-04-SS	0.023	0	0.029	0	0.02	0
G	BKGDPT59-04-SS	0.017	0	0.025	0	0.022	0
G	BKGDPT60-04-SS	0.028	0	0.053	0	0.024	0

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99	Thorium-228	D_Thorium-228
D	BKGDPT31-04-SS	0.017	0	0.48	0	1.04	1
D	BKGDPT32-04-SS	0.011	0	0.509	0	1.12	1
D	BKGDPT33-04-SS	0.017	1	0.548	0	1.38	1
E	BKGDPT34-04-SS	0.013	0	0.439	0	0.98	1
E	BKGDPT35-04-SS	0.024	1	0.463	0	1.06	1
E	BKGDPT36-04-SS	0.028	0	0.429	0	1.09	1
E	BKGDPT37-04-SS	0.015	0	0.457	0	1.74	1
F	BKGDPT38-04-SS	0.026	0	0.467	0	1.03	1
F	BKGDPT39-04-SS	0.021	0	0.403	0	1.12	1
F	BKGDPT40-04-SS	0.022	0	0.31	0	1.27	1
F	BKGDPT41-04-SS	0.024	0	0.412	0	1.13	1
F	BKGDPT42-04-SS	0.014	0	0.365	0	1.3	1
F	BKGDPT43-04-SS	0.019	0	0.407	0	1.32	1
F	BKGDPT44-04-SS	0.02	0	0.492	0	1	1
F	BKGDPT45-04-SS	0.011	0	0.355	0	1.16	1
F	BKGDPT46-04-SS	0.005	0	0.394	0	1.35	1
F	BKGDPT47-04-SS	0.022	1	0.394	0	1.29	1
G	BKGDPT48-04-SS	0.025	0	0.37	0	1.26	1
G	BKGDPT49-04-SS	0.023	0	0.488	0	1.55	1
G	BKGDPT50-04-SS	0.038	0	0.375	0	1.2	1
G	BKGDPT51-04-SS	0.024	0	0.402	0	1.07	1
G	BKGDPT52-04-SS	0.013	0	0.382	0	1.39	1
G	BKGDPT53-04-SS	0.034	0	0.329	0	1.48	1
G	BKGDPT54-04-SS	0.039	0	0.392	0	1.18	1
G	BKGDPT55-04-SS	0.037	0	0.361	0	1.24	1
G	BKGDPT56-04-SS	0.02	0	0.418	0	1.08	1
G	BKGDPT57-04-SS	0.017	0	0.388	0	1.19	1
G	BKGDPT58-04-SS	0.02	0	0.431	0	1.31	1
G	BKGDPT59-04-SS	0.022	0	0.581	0	0.99	1
G	BKGDPT60-04-SS	0.015	1	0.444	0	1.18	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234
D	BKGDPT31-04-SS	1.19	1	1.03	1	1.05	1
D	BKGDPT32-04-SS	1.28	1	1	1	1.03	1
D	BKGDPT33-04-SS	1.53	1	1.2	1	1.13	1
E	BKGDPT34-04-SS	1.22	1	1	1	1.01	1
E	BKGDPT35-04-SS	1.08	1	1.18	1	1.08	1
E	BKGDPT36-04-SS	1.34	1	1.22	1	0.98	1
E	BKGDPT37-04-SS	1.66	1	1.63	1	1.16	1
F	BKGDPT38-04-SS	1.09	1	0.85	1	0.9	1
F	BKGDPT39-04-SS	1.01	1	1.12	1	0.84	1
F	BKGDPT40-04-SS	1.09	1	1.05	1	1	1
F	BKGDPT41-04-SS	1.13	1	1.01	1	1	1
F	BKGDPT42-04-SS	1.18	1	1.25	1	0.81	1
F	BKGDPT43-04-SS	1.37	1	1.3	1	0.97	1
F	BKGDPT44-04-SS	1.2	1	0.93	1	1.03	1
F	BKGDPT45-04-SS	1.19	1	0.92	1	1.03	1
F	BKGDPT46-04-SS	1.11	1	1.1	1	1.11	1
F	BKGDPT47-04-SS	1.21	1	1.18	1	1.04	1
G	BKGDPT48-04-SS	1.06	1	1.38	1	0.89	1
G	BKGDPT49-04-SS	1.22	1	1.35	1	1.19	1
G	BKGDPT50-04-SS	1.18	1	1	1	1.35	1
G	BKGDPT51-04-SS	1.28	1	1.04	1	1.07	1
G	BKGDPT52-04-SS	1.18	1	1.37	1	1.07	1
G	BKGDPT53-04-SS	1.56	1	1.44	1	0.98	1
G	BKGDPT54-04-SS	0.93	1	1.01	1	1.21	1
G	BKGDPT55-04-SS	1.06	1	1.06	1	0.93	1
G	BKGDPT56-04-SS	0.99	1	1.14	1	0.88	1
G	BKGDPT57-04-SS	1.17	1	1.11	1	0.95	1
G	BKGDPT58-04-SS	1.3	1	0.95	1	1.03	1
G	BKGDPT59-04-SS	1.17	1	1.14	1	0.94	1
G	BKGDPT60-04-SS	1.14	1	1.18	1	0.91	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
D	BKGDPT31-04-SS	0.06	1	1.25	1
D	BKGDPT32-04-SS	0.09	1	1.1	1
D	BKGDPT33-04-SS	0.05	0	1.11	1
E	BKGDPT34-04-SS	0.059	0	0.99	1
E	BKGDPT35-04-SS	0.06	0	1.12	1
E	BKGDPT36-04-SS	0.057	1	0.9	1
E	BKGDPT37-04-SS	0.072	1	1.22	1
F	BKGDPT38-04-SS	0.048	0	0.95	1
F	BKGDPT39-04-SS	0.062	0	1.05	1
F	BKGDPT40-04-SS	0.091	0	0.95	1
F	BKGDPT41-04-SS	0.083	1	1.05	1
F	BKGDPT42-04-SS	0.068	0	1.07	1
F	BKGDPT43-04-SS	0.05	0	1.1	1
F	BKGDPT44-04-SS	0.064	1	1.01	1
F	BKGDPT45-04-SS	0.073	0	1.08	1
F	BKGDPT46-04-SS	0.067	1	1.04	1
F	BKGDPT47-04-SS	0.033	0	1.09	1
G	BKGDPT48-04-SS	0.056	0	1.14	1
G	BKGDPT49-04-SS	0.054	0	1.28	1
G	BKGDPT50-04-SS	0.07	1	1.42	1
G	BKGDPT51-04-SS	0.061	1	1.13	1
G	BKGDPT52-04-SS	0.045	1	1.11	1
G	BKGDPT53-04-SS	0.056	0	0.97	1
G	BKGDPT54-04-SS	0.075	1	1.14	1
G	BKGDPT55-04-SS	0.056	1	0.98	1
G	BKGDPT56-04-SS	0.098	0	1.15	1
G	BKGDPT57-04-SS	0.072	1	0.94	1
G	BKGDPT58-04-SS	0.076	1	0.9	1
G	BKGDPT59-04-SS	0.057	1	0.88	1
G	BKGDPT60-04-SS	0.062	0	1.03	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
A	BKGDPT01-03-10	7079	1	0.61	1	10.5	1	34.3	1	0.44	1	0.17	1	2415	1
A	BKGDPT02-03-10	8189	1	0.86	1	10.6	1	45.7	1	0.48	1	0.16	1	7138	1
A	BKGDPT03-03-10	3614	1	1.05	0	8.5	1	34.9	1	0.15	1	0.11	0	103394	1
A	BKGDPT04-03-10	5214	1	0.99	1	8	1	26.7	1	0.34	1	0.06	0	40971	1
A	BKGDPT05-03-10	3459	1	0.43	0	7	1	24.2	1	0.13	0	0.11	0	127123	1
B	BKGDPT06-03-10	5338	1	0.47	0	6.7	1	32.2	1	0.24	1	0.07	1	1352	1
B	BKGDPT07-03-10	5577	1	0.68	1	7.5	1	38	1	0.34	1	0.09	1	1267	1
B	BKGDPT08-03-10	6881	1	1.14	1	8.9	1	47.5	1	0.54	1	0.15	1	1150	1
B	BKGDPT09-03-10	3371	1	0.44	0	6.5	1	18.3	1	0.26	1	0.08	1	54219	1
B	BKGDPT10-03-10	6715	1	0.99	1	10.1	1	36.7	1	0.53	1	0.17	1	1133	1
B	BKGDPT11-03-10	4805	1	0.46	0	4	1	15.7	1	0.14	0	0.11	0	72413	1
B	BKGDPT12-03-10	13997	1	1.05	1	9.8	1	81.8	1	0.8	1	0.29	1	8398	1
B	BKGDPT13-03-10	5769	1	0.56	1	7.9	1	57	1	0.31	1	0.14	1	59441	1
B	BKGDPT14-03-10	3052	1	0.43	0	5.9	1	31.7	1	0.35	1	0.11	0	65082	1
B	BKGDPT15-03-10	3306	1	0.42	0	9.8	1	22.5	1	0.13	1	0.05	0	67394	1
B	BKGDPT16-03-10	4045	1	0.5	1	6.5	1	30.1	1	0.28	1	0.06	0	39888	1
B	BKGDPT17-03-10	2376	1	0.42	0	4.3	1	28.3	1	0.36	1	0.11	0	99635	1
B	BKGDPT18-03-10	2965	1	0.35	1	4.2	1	21.4	1	0.21	1	0.06	0	54034	1
B	BKGDPT19-03-10	3903	1	1.07	0	7	1	39	1	0.3	1	0.11	0	110178	1
B	BKGDPT20-03-10	3384	1	0.46	1	5.9	1	20	1	0.23	1	0.06	0	44700	1
B	BKGDPT21-03-10	3215	1	0.43	0	6.9	1	25.4	1	0.08	1	0.05	0	71912	1
B	BKGDPT22-03-10	3205	1	0.42	0	5.9	1	22.4	1	0.15	1	0.05	0	70800	1
B	BKGDPT23-03-10	3239	1	0.43	0	8.1	1	89.9	1	0.15	1	0.05	0	75758	1
B	BKGDPT24-03-10	7831	1	0.93	1	9.1	1	65.9	1	0.49	1	0.08	1	36145	1
B	BKGDPT25-03-10	3582	1	1.27	1	6	1	34.3	1	0.26	1	0.07	1	19286	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
A	BKGDPT01-03-10	11.5	1	7.3	1	12.6	1	16490	1	9.1	1	35.8	1	2167	1	375	1
A	BKGDPT02-03-10	12.4	1	7.4	1	12.1	1	17173	1	8.3	1	42.2	1	3131	1	435	1
A	BKGDPT03-03-10	8.4	1	5.5	1	10.6	1	12256	1	3.8	1	35.8	1	30484	1	398	1
A	BKGDPT04-03-10	12.4	1	5.2	1	10	1	13205	1	6.8	1	29.1	1	12302	1	255	1
A	BKGDPT05-03-10	5.8	1	4.6	1	7.3	1	9086	1	4.6	1	45.2	1	31051	1	363	1
B	BKGDPT06-03-10	10	1	5.6	1	8.4	1	12371	1	5.5	1	24.4	1	1546	1	255	1
B	BKGDPT07-03-10	4.8	1	5.1	1	10.6	1	13009	1	6.1	1	21.5	1	1437	1	310	1
B	BKGDPT08-03-10	6.5	1	6.7	1	12.9	1	15714	1	8.1	1	29.8	1	1512	1	385	1
B	BKGDPT09-03-10	6.2	1	4.5	1	13.3	1	9684	1	4.8	1	21	1	14816	1	227	1
B	BKGDPT10-03-10	7.9	1	7.4	1	12.2	1	16547	1	9.7	1	30.5	1	1583	1	421	1
B	BKGDPT11-03-10	8.3	1	6.7	1	5.4	0	9435	1	7.6	1	17.5	1	24799	1	258	1
B	BKGDPT12-03-10	18.2	1	11.9	1	21.8	1	24086	1	13.4	1	59.8	1	5864	1	295	1
B	BKGDPT13-03-10	9.4	1	6.5	1	11	1	14336	1	6.9	1	32.3	1	29254	1	541	1
B	BKGDPT14-03-10	4.6	1	4.7	1	10.9	1	12041	1	4	1	30.7	1	19618	1	366	1
B	BKGDPT15-03-10	7.9	1	6.2	1	7.4	1	11232	1	5.4	1	23.4	1	22465	1	336	1
B	BKGDPT16-03-10	8.7	1	4.9	1	8.3	1	12022	1	6.1	1	24.9	1	13933	1	312	1
B	BKGDPT17-03-10	13	1	3.5	1	6.6	1	7233	1	3.5	1	41.3	1	39083	1	304	1
B	BKGDPT18-03-10	9	1	4	1	5.6	1	8508	1	3.8	1	21.7	1	12031	1	256	1
B	BKGDPT19-03-10	10.7	1	5.6	1	14	1	13641	1	4.9	1	48.4	1	15530	1	888	1
B	BKGDPT20-03-10	7.7	1	4.7	1	7.6	1	9919	1	5.2	1	20.8	1	13729	1	251	1
B	BKGDPT21-03-10	10.5	1	4.2	1	6.2	1	9528	1	3.4	1	21.7	1	20199	1	380	1
B	BKGDPT22-03-10	6.3	1	4.8	1	2.6	0	9541	1	4.2	1	27.3	1	14244	1	298	1
B	BKGDPT23-03-10	8.3	1	5.9	1	9.8	1	10387	1	4.8	1	22.8	1	18913	1	728	1
B	BKGDPT24-03-10	7.9	1	7.2	1	14.2	1	16386	1	8.6	1	30.4	1	13133	1	460	1
B	BKGDPT25-03-10	7.1	1	5.1	1	6.6	1	10690	1	4.3	1	19.2	1	8155	1	396	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
A	BKGDPT01-03-10	0.0219	0	19.1	1	1058	1	0.232	1	0.66	0	50	1	0.29	1
A	BKGDPT02-03-10	0.023	0	19.7	1	1055	1	0.227	0	0.66	0	63	1	0.396	1
A	BKGDPT03-03-10	0.0198	0	11.1	1	447	1	0.97	0	2.84	0	132	1	0.649	1
A	BKGDPT04-03-10	0.0219	0	12.6	1	770	1	0.547	0	1.6	0	74	1	0.327	0
A	BKGDPT05-03-10	0.0196	0	13.1	1	448	1	0.971	0	2.84	0	130	1	0.58	0
B	BKGDPT06-03-10	0.0228	0	15	1	781	1	0.213	0	0.63	0	53	1	0.341	1
B	BKGDPT07-03-10	0.0206	0	15.2	1	853	1	0.219	0	0.64	0	46	1	0.131	0
B	BKGDPT08-03-10	0.0233	0	16.5	1	854	1	0.263	1	0.65	0	37	1	0.263	1
B	BKGDPT09-03-10	0.021	0	11.4	1	541	1	0.51	0	1.49	0	92	1	0.305	0
B	BKGDPT10-03-10	0.0233	0	18.3	1	960	1	0.229	0	0.67	0	44	1	0.26	1
B	BKGDPT11-03-10	0.0211	0	15.7	1	1085	1	1.042	0	3.05	0	141	1	0.623	0
B	BKGDPT12-03-10	0.0474	1	28.2	1	1828	1	0.235	0	0.69	0	55	1	0.291	1
B	BKGDPT13-03-10	0.0219	0	16.7	1	804	1	1.03	1	2.09	1	98	1	0.641	1
B	BKGDPT14-03-10	0.0199	0	11.7	1	378	1	0.975	0	2.85	0	126	1	0.582	0
B	BKGDPT15-03-10	0.0188	0	14.3	1	419	1	0.497	0	1.45	0	125	1	0.486	1
B	BKGDPT16-03-10	0.0216	0	11.3	1	648	1	1.337	1	4.76	1	73	1	0.322	0
B	BKGDPT17-03-10	0.0174	0	8.6	1	491	1	2.543	1	3.73	1	125	1	0.726	1
B	BKGDPT18-03-10	0.017	0	9.9	1	375	1	1.504	1	1.99	1	105	1	0.403	1
B	BKGDPT19-03-10	0.0188	0	13.2	1	482	1	1.931	1	4.17	1	94	1	0.964	1
B	BKGDPT20-03-10	0.0186	0	11.2	1	607	1	1.014	1	3.12	1	76	1	0.301	0
B	BKGDPT21-03-10	0.0206	0	11.2	1	383	1	0.492	0	1.44	0	106	1	0.305	1
B	BKGDPT22-03-10	0.0194	0	10.3	1	411	1	1.435	1	4.47	1	90	1	0.296	0
B	BKGDPT23-03-10	0.0191	0	13.8	1	424	1	0.496	0	1.71	1	118	1	0.639	1
B	BKGDPT24-03-10	0.023	1	15.7	1	911	1	0.924	1	1.54	1	65	1	0.416	1
B	BKGDPT25-03-10	0.022	0	11.5	1	474	1	0.503	1	1.05	1	57	1	0.374	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
A	BKGDPT01-03-10	2.47	1	22.4	1	52.8	1
A	BKGDPT02-03-10	2.53	1	24.6	1	54.8	1
A	BKGDPT03-03-10	1.70	1	10.3	1	26.6	1
A	BKGDPT04-03-10	1.76	1	12.4	1	35.8	1
A	BKGDPT05-03-10	1.73	1	7.6	1	32.2	1
B	BKGDPT06-03-10	1.91	1	13.6	1	38	1
B	BKGDPT07-03-10	1.97	1	16.3	1	42.2	1
B	BKGDPT08-03-10	2.24	1	21.9	1	49.6	1
B	BKGDPT09-03-10	1.58	1	12.2	1	34.1	1
B	BKGDPT10-03-10	2.59	1	21.6	1	55	1
B	BKGDPT11-03-10	2.53	1	8.5	1	45.9	1
B	BKGDPT12-03-10	3.64	1	35.4	1	90	1
B	BKGDPT13-03-10	2.12	1	21.1	1	45.3	1
B	BKGDPT14-03-10	1.37	1	17.2	1	34.8	1
B	BKGDPT15-03-10	1.52	1	10.2	1	29.4	1
B	BKGDPT16-03-10	1.37	1	19	1	31.9	1
B	BKGDPT17-03-10	1.28	1	11.4	1	10.8	1
B	BKGDPT18-03-10	1.07	1	12.9	1	25.2	1
B	BKGDPT19-03-10	1.28	1	18	1	27.2	1
B	BKGDPT20-03-10	1.85	1	13.2	1	27.4	1
B	BKGDPT21-03-10	1.70	1	4.8	1	24.5	1
B	BKGDPT22-03-10	1.37	1	9.3	1	24.2	1
B	BKGDPT23-03-10	1.31	1	8.3	1	30.8	1
B	BKGDPT24-03-10	2.50	1	21.7	1	50.1	1
B	BKGDPT25-03-10	1.55	1	12.3	1	29.6	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
A	BKGDPT01-04-10	0.021	0	0.061	0	0.043	0	0.049	0	0.439	0
A	BKGDPT02-04-10	0.039	0	0.067	0	0.049	0	0.045	0	0.453	0
A	BKGDPT03-04-10	0.046	0	0.07	0	0.04	0	0.025	0	0.411	0
A	BKGDPT04-04-10	0.079	0	0.063	0	0.061	0	0.057	0	0.427	0
A	BKGDPT05-04-10	0.053	0	0.088	0	0.106	0	0.089	0	0.381	0
B	BKGDPT06-04-10	0.049	0	0.085	0	0.035	0	0.018	0	0.407	0
B	BKGDPT07-04-10	0.053	0	0.031	0	0.058	0	0.055	0	0.414	0
B	BKGDPT08-04-10	0.047	0	0.069	0	0.091	0	0.059	0	0.426	0
B	BKGDPT09-04-10	0.042	0	0.035	0	0.021	0	0.017	0	0.361	0
B	BKGDPT10-04-10	0.105	0	0.07	0	0.078	0	0.063	0	0.434	0
B	BKGDPT11-04-10	0.039	0	0.089	0	0.039	0	0.044	0	0.358	0
B	BKGDPT12-04-10	0.036	0	0.064	0	0.149	0	0.098	0	0.472	0
B	BKGDPT13-04-10	0.036	0	0.057	0	0.021	0	0.01	0	0.38	0
B	BKGDPT14-04-10	0.064	0	0.06	0	0.027	0	0.031	0	0.358	0
B	BKGDPT15-04-10	0.022	0	0.042	0	0.049	0	0.041	0	0.359	0
B	BKGDPT16-04-10	0.028	0	0.047	0	0.022	0	0.01	0	0.398	0
B	BKGDPT17-04-10	0.074	0	0.053	0	0.017	0	0.021	0	0.361	0
B	BKGDPT18-04-10	0.024	0	0.071	0	0.043	0	0.043	0	0.388	0
B	BKGDPT19-04-10	0.023	0	0.022	0	0.036	0	0.019	0	0.378	0
B	BKGDPT20-04-10	0.047	0	0.052	0	0.032	0	0.032	0	0.358	0
B	BKGDPT21-04-10	0.06	0	0.05	0	0.072	0	0.019	0	0.375	0
B	BKGDPT22-04-10	0.047	0	0.059	0	0.021	0	0.011	0	0.375	0
B	BKGDPT23-04-10	0.033	0	0.053	0	0.057	0	0.031	0	0.38	0
B	BKGDPT24-04-10	0.07	0	0.087	0	0.009	0	0.009	0	0.427	0
B	BKGDPT25-04-10	0.02	0	0.053	0	0.017	0	0.017	0	0.365	0

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
A	BKGDPT01-04-10	0.58	1	0.93	1	0.62	1	0.82	1	0.045	1	0.83	1
A	BKGDPT02-04-10	0.67	1	1.24	1	0.79	1	0.76	1	0.047	1	0.85	1
A	BKGDPT03-04-10	0.2	1	0.55	1	0.16	1	0.42	1	0.051	0	0.57	1
A	BKGDPT04-04-10	0.36	1	0.68	1	0.38	1	0.54	1	0.026	1	0.59	1
A	BKGDPT05-04-10	0.3	1	0.72	1	0.25	1	0.6	1	0.041	0	0.58	1
B	BKGDPT06-04-10	0.32	1	1.16	1	0.48	1	0.67	1	0.036	1	0.64	1
B	BKGDPT07-04-10	0.34	1	0.92	1	0.35	1	0.55	1	0.042	1	0.66	1
B	BKGDPT08-04-10	0.47	1	1.04	1	0.57	1	0.65	1	0.041	0	0.75	1
B	BKGDPT09-04-10	0.32	1	0.78	1	0.25	1	0.58	1	0.021	0	0.53	1
B	BKGDPT10-04-10	0.63	1	1.47	1	0.7	1	0.75	1	0.034	1	0.87	1
B	BKGDPT11-04-10	0.34	1	1.27	1	0.26	1	0.96	1	0.037	1	0.85	1
B	BKGDPT12-04-10	1.16	1	1.74	1	1.15	1	1.31	1	0.045	1	1.22	1
B	BKGDPT13-04-10	0.66	1	1.27	1	0.62	1	0.65	1	0.026	1	0.71	1
B	BKGDPT14-04-10	0.3	1	0.73	1	0.24	1	0.4	1	0.028	1	0.46	1
B	BKGDPT15-04-10	0.26	1	0.85	1	0.44	1	0.54	1	0.02	1	0.51	1
B	BKGDPT16-04-10	0.49	1	0.89	1	0.47	1	0.52	1	0.044	1	0.46	1
B	BKGDPT17-04-10	0.28	1	0.57	1	0.51	1	0.35	1	0.044	0	0.43	1
B	BKGDPT18-04-10	0.26	1	0.76	1	0.37	1	0.4	1	0.049	0	0.36	1
B	BKGDPT19-04-10	0.34	1	0.79	1	0.28	1	0.37	1	0.031	1	0.43	1
B	BKGDPT20-04-10	0.35	1	0.75	1	0.28	1	0.67	1	0.059	0	0.62	1
B	BKGDPT21-04-10	0.29	1	0.52	1	0.23	1	0.35	1	0.032	1	0.57	1
B	BKGDPT22-04-10	0.24	1	0.58	1	0.31	1	0.35	1	0.029	1	0.46	1
B	BKGDPT23-04-10	0.17	1	0.65	1	0.18	1	0.43	1	0.03	1	0.44	1
B	BKGDPT24-04-10	0.83	1	1.13	1	0.7	1	0.78	1	0.048	1	0.84	1
B	BKGDPT25-04-10	0.41	1	0.71	1	0.37	1	0.47	1	0.052	0	0.52	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
D	BKGDPT31-03-2	15035	1	1.26	1	21.1	1	59.6	1	0.79	1	0.06	0	275	1
D	BKGDPT31-03-4	15450	1	2.62	1	77.7	1	431.9	1	1.35	1	1.46	1	292	1
D	BKGDPT32-03-10	11613	1	0.95	0	12.2	1	49	1	0.76	1	0.02	0	787	1
D	BKGDPT32-03-12	9928	1	2.46	1	53.3	1	71.6	1	1.71	1	0.06	0	880	1
D	BKGDPT32-03-2	19830	1	1.01	0	9.3	1	61.4	1	0.62	1	0.02	0	876	1
D	BKGDPT32-03-4	12057	1	0.98	0	6.2	1	74.9	1	0.67	1	0.02	0	978	1
D	BKGDPT32-03-6	15466	1	0.59	1	29.5	1	72.5	1	0.83	1	0.02	0	882	1
D	BKGDPT32-03-8	12663	1	0.98	0	21.8	1	68.2	1	1.1	1	0.06	0	1151	1
D	BKGDPT33-03-2	11089	1	0.93	0	11.7	1	49.9	1	0.43	1	0.02	0	123	1
D	BKGDPT33-03-4	20430	1	1.46	1	23.9	1	97.7	1	0.96	1	0.02	0	553	1
D	BKGDPT33-03-6	14365	1	2.91	1	37.3	1	83.9	1	1.18	1	0.06	0	434	1
E	BKGDPT34-03-10	15126	1	0.82	1	7.9	1	58.2	1	0.78	1	0.02	0	683	1
E	BKGDPT34-03-12	13839	1	1.06	1	14.1	1	64.1	1	0.97	1	0.03	0	765	1
E	BKGDPT34-03-14	13501	1	1.03	1	15.1	1	75.9	1	0.87	1	0.02	0	695	1
E	BKGDPT34-03-2	15610	1	1.61	1	13.6	1	51.1	1	0.65	1	0.02	0	278	1
E	BKGDPT34-03-4	20388	1	1.44	1	11.5	1	1529.1	1	1.11	1	0.02	0	774	1
E	BKGDPT34-03-6	20463	1	1.06	1	2.6	1	92.8	1	0.91	1	0.03	0	938	1
E	BKGDPT34-03-8	15981	1	0.77	1	4.9	1	58.8	1	0.61	1	0.02	0	652	1
E	BKGDPT35-03-10	11023	1	0.28	0	11.7	1	61.4	1	0.77	1	0.02	0	585	1
E	BKGDPT35-03-12	9166	1	0.39	1	20.4	1	60.4	1	0.71	1	0.02	0	588	1
E	BKGDPT35-03-14	9349	1	0.3	1	19.1	1	59.7	1	0.72	1	0.03	0	526	1
E	BKGDPT35-03-2	10011	1	1.03	1	36	1	47.8	1	1.17	1	0.1	0	288	1
E	BKGDPT35-03-4	15357	1	0.99	1	9	1	68.8	1	0.64	1	0.02	0	743	1
E	BKGDPT35-03-6	14320	1	0.76	1	16.2	1	75.2	1	0.8	1	0.02	0	686	1
E	BKGDPT35-03-8	12334	1	0.3	0	10.5	1	67.8	1	0.46	1	0.02	0	709	1
E	BKGDPT36-03-10	10515	1	1.42	1	16.6	1	47.5	1	1.05	1	0.02	0	720	1
E	BKGDPT36-03-12	11299	1	1.72	1	13.8	1	59.1	1	0.84	1	0.04	1	855	1
E	BKGDPT36-03-14	8986	1	1.6	1	39.7	1	66.5	1	0.87	1	0.06	0	544	1
E	BKGDPT36-03-2	13834	1	1.56	1	8.5	1	47.1	1	0.45	1	0.02	0	196	1
E	BKGDPT36-03-4	14841	1	1.21	0	6.9	1	74.2	1	0.61	1	0.02	0	503	1
E	BKGDPT36-03-6	16038	1	1.18	0	3.4	1	105.8	1	0.73	1	0.02	0	963	1
E	BKGDPT36-03-8	8881	1	2.54	1	32.4	1	43.7	1	2.33	1	0.12	0	510	1
E	BKGDPT37-03-10	13333	1	1.03	1	10	1	76.1	1	0.89	1	0.02	0	494	1
E	BKGDPT37-03-12	14269	1	2.04	1	20.8	1	75.3	1	0.92	1	0.06	0	511	1
E	BKGDPT37-03-14	13769	1	1.69	1	8.9	1	58.3	1	0.91	1	0.02	0	564	1
E	BKGDPT37-03-2	16175	1	1.26	1	10.4	1	527.7	1	0.72	1	0.02	0	320	1
E	BKGDPT37-03-4	13808	1	2.56	1	15.3	1	42.8	1	0.92	1	0.02	0	441	1
E	BKGDPT37-03-6	14527	1	1.67	1	14.5	1	91.8	1	1.05	1	0.02	0	503	1
E	BKGDPT37-03-8	12812	1	1.24	1	9.8	1	71	1	0.8	1	0.02	0	507	1
F	BKGDPT38-03-10	6223	1	0.4	0	3.3	1	58.1	1	0.46	1	0.05	1	493	1
F	BKGDPT38-03-12	8415	1	0.38	0	12.4	1	83.9	1	0.73	1	0.11	1	1167	1
F	BKGDPT38-03-14	6451	1	0.41	0	3.9	1	52.6	1	0.56	1	0.09	1	954	1
F	BKGDPT38-03-2	6104	1	0.4	0	8.4	1	80.1	1	0.74	1	0.06	1	677	1
F	BKGDPT38-03-4	6960	1	0.38	0	6.6	1	40.2	1	0.38	1	0.02	1	668	1
F	BKGDPT38-03-6	8005	1	0.68	1	16.1	1	52.6	1	0.7	1	0.04	1	280	1
F	BKGDPT38-03-8	11904	1	0.41	0	13.5	1	81	1	0.58	1	0.08	1	806	1
F	BKGDPT39-03-10	9373	1	0.36	0	1.7	1	69.9	1	0.73	1	0.2	1	672	1
F	BKGDPT39-03-12	3829	1	0.39	0	2.2	1	32.1	1	0.35	1	0.07	1	284	1
F	BKGDPT39-03-14	8938	1	0.36	0	8	1	83.3	1	0.68	1	0.08	1	805	1
F	BKGDPT39-03-2	7059	1	0.36	1	40.1	1	65.8	1	1.05	1	0.16	1	315	1
F	BKGDPT39-03-4	6023	1	0.62	1	19.3	1	52.2	1	0.66	1	0.07	1	120	1
F	BKGDPT39-03-6	11398	1	0.43	1	2.6	1	96.3	1	1.04	1	0.15	1	669	1

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
F	BKGDPT39-03-8	11966	1	0.53	1	7.5	1	97.5	1	0.94	1	0.15	1	715	1
F	BKGDPT40-03-10	12500	1	1.02	1	10.3	1	81	1	1.12	1	0.18	1	1079	1
F	BKGDPT40-03-12	13010	1	1.51	1	9.3	1	81.4	1	1.06	1	0.17	1	1055	1
F	BKGDPT40-03-14	11538	1	0.87	1	5.3	1	87.3	1	0.93	1	0.24	1	1124	1
F	BKGDPT40-03-2	10098	1	1.76	1	27.3	1	57.1	1	1.18	1	0.14	1	527	1
F	BKGDPT40-03-4	7648	1	0.36	1	9.8	1	82.5	1	0.59	1	0.12	1	758	1
F	BKGDPT40-03-6	8849	1	0.58	1	1.7	1	62.4	1	0.28	1	0.1	1	424	1
F	BKGDPT40-03-8	9397	1	0.38	0	3.8	1	63.5	1	0.56	1	0.08	1	585	1
F	BKGDPT41-03-10	10914	1	0.36	0	8.9	1	90.6	1	1.13	1	0.2	1	1151	1
F	BKGDPT41-03-12	10112	1	0.4	0	3.3	1	80.8	1	0.9	1	0.17	1	1050	1
F	BKGDPT41-03-14	9535	1	0.39	0	4.5	1	76	1	0.88	1	0.21	1	1111	1
F	BKGDPT41-03-2	10806	1	0.36	0	13.4	1	52.2	1	0.5	1	0.1	1	231	1
F	BKGDPT41-03-4	7338	1	0.37	0	11.8	1	54.2	1	0.49	1	0.1	1	265	1
F	BKGDPT41-03-6	10135	1	0.38	0	2.6	1	85.5	1	0.92	1	0.18	1	1018	1
F	BKGDPT41-03-8	10218	1	0.4	0	4.1	1	88	1	1.06	1	0.18	1	1081	1
F	BKGDPT42-03-2	14165	1	0.39	1	12.5	1	39.5	1	0.5	1	0.1	1	327	1
F	BKGDPT42-03-4	11144	1	0.39	1	10	1	39.3	1	0.72	1	0.07	1	698	1
F	BKGDPT42-03-6	9671	1	0.39	1	6.2	1	475.4	1	0.58	1	0.08	1	932	1
F	BKGDPT43-03-10	19090	1	0.37	1	6.3	1	88.4	1	1.03	1	0.03	0	1174	1
F	BKGDPT43-03-12	10668	1	0.28	0	2.5	1	58.4	1	0.59	1	0.02	0	623	1
F	BKGDPT43-03-14	15636	1	0.3	0	12.7	1	78.7	1	0.92	1	0.02	0	945	1
F	BKGDPT43-03-2	25516	1	0.28	0	9.1	1	59.2	1	1.65	1	0.03	0	716	1
F	BKGDPT43-03-4	25352	1	0.29	0	11.6	1	161.3	1	2.75	1	0.06	0	924	1
F	BKGDPT43-03-6	22911	1	0.3	0	6	1	48.9	1	1.35	1	0.03	0	1152	1
F	BKGDPT43-03-8	21274	1	0.31	0	16.8	1	57.8	1	1.31	1	0.06	0	1250	1
F	BKGDPT44-03-10	10618	1	0.56	1	5.4	1	80.2	1	0.77	1	0.2	1	1098	1
F	BKGDPT44-03-12	10339	1	0.39	0	4.6	1	55.1	1	0.55	1	0.12	1	945	1
F	BKGDPT44-03-14	7345	1	0.36	0	6.4	1	72.4	1	0.6	1	0.11	1	598	1
F	BKGDPT44-03-2	6744	1	0.35	0	7.2	1	59.2	1	0.4	1	0.11	1	677	1
F	BKGDPT44-03-4	8629	1	0.71	1	9.1	1	149.7	1	1.21	1	0.13	1	537	1
F	BKGDPT44-03-6	11876	1	1.99	0	8.8	1	73.6	1	0.88	1	0.13	1	990	1
F	BKGDPT44-03-8	11856	1	0.41	0	4.2	1	78.2	1	0.81	1	0.22	1	1203	1
F	BKGDPT45-03-2	10696	1	0.38	1	12.6	1	49.5	1	0.56	1	0.1	1	347	1
F	BKGDPT45-03-4	6466	1	0.68	1	13.3	1	61.8	1	0.55	1	0.07	1	509	1
F	BKGDPT46-03-2	7719	1	0.37	0	15.4	1	49.6	1	0.47	1	0.13	1	362	1
F	BKGDPT46-03-4	8725	1	0.38	0	24.8	1	50.4	1	0.71	1	0.14	1	671	1
F	BKGDPT46-03-6	12862	1	0.35	0	19.9	1	45.1	1	0.89	1	0.14	1	891	1
F	BKGDPT47-03-10	10473	1	0.55	1	8	1	73.1	1	0.61	1	0.13	1	832	1
F	BKGDPT47-03-12	10177	1	0.56	1	9.2	1	68.4	1	0.66	1	0.12	1	761	1
F	BKGDPT47-03-14	10215	1	0.74	1	15	1	66.4	1	0.77	1	0.15	1	749	1
F	BKGDPT47-03-2	8566	1	0.81	1	29.9	1	62.1	1	0.93	1	0.21	1	272	1
F	BKGDPT47-03-4	9443	1	1.75	0	22.3	1	92.3	1	1.17	1	0.3	1	261	1
F	BKGDPT47-03-6	9790	1	0.38	0	12.9	1	74.2	1	0.75	1	0.15	1	489	1
F	BKGDPT47-03-8	10913	1	0.44	1	17.8	1	87.4	1	0.71	1	0.16	1	776	1
G	BKGDPT48-03-10	11041	1	0.37	1	26.7	1	91.3	1	1.16	1	0.15	1	1025	1
G	BKGDPT48-03-12	8890	1	0.37	1	11	1	72.4	1	0.64	1	0.12	1	882	1
G	BKGDPT48-03-14	9821	1	0.41	1	14.1	1	60.3	1	0.72	1	0.12	1	892	1
G	BKGDPT48-03-2	7937	1	0.67	1	17	1	72.5	1	0.65	1	0.11	1	263	1
G	BKGDPT48-03-4	10708	1	2.38	1	93	1	54.7	1	1.94	1	0.25	1	220	1
G	BKGDPT48-03-6	10408	1	0.54	1	7.6	1	64	1	1.13	1	0.11	1	950	1
G	BKGDPT48-03-8	13325	1	1.89	0	15.2	1	81.5	1	0.91	1	0.11	1	738	1
G	BKGDPT49-03-10	12190	1	0.56	1	20.8	1	117.5	1	1.11	1	0.24	1	1502	1

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
G	BKGDPT49-03-12	12659	1	0.92	1	47.6	1	114.5	1	1.26	1	0.4	1	1489	1
G	BKGDPT49-03-14	9627	1	0.55	1	8	1	84.3	1	1.03	1	0.19	1	1097	1
G	BKGDPT49-03-2	13230	1	0.89	1	18.1	1	563.8	1	0.87	1	0.1	1	728	1
G	BKGDPT49-03-4	14112	1	0.42	1	9.3	1	169.1	1	1.64	1	0.15	1	1217	1
G	BKGDPT49-03-6	15013	1	0.79	1	8	1	396.9	1	1.96	1	0.34	1	1606	1
G	BKGDPT49-03-8	13032	1	0.73	1	5.7	1	39.2	1	1.01	1	0.26	1	1523	1
G	BKGDPT50-03-10	9671	1	0.39	0	2.9	1	79.8	1	1.08	1	0.13	1	1023	1
G	BKGDPT50-03-12	8968	1	0.38	0	0.6	1	82.7	1	0.7	1	0.09	1	956	1
G	BKGDPT50-03-14	7012	1	0.36	0	0.4	1	108.3	1	0.61	1	0.14	1	662	1
G	BKGDPT50-03-2	10965	1	0.38	0	0.4	1	54.1	1	0.42	1	0.04	1	475	1
G	BKGDPT50-03-4	13155	1	0.37	0	1.4	1	72.8	1	0.81	1	0.07	1	1127	1
G	BKGDPT50-03-6	10755	1	0.39	0	1.8	1	71.6	1	0.76	1	0.08	1	965	1
G	BKGDPT50-03-8	11533	1	0.38	0	1.7	1	73.5	1	0.81	1	0.1	1	1185	1
G	BKGDPT51-03-10	9541	1	0.34	0	5.4	1	70	1	0.71	1	0.05	1	1035	1
G	BKGDPT51-03-12	8992	1	0.34	1	5.6	1	81.1	1	0.55	1	0.04	1	1107	1
G	BKGDPT51-03-14	9691	1	0.35	1	9.4	1	277.1	1	0.73	1	0.11	1	1185	1
G	BKGDPT51-03-2	10789	1	0.36	1	13.9	1	84	1	0.86	1	0.08	1	624	1
G	BKGDPT51-03-4	11803	1	0.38	1	4.6	1	51.8	1	0.57	1	0.08	1	374	1
G	BKGDPT51-03-6	8614	1	0.37	1	3.5	1	53	1	1.07	1	0.17	1	682	1
G	BKGDPT51-03-8	7855	1	0.39	1	2.4	1	39.3	1	0.5	1	0.04	1	774	1
G	BKGDPT52-03-10	9766	1	2.08	1	15	1	53.7	1	0.83	1	0.19	1	8324	1
G	BKGDPT52-03-12	10767	1	0.36	1	12.2	1	34.4	1	0.82	1	0.08	1	1794	1
G	BKGDPT52-03-14	10695	1	0.33	1	13.7	1	39.2	1	0.81	1	0.1	1	1207	1
G	BKGDPT52-03-2	10566	1	1.7	1	28.7	1	45.1	1	0.86	1	0.12	1	201	1
G	BKGDPT52-03-4	12965	1	0.39	1	9.3	1	44.9	1	0.63	1	0.09	1	361	1
G	BKGDPT52-03-6	10688	1	0.54	1	6.5	1	83.8	1	0.74	1	0.1	1	1224	1
G	BKGDPT52-03-8	11825	1	0.39	1	7.9	1	49.1	1	0.72	1	0.09	1	741	1
G	BKGDPT53-03-10	19053	1	0.82	1	5.7	1	107.2	1	0.96	1	0.02	0	1151	1
G	BKGDPT53-03-12	17912	1	0.58	1	4.7	1	106.3	1	0.78	1	0.02	0	1023	1
G	BKGDPT53-03-14	16302	1	1.37	1	10.5	1	100.1	1	0.82	1	0.03	0	1035	1
G	BKGDPT53-03-2	20455	1	1.4	1	13	1	66.9	1	0.68	1	0.06	0	511	1
G	BKGDPT53-03-4	22236	1	0.29	0	8.2	1	218.7	1	1.64	1	0.02	0	1543	1
G	BKGDPT53-03-6	25194	1	0.32	0	10.5	1	213.2	1	1.43	1	0.03	0	1757	1
G	BKGDPT53-03-8	17983	1	0.3	0	29.2	1	100.9	1	0.93	1	0.03	0	1300	1
G	BKGDPT54-03-10	9842	1	0.36	0	4.3	1	92	1	0.71	1	0.08	1	1100	1
G	BKGDPT54-03-12	9245	1	0.36	0	3.3	1	104.4	1	0.68	1	0.08	1	1068	1
G	BKGDPT54-03-14	9263	1	0.37	0	6	1	92.7	1	0.58	1	0.08	1	1152	1
G	BKGDPT54-03-2	12225	1	0.39	0	16.9	1	76.4	1	0.52	1	0.11	1	801	1
G	BKGDPT54-03-4	4319	1	0.37	0	4.9	1	32.4	1	0.32	1	0.16	1	512	1
G	BKGDPT54-03-6	10443	1	0.33	0	7.6	1	70.2	1	0.53	1	0.11	1	811	1
G	BKGDPT54-03-8	9353	1	0.38	0	6.5	1	108.7	1	0.7	1	0.14	1	838	1
G	BKGDPT55-03-10	9339	1	4.28	1	37.2	1	72.6	1	0.9	1	0.13	1	622	1
G	BKGDPT55-03-12	10348	1	1.68	0	27.5	1	71.3	1	0.9	1	0.11	1	756	1
G	BKGDPT55-03-14	7968	1	0.93	1	18.5	1	131.7	1	1.01	1	0.12	1	573	1
G	BKGDPT55-03-2	8304	1	0.9	1	17.7	1	69.7	1	0.82	1	0.11	1	611	1
G	BKGDPT55-03-4	10215	1	0.78	1	9.8	1	54.8	1	0.6	1	0.09	1	221	1
G	BKGDPT55-03-6	8345	1	0.37	1	13.1	1	52	1	0.62	1	0.11	1	405	1
G	BKGDPT55-03-8	8729	1	1.82	1	26.5	1	60.2	1	0.69	1	0.12	1	542	1
G	BKGDPT56-03-10	13445	1	0.99	1	9.1	1	79.7	1	0.93	1	0.14	1	1561	1
G	BKGDPT56-03-12	12335	1	0.41	1	6.9	1	94.6	1	1.15	1	0.21	1	1617	1
G	BKGDPT56-03-14	10119	1	0.71	1	4.5	1	107.5	1	1.17	1	0.22	1	1413	1
G	BKGDPT56-03-2	13237	1	0.36	1	10.8	1	70.5	1	0.43	1	0.16	1	443	1

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
G	BKGDPT56-03-4	8568	1	0.78	1	11.1	1	83.8	1	0.7	1	0.16	1	481	1
G	BKGDPT56-03-6	8079	1	0.39	0	8.1	1	127.3	1	0.67	1	0.17	1	721	1
G	BKGDPT56-03-8	10115	1	0.73	1	11.5	1	67.6	1	0.55	1	0.11	1	1218	1
G	BKGDPT57-03-10	13527	1	1.46	1	11.2	1	81.9	1	0.81	1	0.02	0	1005	1
G	BKGDPT57-03-12	11865	1	1.64	1	26.2	1	57.8	1	0.8	1	0.02	0	916	1
G	BKGDPT57-03-14	11560	1	0.59	1	18.4	1	50.4	1	0.71	1	0.02	0	807	1
G	BKGDPT57-03-2	22644	1	0.29	0	6.6	1	80.7	1	0.75	1	0.02	0	636	1
G	BKGDPT57-03-4	18549	1	0.28	0	5.8	1	153.4	1	1.5	1	0.02	0	1114	1
G	BKGDPT57-03-6	20192	1	0.37	1	15.3	1	97.2	1	0.83	1	0.06	0	1126	1
G	BKGDPT57-03-8	12961	1	1.13	1	7.9	1	70	1	0.7	1	0.02	0	868	1
G	BKGDPT58-03-10	10596	1	0.39	0	5.1	1	108.1	1	1.24	1	0.15	1	1124	1
G	BKGDPT58-03-12	10641	1	0.38	0	9.5	1	187.4	1	1.15	1	0.25	1	1202	1
G	BKGDPT58-03-14	10641	1	0.36	0	6.7	1	96.7	1	0.86	1	0.15	1	901	1
G	BKGDPT58-03-2	8253	1	0.36	0	4.6	1	38	1	0.24	1	0.1	1	200	1
G	BKGDPT58-03-4	7957	1	0.38	0	4.7	1	52.4	1	0.41	1	0.07	1	406	1
G	BKGDPT58-03-6	11864	1	0.34	0	6.2	1	92.8	1	1.12	1	0.16	1	1089	1
G	BKGDPT58-03-8	12967	1	0.39	0	13.8	1	125.8	1	1.42	1	0.21	1	1430	1
G	BKGDPT59-03-10	10142	1	1.26	1	14.9	1	57.1	1	0.74	1	0.02	0	685	1
G	BKGDPT59-03-12	10737	1	0.77	1	17.1	1	47	1	0.73	1	0.03	0	711	1
G	BKGDPT59-03-14	12264	1	0.73	1	10.1	1	61.1	1	0.53	1	0.02	0	864	1
G	BKGDPT59-03-2	24046	1	0.52	1	11.1	1	199.7	1	2.4	1	0.03	0	1117	1
G	BKGDPT59-03-4	20865	1	0.87	1	15.3	1	456.7	1	1.13	1	0.03	0	1272	1
G	BKGDPT59-03-6	12305	1	0.95	1	2.5	1	86.7	1	0.73	1	0.03	0	788	1
G	BKGDPT59-03-8	20685	1	0.35	1	2.9	1	113.8	1	1.06	1	0.03	0	1497	1
G	BKGDPT60-03-10	6879	1	0.68	1	13.9	1	52.8	1	0.78	1	0.21	1	786	1
G	BKGDPT60-03-12	7237	1	0.97	1	27.6	1	50.3	1	0.81	1	0.23	1	861	1
G	BKGDPT60-03-14	6247	1	1.25	1	19	1	51.1	1	0.74	1	0.29	1	751	1
G	BKGDPT60-03-2	7739	1	0.95	1	29.6	1	79.4	1	1.22	1	0.17	1	354	1
G	BKGDPT60-03-4	9307	1	0.37	0	11.9	1	70.1	1	0.56	1	0.14	1	354	1
G	BKGDPT60-03-6	5047	1	0.36	0	7	1	41.5	1	0.57	1	0.12	1	457	1
G	BKGDPT60-03-8	7611	1	0.99	1	10.2	1	43.8	1	0.54	1	0.14	1	625	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
D	BKGDPT31-03-2	17.7	1	12.9	1	23.5	1	42191	1	26.1	1	103.6	1	1783	1	283	1
D	BKGDPT31-03-4	16.5	1	29.9	1	25.2	1	35888	1	26.9	1	96.2	1	2689	1	1715	1
D	BKGDPT32-03-10	24.4	1	6.2	1	9	1	17802	1	15.1	1	61.2	1	1128	1	52	1
D	BKGDPT32-03-12	26.1	1	21.4	1	15.8	1	64337	1	31.2	1	148.2	1	1229	1	530	1
D	BKGDPT32-03-2	20.3	1	6	1	24	1	30535	1	11.4	1	90.4	1	3017	1	142	1
D	BKGDPT32-03-4	15.7	1	5.2	1	19.7	1	12175	1	10.9	1	42	1	2293	1	91	1
D	BKGDPT32-03-6	17	1	12.5	1	15.1	1	19481	1	15.8	1	59.5	1	1688	1	72	1
D	BKGDPT32-03-8	6.3	1	12	1	4.6	1	37041	1	15.3	1	98.9	1	1479	1	98	1
D	BKGDPT33-03-2	12.3	1	5.2	1	7.7	1	20757	1	9.7	1	68	1	946	1	200	1
D	BKGDPT33-03-4	18.2	1	10.6	1	14.2	1	32019	1	12.9	1	116.6	1	1864	1	105	1
D	BKGDPT33-03-6	10.6	1	58.7	1	16.3	1	51336	1	39.9	1	158.1	1	1347	1	719	1
E	BKGDPT34-03-10	12.2	1	21.5	1	9.4	1	21248	1	8.8	1	67.6	1	1657	1	160	1
E	BKGDPT34-03-12	10.5	1	19.6	1	12.3	1	28761	1	10.2	1	87.5	1	1974	1	195	1
E	BKGDPT34-03-14	14.5	1	9.3	1	8	1	25568	1	9.2	1	78.5	1	1768	1	119	1
E	BKGDPT34-03-2	23.6	1	9.5	1	8.6	1	32160	1	14.8	1	94.8	1	1420	1	255	1
E	BKGDPT34-03-4	18.3	1	72.5	1	21.2	1	36772	1	349.5	1	113.8	1	2694	1	9005	1
E	BKGDPT34-03-6	18.3	1	9.1	1	11.5	1	21072	1	9.7	1	79.9	1	2887	1	94	1
E	BKGDPT34-03-8	12.1	1	8.2	1	6.7	1	17274	1	8	1	64.3	1	1586	1	66	1
E	BKGDPT35-03-10	13.6	1	13.4	1	11.2	1	25803	1	10.1	1	54.9	1	1237	1	99	1
E	BKGDPT35-03-12	11	1	8.4	1	10.4	1	22288	1	7.5	1	45.4	1	1163	1	94	1
E	BKGDPT35-03-14	6.8	1	7.5	1	9.8	1	22437	1	8.4	1	47.8	1	1156	1	110	1
E	BKGDPT35-03-2	23.7	1	19.3	1	13.7	1	54372	1	20.3	1	113.2	1	839	1	729	1
E	BKGDPT35-03-4	14.8	1	5.8	1	8.9	1	17500	1	6.3	1	43.6	1	1169	1	47	1
E	BKGDPT35-03-6	12.6	1	6.6	1	11.2	1	31026	1	6.6	1	79.1	1	1360	1	98	1
E	BKGDPT35-03-8	13.9	1	5.3	1	11.3	1	17775	1	6	1	50.5	1	1318	1	50	1
E	BKGDPT36-03-10	11.9	1	6.9	1	7.6	1	26698	1	11.9	1	60.9	1	899	1	47	1
E	BKGDPT36-03-12	14.7	1	9.5	1	8.9	1	25626	1	15	1	40.6	1	1228	1	136	1
E	BKGDPT36-03-14	18.7	1	11.9	1	16.5	1	48449	1	13.5	1	68.4	1	1093	1	226	1
E	BKGDPT36-03-2	17.9	1	3.6	1	3	1	20633	1	11.5	1	38.8	1	1336	1	115	1
E	BKGDPT36-03-4	14.8	1	3.4	1	6.7	1	16254	1	7.5	1	37.9	1	1272	1	40	1
E	BKGDPT36-03-6	19.7	1	6.3	1	6.6	1	8373	1	11.7	1	40.2	1	1509	1	27	1
E	BKGDPT36-03-8	29.7	1	10.1	1	12.5	1	49097	1	14	1	59.6	1	704	1	77	1
E	BKGDPT37-03-10	9.4	1	7.8	1	12.1	1	24483	1	8.6	1	78	1	1793	1	97	1
E	BKGDPT37-03-12	6.6	1	8.8	1	18.5	1	39356	1	12.1	1	112.3	1	1853	1	146	1
E	BKGDPT37-03-14	8.9	1	7.9	1	11.6	1	29638	1	8.2	1	93.2	1	2019	1	154	1
E	BKGDPT37-03-2	15.9	1	6.4	1	12.9	1	24557	1	12	1	74.9	1	1747	1	86	1
E	BKGDPT37-03-4	18.6	1	7.2	1	12.8	1	28953	1	13.6	1	83.4	1	1537	1	137	1
E	BKGDPT37-03-6	9.9	1	37.5	1	9.6	1	32320	1	20.7	1	95.5	1	1700	1	546	1
E	BKGDPT37-03-8	8.9	1	9.6	1	12.5	1	24603	1	12.1	1	75.2	1	2041	1	125	1
F	BKGDPT38-03-10	12.1	1	8.2	1	7.4	1	14555	1	8.2	1	16.8	1	1631	1	102	1
F	BKGDPT38-03-12	13.2	1	6.2	1	10.4	1	35000	1	11.5	1	16.6	1	1720	1	99	1
F	BKGDPT38-03-14	10.7	1	4.3	1	8.2	1	19265	1	8.7	1	11.3	1	1158	1	161	1
F	BKGDPT38-03-2	6.3	1	7.9	1	5.1	1	10931	1	13.2	1	3.7	1	598	1	1340	1
F	BKGDPT38-03-4	12	1	13.5	1	6.6	1	19783	1	11.2	1	8.6	1	1053	1	327	1
F	BKGDPT38-03-6	32.3	1	6.7	1	13.7	1	40625	1	13.1	1	16.3	1	1394	1	299	1
F	BKGDPT38-03-8	13.1	1	15	1	17.3	1	26356	1	11.9	1	21.3	1	3682	1	357	1
F	BKGDPT39-03-10	17.5	1	44.1	1	15.9	1	17043	1	16	1	29.3	1	3170	1	116	1
F	BKGDPT39-03-12	9.6	1	4.9	1	4.3	1	7385	1	6.7	1	10.3	1	658	1	254	1
F	BKGDPT39-03-14	16	1	12.1	1	9.6	1	33455	1	11.4	1	20.8	1	1514	1	254	1
F	BKGDPT39-03-2	29.3	1	27.3	1	12	1	32211	1	24.5	1	15.8	1	880	1	718	1
F	BKGDPT39-03-4	14.7	1	13.7	1	9.3	1	47119	1	15	1	10.2	1	503	1	529	1
F	BKGDPT39-03-6	23.6	1	9.8	1	20.4	1	19789	1	13.5	1	38.7	1	3259	1	311	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
F	BKGDPT39-03-8	22.2	1	8.2	1	16.9	1	47493	1	9.8	1	32.6	1	3074	1	191	1
F	BKGDPT40-03-10	26.8	1	9.4	1	22.5	1	37500	1	14.2	1	28.8	1	3307	1	202	1
F	BKGDPT40-03-12	20.5	1	23.6	1	20.3	1	36097	1	16.1	1	30	1	3980	1	366	1
F	BKGDPT40-03-14	20	1	10.2	1	18.5	1	25707	1	12.8	1	29	1	3665	1	154	1
F	BKGDPT40-03-2	31	1	24.6	1	14.1	1	62699	1	26.3	1	14.5	1	1474	1	1254	1
F	BKGDPT40-03-4	14.5	1	10.4	1	12.4	1	16285	1	11.7	1	18.2	1	1520	1	396	1
F	BKGDPT40-03-6	14.8	1	2.8	1	5.9	1	39052	1	7.5	1	12.5	1	1433	1	115	1
F	BKGDPT40-03-8	14.8	1	6.3	1	12.4	1	25887	1	8.9	1	21	1	1690	1	102	1
F	BKGDPT41-03-10	20.5	1	19.5	1	20.4	1	27534	1	13.1	1	31	1	3504	1	314	1
F	BKGDPT41-03-12	18.3	1	15	1	19.7	1	25062	1	12.7	1	32.9	1	3130	1	231	1
F	BKGDPT41-03-14	19.9	1	9.7	1	18.1	1	22390	1	12.6	1	31.4	1	3069	1	308	1
F	BKGDPT41-03-2	20.6	1	5.1	1	10.5	1	36799	1	13.6	1	12.7	1	1002	1	112	1
F	BKGDPT41-03-4	12	1	5.2	1	9	1	21437	1	9.5	1	14.1	1	882	1	34	1
F	BKGDPT41-03-6	20.2	1	6.8	1	20.2	1	21429	1	9	1	29.8	1	3140	1	383	1
F	BKGDPT41-03-8	18.1	1	23	1	19.8	1	27273	1	13.2	1	29.1	1	3042	1	153	1
F	BKGDPT42-03-2	29.1	1	4.8	1	10.4	1	33172	1	11.9	1	33.1	1	1295	1	28	1
F	BKGDPT42-03-4	13.8	1	4.4	1	8.5	1	28605	1	9.3	1	10.5	1	2944	1	71	1
F	BKGDPT42-03-6	15.1	1	10.5	1	11.3	1	31808	1	6	1	37.1	1	2124	1	102	1
F	BKGDPT43-03-10	28.4	1	14.2	1	24.9	1	31100	1	10.5	1	105.3	1	3856	1	646	1
F	BKGDPT43-03-12	14	1	8.1	1	13.7	1	16877	1	8.1	1	57.6	1	2229	1	168	1
F	BKGDPT43-03-14	19	1	11.8	1	17.3	1	26303	1	10.9	1	89.1	1	2836	1	305	1
F	BKGDPT43-03-2	24.9	1	20.4	1	22.1	1	28797	1	13	1	73.1	1	3572	1	146	1
F	BKGDPT43-03-4	32	1	46.1	1	33.4	1	42638	1	13.8	1	101.5	1	5122	1	379	1
F	BKGDPT43-03-6	23.9	1	14.4	1	27.5	1	31519	1	13.3	1	93.5	1	4924	1	215	1
F	BKGDPT43-03-8	28.4	1	16.6	1	33.9	1	55032	1	14.4	1	117.8	1	4662	1	484	1
F	BKGDPT44-03-10	17.9	1	14.6	1	18	1	27869	1	15.5	1	32.2	1	3077	1	1602	1
F	BKGDPT44-03-12	13.2	1	11.6	1	15.2	1	22710	1	9.7	1	22.6	1	2911	1	296	1
F	BKGDPT44-03-14	15.4	1	15.5	1	9	1	21333	1	21	1	15.4	1	1430	1	432	1
F	BKGDPT44-03-2	9.3	1	5.2	1	6.7	1	14742	1	12.2	1	6.3	1	875	1	334	1
F	BKGDPT44-03-4	11.9	1	15.8	1	7.2	1	32956	1	23.8	1	6	1	955	1	960	1
F	BKGDPT44-03-6	15.8	1	29.1	1	15.4	1	90298	1	9.7	1	30.4	1	2988	1	1798	1
F	BKGDPT44-03-8	15.9	1	17.8	1	17.7	1	25031	1	13.7	1	33.4	1	3437	1	377	1
F	BKGDPT45-03-2	21.5	1	5	1	8	1	24490	1	11.5	1	24.4	1	1133	1	22	1
F	BKGDPT45-03-4	11	1	3.8	1	7.7	1	46466	1	13.1	1	5.5	1	1286	1	346	1
F	BKGDPT46-03-2	15.1	1	6.3	1	9.7	1	20337	1	16.3	1	16.4	1	1753	1	121	1
F	BKGDPT46-03-4	19.1	1	6.8	1	11.7	1	29123	1	20.2	1	17.7	1	2094	1	131	1
F	BKGDPT46-03-6	18.3	1	8	1	20.3	1	25492	1	14.4	1	46.8	1	4426	1	138	1
F	BKGDPT47-03-10	13.3	1	12	1	10	1	24142	1	12.2	1	20.4	1	2095	1	315	1
F	BKGDPT47-03-12	14	1	14.7	1	12.7	1	27594	1	13.3	1	20.3	1	1899	1	171	1
F	BKGDPT47-03-14	16.4	1	22.5	1	14.8	1	37560	1	20	1	21.2	1	1806	1	293	1
F	BKGDPT47-03-2	20.9	1	18.4	1	13.6	1	36763	1	26.2	1	18.2	1	1318	1	570	1
F	BKGDPT47-03-4	24.7	1	37.1	1	12.2	1	83163	1	27.4	1	10.5	1	1251	1	1006	1
F	BKGDPT47-03-6	14.3	1	12.3	1	12.3	1	34463	1	17.3	1	16.6	1	1320	1	119	1
F	BKGDPT47-03-8	13.4	1	7.7	1	12.6	1	37248	1	10.7	1	20.5	1	1922	1	159	1
G	BKGDPT48-03-10	18.4	1	18.9	1	15.1	1	48421	1	61.2	1	28.7	1	2433	1	278	1
G	BKGDPT48-03-12	14.8	1	16.2	1	10.3	1	29516	1	17.9	1	26.8	1	2231	1	238	1
G	BKGDPT48-03-14	20.5	1	8.2	1	10.6	1	25957	1	14.2	1	27.2	1	1998	1	123	1
G	BKGDPT48-03-2	12.6	1	24.8	1	9.2	1	25029	1	20.5	1	17.8	1	977	1	961	1
G	BKGDPT48-03-4	38.8	1	21.4	1	26	1	157025	1	48.1	1	14.6	1	1143	1	697	1
G	BKGDPT48-03-6	20.3	1	14.7	1	13.2	1	42890	1	18.2	1	18.5	1	3834	1	334	1
G	BKGDPT48-03-8	14.5	1	21.5	1	13.1	1	77241	1	17.8	1	25.2	1	1969	1	417	1
G	BKGDPT49-03-10	20.3	1	20.5	1	20.9	1	35419	1	14.8	1	35.9	1	4493	1	367	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
G	BKGDPT49-03-12	27.4	1	31.8	1	24.9	1	47710	1	19	1	34	1	4822	1	1112	1
G	BKGDPT49-03-14	21.3	1	14.1	1	20.8	1	48881	1	14.8	1	36.1	1	3470	1	701	1
G	BKGDPT49-03-2	27.1	1	6.1	1	12	1	55066	1	20.1	1	17.5	1	1943	1	150	1
G	BKGDPT49-03-4	20.3	1	53	1	17.8	1	33333	1	17.9	1	26.4	1	3820	1	382	1
G	BKGDPT49-03-6	23.6	1	38.8	1	23	1	38642	1	24.8	1	35	1	6070	1	779	1
G	BKGDPT49-03-8	22.8	1	12.4	1	21	1	30323	1	13.9	1	33.9	1	4877	1	169	1
G	BKGDPT50-03-10	18.4	1	12.4	1	18.1	1	28136	1	8.8	1	32	1	2753	1	1535	1
G	BKGDPT50-03-12	18.1	1	10	1	14.1	1	35749	1	9.4	1	29.5	1	2555	1	1548	1
G	BKGDPT50-03-14	17.3	1	14.5	1	5.8	1	36667	1	11.9	1	16.8	1	1405	1	1988	1
G	BKGDPT50-03-2	10.8	1	3.5	1	6	1	23765	1	9.4	1	11.6	1	1071	1	31	1
G	BKGDPT50-03-4	17.1	1	8.7	1	18.5	1	30572	1	14.4	1	21.3	1	3276	1	103	1
G	BKGDPT50-03-6	17.5	1	9	1	17.7	1	26797	1	13.2	1	23.5	1	3191	1	164	1
G	BKGDPT50-03-8	18	1	10.5	1	19.3	1	27689	1	10.5	1	29.4	1	3622	1	171	1
G	BKGDPT51-03-10	14.7	1	16.7	1	16	1	31647	1	13.5	1	22.6	1	2153	1	247	1
G	BKGDPT51-03-12	12.4	1	19.9	1	12	1	35281	1	12.7	1	19.5	1	1913	1	434	1
G	BKGDPT51-03-14	14.4	1	15.1	1	13.6	1	23781	1	16.4	1	22.6	1	2140	1	251	1
G	BKGDPT51-03-2	18.5	1	21.4	1	9.9	1	33333	1	25.7	1	12.7	1	1378	1	2206	1
G	BKGDPT51-03-4	18.5	1	6.8	1	15.3	1	26309	1	11.9	1	24.1	1	2521	1	379	1
G	BKGDPT51-03-6	21.4	1	14.1	1	16.3	1	15301	1	24.2	1	22.3	1	2048	1	331	1
G	BKGDPT51-03-8	11.5	1	10.7	1	11	1	19076	1	8.2	1	21.1	1	1671	1	140	1
G	BKGDPT52-03-10	18.2	1	12.3	1	18.2	1	69871	1	15.5	1	47.1	1	3740	1	614	1
G	BKGDPT52-03-12	19.2	1	14	1	20.4	1	28910	1	15.4	1	45.5	1	4730	1	316	1
G	BKGDPT52-03-14	17.9	1	11	1	19.2	1	27901	1	14.1	1	46.6	1	4661	1	401	1
G	BKGDPT52-03-2	30.3	1	30.1	1	11	1	72370	1	31.8	1	23.6	1	1503	1	939	1
G	BKGDPT52-03-4	21.2	1	9.7	1	19	1	40336	1	15.5	1	47.4	1	3830	1	146	1
G	BKGDPT52-03-6	18.2	1	9.9	1	15.7	1	40326	1	11.5	1	50.2	1	3998	1	329	1
G	BKGDPT52-03-8	17.9	1	12	1	18.5	1	30213	1	12.4	1	52.4	1	4727	1	307	1
G	BKGDPT53-03-10	12.8	1	9.3	1	7	1	23195	1	12.4	1	60.1	1	2095	1	381	1
G	BKGDPT53-03-12	12	1	9.1	1	5.8	1	19810	1	12	1	56	1	1934	1	259	1
G	BKGDPT53-03-14	11.3	1	12.2	1	7.5	1	26521	1	9.6	1	59.7	1	1934	1	152	1
G	BKGDPT53-03-2	19.5	1	10.9	1	14.2	1	37201	1	17.2	1	75.4	1	2739	1	293	1
G	BKGDPT53-03-4	18.8	1	35.8	1	13.4	1	30498	1	16.5	1	81.9	1	3390	1	1750	1
G	BKGDPT53-03-6	24.8	1	17.1	1	17.7	1	36434	1	13.2	1	97.5	1	5116	1	217	1
G	BKGDPT53-03-8	13.9	1	15.9	1	16.5	1	33050	1	12.8	1	89.6	1	3244	1	673	1
G	BKGDPT54-03-10	17.5	1	14.2	1	9.1	1	27549	1	16	1	12.4	1	1299	1	985	1
G	BKGDPT54-03-12	12.6	1	18	1	8.3	1	28897	1	22.7	1	13.9	1	1307	1	662	1
G	BKGDPT54-03-14	11.4	1	14.6	1	9.3	1	29608	1	13.6	1	18.3	1	1605	1	482	1
G	BKGDPT54-03-2	19.7	1	8	1	15.8	1	29584	1	20.2	1	12.1	1	2445	1	345	1
G	BKGDPT54-03-4	7.2	1	6	1	5.8	1	23391	1	5.8	1	9.3	1	689	1	170	1
G	BKGDPT54-03-6	14.4	1	6.2	1	13.7	1	22054	1	13.7	1	10	1	2847	1	228	1
G	BKGDPT54-03-8	23.5	1	9.5	1	7.1	1	35059	1	17.3	1	10.6	1	1271	1	841	1
G	BKGDPT55-03-10	20.3	1	23.9	1	16.8	1	85730	1	19.4	1	26	1	1699	1	609	1
G	BKGDPT55-03-12	22	1	20.4	1	14.6	1	64759	1	21.7	1	24.2	1	1852	1	323	1
G	BKGDPT55-03-14	21	1	20.7	1	16.5	1	45516	1	21.1	1	24.4	1	1566	1	554	1
G	BKGDPT55-03-2	21.9	1	17.4	1	14.5	1	42807	1	14.5	1	26	1	1637	1	385	1
G	BKGDPT55-03-4	16.8	1	12.5	1	13.1	1	29594	1	13.8	1	22.6	1	2100	1	234	1
G	BKGDPT55-03-6	15.1	1	7	1	9.5	1	26714	1	13.2	1	16.2	1	1180	1	135	1
G	BKGDPT55-03-8	16.9	1	12.2	1	10.5	1	48606	1	11.1	1	21.3	1	1516	1	365	1
G	BKGDPT56-03-10	23.2	1	8.2	1	19.8	1	30252	1	15	1	29.7	1	3241	1	190	1
G	BKGDPT56-03-12	28.5	1	11.7	1	22	1	32216	1	12.1	1	31	1	3677	1	477	1
G	BKGDPT56-03-14	22.2	1	11.3	1	19	1	27435	1	14.8	1	28.7	1	3076	1	628	1
G	BKGDPT56-03-2	19.4	1	5.1	1	10.7	1	21300	1	14.6	1	13.2	1	2238	1	170	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
G	BKGDPT56-03-4	17.3	1	7.6	1	13.8	1	24821	1	12.3	1	15.5	1	1909	1	181	1
G	BKGDPT56-03-6	16.7	1	5.8	1	9.8	1	19088	1	11	1	15.7	1	1801	1	124	1
G	BKGDPT56-03-8	17.2	1	5.3	1	9.1	1	34943	1	7.7	1	29.7	1	1598	1	418	1
G	BKGDPT57-03-10	16.8	1	23.4	1	17.5	1	28502	1	11.6	1	73.1	1	1751	1	453	1
G	BKGDPT57-03-12	14.9	1	18.5	1	17	1	27437	1	10.7	1	62.9	1	1504	1	242	1
G	BKGDPT57-03-14	18.1	1	10.9	1	17.5	1	25635	1	7.6	1	65.8	1	1451	1	116	1
G	BKGDPT57-03-2	23.7	1	9.5	1	18.6	1	26805	1	14.3	1	72.9	1	3146	1	186	1
G	BKGDPT57-03-4	23.4	1	40.2	1	13.6	1	18668	1	11.1	1	63	1	2842	1	227	1
G	BKGDPT57-03-6	18.4	1	7.5	1	18.1	1	39904	1	11.3	1	98.2	1	2151	1	248	1
G	BKGDPT57-03-8	15.6	1	8.1	1	11.2	1	18668	1	8.6	1	55.4	1	1415	1	244	1
G	BKGDPT58-03-10	22.6	1	9.3	1	21.2	1	27950	1	11.4	1	30.3	1	3130	1	257	1
G	BKGDPT58-03-12	35.5	1	20.3	1	25.6	1	26510	1	14.7	1	25.3	1	3132	1	600	1
G	BKGDPT58-03-14	17.5	1	9	1	9.7	1	33916	1	14.8	1	18.8	1	1457	1	2145	1
G	BKGDPT58-03-2	12.3	1	2	1	5.6	1	13599	1	9	1	8.9	1	638	1	17	1
G	BKGDPT58-03-4	12.7	1	3.8	1	5.3	1	18884	1	9.6	1	12.4	1	909	1	49	1
G	BKGDPT58-03-6	23.1	1	15.6	1	28.3	1	31790	1	17.1	1	22.3	1	3191	1	227	1
G	BKGDPT58-03-8	22.5	1	18.4	1	20.8	1	31523	1	15.2	1	27.9	1	3894	1	264	1
G	BKGDPT59-03-10	9.6	1	25.2	1	12.4	1	21934	1	15.3	1	54.4	1	1215	1	371	1
G	BKGDPT59-03-12	11.8	1	8.7	1	13.3	1	23068	1	7.4	1	58.6	1	1272	1	106	1
G	BKGDPT59-03-14	17	1	7.8	1	10.8	1	18278	1	6.1	1	56.4	1	1521	1	83	1
G	BKGDPT59-03-2	20.9	1	77.5	1	17.7	1	35878	1	14.8	1	83.5	1	3919	1	411	1
G	BKGDPT59-03-4	17.4	1	15.9	1	22.9	1	30916	1	20.5	1	75.4	1	3804	1	453	1
G	BKGDPT59-03-6	10.8	1	9.7	1	15	1	19703	1	10.7	1	55.9	1	2515	1	477	1
G	BKGDPT59-03-8	19.7	1	14.1	1	15.1	1	25000	1	12.2	1	76.4	1	3832	1	365	1
G	BKGDPT60-03-10	14	1	19.4	1	13.3	1	31095	1	12.1	1	15.5	1	1032	1	303	1
G	BKGDPT60-03-12	15.9	1	15	1	15.6	1	30815	1	11.4	1	14.6	1	1204	1	152	1
G	BKGDPT60-03-14	14.6	1	11	1	15.3	1	24703	1	11.6	1	14.6	1	1129	1	175	1
G	BKGDPT60-03-2	22.8	1	44.2	1	11.6	1	47669	1	47.3	1	14.9	1	797	1	866	1
G	BKGDPT60-03-4	15.9	1	5.3	1	10.1	1	19594	1	13.6	1	17.1	1	1114	1	91	1
G	BKGDPT60-03-6	12.2	1	10.8	1	8.9	1	20686	1	9.1	1	10.9	1	664	1	102	1
G	BKGDPT60-03-8	12.2	1	11.8	1	8.6	1	44658	1	12.7	1	13.4	1	942	1	252	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
D	BKGDPT31-03-2	0.0228	0	28	1	1643	1	0.544	0	1.6	0	69	1	0.325	0
D	BKGDPT31-03-4	0.024	0	86.4	1	3406	1	2.336	1	0.66	0	98	1	5.474	1
D	BKGDPT32-03-10	0.0238	0	14	1	934	1	0.222	0	0.65	0	90	1	0.133	0
D	BKGDPT32-03-12	0.0487	1	62.7	1	913	1	0.563	0	1.65	0	66	1	0.336	0
D	BKGDPT32-03-2	0.096	1	18.7	1	1302	1	0.223	0	0.65	0	145	1	0.133	0
D	BKGDPT32-03-4	0.033	1	13.4	1	926	1	0.381	1	0.64	0	80	1	0.13	0
D	BKGDPT32-03-6	0.0243	1	12.9	1	1192	1	0.302	1	0.61	0	95	1	0.125	0
D	BKGDPT32-03-8	0.0508	1	16.4	1	931	1	0.521	0	1.53	0	108	1	0.311	0
D	BKGDPT33-03-2	0.0272	1	11	1	771	1	0.378	1	0.63	1	43	1	0.13	0
D	BKGDPT33-03-4	0.0221	0	19.4	1	1386	1	0.227	0	0.66	1	139	1	0.136	0
D	BKGDPT33-03-6	0.0186	0	21.5	1	1559	1	0.531	0	1.56	0	117	1	0.317	0
E	BKGDPT34-03-10	0.0228	0	14.8	1	1597	1	0.537	1	0.66	0	140	1	0.136	0
E	BKGDPT34-03-12	0.0226	0	17.7	1	1625	1	0.369	1	0.68	0	148	1	0.138	0
E	BKGDPT34-03-14	0.0226	0	15.2	1	1553	1	0.225	0	0.66	0	139	1	0.134	0
E	BKGDPT34-03-2	0.0228	0	10.4	1	1007	1	0.742	1	0.65	1	48	1	0.133	0
E	BKGDPT34-03-4	0.0212	0	30.3	1	2197	1	9.417	1	0.63	0	165	1	19.66	1
E	BKGDPT34-03-6	0.0227	0	18.5	1	2168	1	0.932	1	0.68	0	166	1	0.139	0
E	BKGDPT34-03-8	0.0219	0	12.7	1	1434	1	0.477	1	0.66	0	129	1	0.135	0
E	BKGDPT35-03-10	0.0234	0	20	1	1145	1	0.278	1	0.66	0	49	1	0.395	1
E	BKGDPT35-03-12	0.0238	0	17.9	1	965	1	0.306	1	0.67	0	47	1	0.164	1
E	BKGDPT35-03-14	0.0201	0	18.6	1	1151	1	0.357	1	0.68	0	50	1	0.274	1
E	BKGDPT35-03-2	0.0188	0	15.6	1	730	1	2.052	1	2.65	0	28	1	1.357	1
E	BKGDPT35-03-4	0.0232	0	10.4	1	1076	1	0.519	1	0.6	0	46	1	0.123	0
E	BKGDPT35-03-6	0.0237	0	14.6	1	1539	1	0.687	1	0.66	0	53	1	0.257	1
E	BKGDPT35-03-8	0.0573	1	13.8	1	1427	1	0.238	1	0.64	0	135	1	0.26	1
E	BKGDPT36-03-10	0.023	0	17.9	1	881	1	0.211	0	0.62	0	778	1	0.126	0
E	BKGDPT36-03-12	0.0221	0	19.3	1	1122	1	0.228	0	0.67	0	200	1	0.136	0
E	BKGDPT36-03-14	0.0228	0	35.8	1	975	1	0.561	0	1.65	0	267	1	0.434	1
E	BKGDPT36-03-2	0.0197	0	7.2	1	808	1	0.216	0	0.63	0	161	1	0.129	0
E	BKGDPT36-03-4	0.022	0	7.1	1	872	1	0.214	0	0.63	0	188	1	0.128	0
E	BKGDPT36-03-6	0.0226	0	12.6	1	1392	1	0.225	0	2.72	1	327	1	0.244	1
E	BKGDPT36-03-8	0.0227	0	30.2	1	503	1	1.081	0	14.8	1	230	1	0.646	0
E	BKGDPT37-03-10	0.0248	1	19.2	1	1713	1	0.22	0	0.64	0	134	1	0.131	0
E	BKGDPT37-03-12	0.0345	1	22.4	1	1669	1	0.524	0	1.53	0	145	1	0.313	0
E	BKGDPT37-03-14	0.0225	0	20	1	1704	1	0.223	0	0.65	0	163	1	0.133	0
E	BKGDPT37-03-2	0.0234	0	11.9	1	1429	1	0.217	0	0.64	0	83	1	0.13	0
E	BKGDPT37-03-4	0.0218	0	12.5	1	1214	1	0.228	1	0.61	0	125	1	0.125	0
E	BKGDPT37-03-6	0.0327	1	20.2	1	1520	1	0.67	1	0.63	1	116	1	0.391	1
E	BKGDPT37-03-8	0.0389	1	19.4	1	1723	1	0.202	0	0.59	0	130	1	0.12	0
F	BKGDPT38-03-10	0.0051	1	11.9	1	590	1	0.398	1	1.15	1	78	1	0.152	1
F	BKGDPT38-03-12	0.0209	1	10.3	1	1000	1	0.368	0	0.64	1	132	1	0.149	1
F	BKGDPT38-03-14	0.0176	1	9	1	579	1	0.392	1	1.43	1	106	1	0.106	1
F	BKGDPT38-03-2	0.016	1	7.3	1	213	1	0.473	1	0.96	1	51	1	0.125	1
F	BKGDPT38-03-4	0.0151	1	6.4	1	387	1	0.397	1	1.58	1	128	1	0.103	1
F	BKGDPT38-03-6	0.0097	1	15.9	1	505	1	0.357	1	3.15	1	79	1	0.118	1
F	BKGDPT38-03-8	0.0141	1	18.7	1	1030	1	0.376	1	1.97	1	148	1	0.137	1
F	BKGDPT39-03-10	0.0267	1	24.6	1	1253	1	0.412	0	0.18	1	92	1	0.197	1
F	BKGDPT39-03-12	0.0161	1	5.2	1	472	1	0.399	0	0.21	1	48	1	0.073	1
F	BKGDPT39-03-14	0.0313	1	10.6	1	1126	1	0.402	0	0.45	1	99	1	0.149	1
F	BKGDPT39-03-2	0.0198	1	18.3	1	549	1	0.365	1	2.6	1	33	1	0.154	1
F	BKGDPT39-03-4	0.0101	1	11.5	1	325	1	0.347	1	3.63	1	32	1	0.104	1
F	BKGDPT39-03-6	0.0202	1	32.6	1	1544	1	0.43	1	1.41	1	115	1	0.26	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
F	BKGDPT39-03-8	0.014	1	27.7	1	1266	1	0.433	1	3.5	1	107	1	0.23	1
F	BKGDPT40-03-10	0.0276	1	36.7	1	1745	1	0.428	1	2.73	1	121	1	0.257	1
F	BKGDPT40-03-12	0.0432	1	37.4	1	1696	1	0.367	1	2.64	1	151	1	0.27	1
F	BKGDPT40-03-14	0.0355	1	31.6	1	1710	1	0.39	0	1.82	1	159	1	0.205	1
F	BKGDPT40-03-2	0.0333	1	17.7	1	726	1	0.32	1	4.91	1	19	1	0.107	1
F	BKGDPT40-03-4	0.0246	1	12.7	1	491	1	0.376	1	1.15	1	12	1	0.187	1
F	BKGDPT40-03-6	0.0063	1	8.8	1	460	1	0.371	0	2.91	1	35	1	0.19	1
F	BKGDPT40-03-8	0.0236	1	14.3	1	714	1	0.344	0	1.97	1	51	1	0.158	1
F	BKGDPT41-03-10	0.026	1	38.2	1	1577	1	0.364	0	0.59	1	146	1	0.239	1
F	BKGDPT41-03-12	0.0125	1	28.3	1	1484	1	0.403	1	0.46	1	142	1	0.19	1
F	BKGDPT41-03-14	0.0318	1	29.3	1	1560	1	0.405	1	0.27	1	141	1	0.223	1
F	BKGDPT41-03-2	0.029	1	8.5	1	464	1	0.36	1	0.73	1	38	1	0.19	1
F	BKGDPT41-03-4	0.0105	1	8.4	1	495	1	0.338	1	0.41	1	45	1	0.151	1
F	BKGDPT41-03-6	0.0048	0	28.8	1	1256	1	0.403	1	0.31	1	118	1	0.212	1
F	BKGDPT41-03-8	0.0155	1	31.4	1	1430	1	0.388	1	0.38	1	138	1	0.2	1
F	BKGDPT42-03-2	0.0345	1	11.4	1	742	1	0.39	1	1.09	1	45	1	0.235	1
F	BKGDPT42-03-4	0.0056	1	9.2	1	1085	1	0.385	1	0.74	1	105	1	0.138	1
F	BKGDPT42-03-6	0.0421	1	21.1	1	1103	1	0.372	1	0.8	1	146	1	0.169	1
F	BKGDPT43-03-10	0.0241	0	44	1	3464	1	0.856	1	0.69	0	321	1	0.645	1
F	BKGDPT43-03-12	0.0236	0	15.4	1	1725	1	0.563	1	0.63	0	209	1	0.128	0
F	BKGDPT43-03-14	0.0309	1	20.2	1	2436	1	0.617	1	0.66	0	222	1	0.135	0
F	BKGDPT43-03-2	0.0241	0	37.4	1	2758	1	0.817	1	0.67	0	200	1	0.295	1
F	BKGDPT43-03-4	0.0255	0	61.3	1	4097	1	0.909	1	1.61	1	271	1	0.483	1
F	BKGDPT43-03-6	0.0244	0	38.6	1	4152	1	0.838	1	0.67	1	343	1	0.137	0
F	BKGDPT43-03-8	0.0266	1	41.7	1	4013	1	1.49	1	1.69	1	361	1	0.346	0
F	BKGDPT44-03-10	0.0174	1	34	1	1134	1	0.369	0	2.19	1	154	1	0.208	1
F	BKGDPT44-03-12	0.0211	1	20.1	1	1072	1	0.376	0	1.69	1	128	1	0.138	1
F	BKGDPT44-03-14	0.0136	1	12.7	1	476	1	0.372	0	1.68	1	76	1	0.132	1
F	BKGDPT44-03-2	0.0217	1	7.4	1	254	1	0.343	0	1.18	1	40	1	0.165	1
F	BKGDPT44-03-4	0.0132	1	12.3	1	472	1	0.357	0	2.65	1	53	1	0.123	1
F	BKGDPT44-03-6	0.0422	1	29.1	1	1208	1	0.419	0	6.92	1	102	1	0.228	1
F	BKGDPT44-03-8	0.0304	1	28	1	1382	1	0.4	0	1.76	1	157	1	0.198	1
F	BKGDPT45-03-2	0.0343	1	9.3	1	594	1	0.393	1	1.69	1	51	1	0.191	1
F	BKGDPT45-03-4	0.0043	0	6.3	1	771	1	0.371	1	3.26	1	85	1	0.127	1
F	BKGDPT46-03-2	0.0157	1	10.1	1	484	1	0.367	0	1.62	1	109	1	0.147	1
F	BKGDPT46-03-4	0.025	1	14.2	1	526	1	0.379	0	2.18	1	154	1	0.146	1
F	BKGDPT46-03-6	0.0225	1	27.8	1	1117	1	0.351	0	2.03	1	228	1	0.155	1
F	BKGDPT47-03-10	0.0042	0	14.6	1	953	1	0.391	0	1.76	1	95	1	0.111	1
F	BKGDPT47-03-12	0.0063	1	17.1	1	921	1	0.371	0	2.03	1	98	1	0.123	1
F	BKGDPT47-03-14	0.0045	0	21.3	1	872	1	0.382	0	2.83	1	102	1	0.127	1
F	BKGDPT47-03-2	0.017	1	16.4	1	497	1	0.465	1	2.88	1	25	1	0.15	1
F	BKGDPT47-03-4	0.0132	1	25.5	1	425	1	0.359	0	6.91	1	34	1	0.109	1
F	BKGDPT47-03-6	0.0046	0	17.6	1	728	1	0.373	0	2.51	1	68	1	0.114	1
F	BKGDPT47-03-8	0.0045	0	17.4	1	805	1	0.372	0	2.73	1	85	1	0.144	1
G	BKGDPT48-03-10	0.0041	0	30.4	1	939	1	0.382	0	3.72	1	132	1	0.117	1
G	BKGDPT48-03-12	0.029	1	19.8	1	881	1	0.364	0	2.44	1	135	1	0.105	1
G	BKGDPT48-03-14	0.0238	1	17.6	1	969	1	0.362	0	2.05	1	146	1	0.103	1
G	BKGDPT48-03-2	0.0255	1	11.7	1	490	1	0.334	0	2.19	1	29	1	0.118	1
G	BKGDPT48-03-4	0.0243	1	27.9	1	296	1	0.365	1	14.29	1	43	1	0.132	1
G	BKGDPT48-03-6	0.0064	1	25.5	1	1364	1	0.376	1	3.26	1	139	1	0.108	1
G	BKGDPT48-03-8	0.0084	1	21.2	1	781	1	0.341	1	6.52	1	92	1	0.127	1
G	BKGDPT49-03-10	0.0437	1	34.9	1	1790	1	0.403	0	2.77	1	315	1	0.263	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
G	BKGDPT49-03-12	0.014	1	53.6	1	1692	1	0.372	0	3.98	1	303	1	0.316	1
G	BKGDPT49-03-14	0.0178	1	29.5	1	1190	1	0.377	0	3.78	1	228	1	0.208	1
G	BKGDPT49-03-2	0.0439	1	14.2	1	660	1	0.386	0	4.37	1	125	1	0.179	1
G	BKGDPT49-03-4	0.0075	1	37.1	1	1496	1	0.35	0	2.62	1	220	1	0.257	1
G	BKGDPT49-03-6	0.008	1	56.7	1	1997	1	0.428	0	3.13	1	303	1	0.282	1
G	BKGDPT49-03-8	0.0246	1	36.9	1	1910	1	0.37	0	2.39	1	314	1	0.245	1
G	BKGDPT50-03-10	0.0298	1	27	1	1352	1	0.391	0	0.77	1	132	1	0.216	1
G	BKGDPT50-03-12	0.0186	1	22.6	1	1186	1	0.355	0	0.95	1	104	1	0.133	1
G	BKGDPT50-03-14	0.0275	1	21.2	1	693	1	0.358	0	1.1	1	81	1	0.112	1
G	BKGDPT50-03-2	0.0258	1	7.6	1	611	1	0.361	0	0.64	1	83	1	0.122	1
G	BKGDPT50-03-4	0.0075	1	22.5	1	1376	1	0.37	0	0.83	1	125	1	0.156	1
G	BKGDPT50-03-6	0.0088	1	24.8	1	1352	1	0.369	0	0.75	1	124	1	0.183	1
G	BKGDPT50-03-8	0.0106	1	28.2	1	1434	1	0.384	0	0.72	1	153	1	0.205	1
G	BKGDPT51-03-10	0.0042	0	17.8	1	1058	1	0.368	0	0.93	1	193	1	0.117	1
G	BKGDPT51-03-12	0.0044	0	19.1	1	1013	1	0.324	1	1.33	1	186	1	0.086	1
G	BKGDPT51-03-14	0.0699	1	20.2	1	1201	1	0.382	1	0.74	1	208	1	0.124	1
G	BKGDPT51-03-2	0.0298	1	11.7	1	659	1	0.727	1	1.18	1	77	1	0.204	1
G	BKGDPT51-03-4	0.011	1	17.9	1	1030	1	0.392	1	0.82	1	132	1	0.212	1
G	BKGDPT51-03-6	0.0281	1	30.5	1	931	1	0.388	1	0.42	1	142	1	0.159	1
G	BKGDPT51-03-8	0.0531	1	11.2	1	906	1	0.385	1	0.53	1	150	1	0.086	1
G	BKGDPT52-03-10	0.014	1	35.5	1	1231	1	0.606	1	5.97	1	225	1	0.131	1
G	BKGDPT52-03-12	0.0182	1	31.2	1	1374	1	0.354	1	2.53	1	209	1	0.135	1
G	BKGDPT52-03-14	0.0177	1	29.3	1	1351	1	0.342	1	2.26	1	202	1	0.131	1
G	BKGDPT52-03-2	0.016	1	17.5	1	605	1	0.37	1	5.8	1	43	1	0.125	1
G	BKGDPT52-03-4	0.0375	1	29.4	1	977	1	0.378	1	3.35	1	103	1	0.134	1
G	BKGDPT52-03-6	0.0659	1	33	1	1111	1	0.334	1	3.25	1	195	1	0.118	1
G	BKGDPT52-03-8	0.0513	1	30.1	1	1351	1	0.341	1	2.51	1	241	1	0.126	1
G	BKGDPT53-03-10	0.0226	0	16.9	1	2083	1	0.217	0	0.63	0	262	1	0.129	0
G	BKGDPT53-03-12	0.0221	0	15.2	1	2206	1	0.222	0	0.65	0	208	1	0.133	0
G	BKGDPT53-03-14	0.0217	0	15	1	2129	1	0.23	0	0.67	0	169	1	0.137	0
G	BKGDPT53-03-2	0.022	0	20.8	1	1806	1	0.551	0	1.61	0	197	1	0.33	0
G	BKGDPT53-03-4	0.0238	0	74.2	1	2722	1	0.711	1	0.66	0	358	1	1.3	1
G	BKGDPT53-03-6	0.0244	0	43.8	1	4780	1	0.248	0	0.73	0	464	1	0.149	0
G	BKGDPT53-03-8	0.0208	0	49	1	2892	1	0.441	1	0.68	0	321	1	0.139	0
G	BKGDPT54-03-10	0.0175	1	11.5	1	799	1	0.373	0	108.74	0	135	1	0.142	1
G	BKGDPT54-03-12	0.0165	1	13.5	1	841	1	0.368	0	0.95	1	128	1	0.097	1
G	BKGDPT54-03-14	0.0121	1	13.3	1	898	1	0.369	0	0.88	1	132	1	0.104	1
G	BKGDPT54-03-2	0.0828	1	12.7	1	620	1	0.379	1	0.7	1	130	1	0.199	1
G	BKGDPT54-03-4	0.0045	0	13.4	1	446	1	0.389	0	0.68	1	72	1	0.118	1
G	BKGDPT54-03-6	0.0146	1	11.6	1	680	1	0.348	0	0.54	1	112	1	0.214	1
G	BKGDPT54-03-8	0.0173	1	14.2	1	547	1	0.379	0	0.97	1	100	1	0.109	1
G	BKGDPT55-03-10	0.0127	1	29	1	928	1	0.349	1	6.82	1	74	1	0.124	1
G	BKGDPT55-03-12	0.0205	1	22.2	1	1057	1	0.364	1	5.34	1	84	1	0.129	1
G	BKGDPT55-03-14	0.0045	1	23.2	1	840	1	0.355	1	4.02	1	69	1	0.113	1
G	BKGDPT55-03-2	0.0139	1	22.2	1	750	1	0.371	1	3.77	1	75	1	0.108	1
G	BKGDPT55-03-4	0.0218	1	16	1	848	1	0.387	1	2.61	1	40	1	0.138	1
G	BKGDPT55-03-6	0.033	1	13.2	1	563	1	0.336	0	2.22	1	66	1	0.088	1
G	BKGDPT55-03-8	0.0087	1	17.5	1	624	1	0.334	0	3.79	1	70	1	0.087	1
G	BKGDPT56-03-10	0.0099	1	27.4	1	1134	1	0.393	0	2.74	1	279	1	0.288	1
G	BKGDPT56-03-12	0.026	1	33.4	1	1114	1	0.383	0	2.8	1	281	1	0.237	1
G	BKGDPT56-03-14	0.0229	1	26.2	1	1145	1	0.387	0	2.23	1	217	1	0.217	1
G	BKGDPT56-03-2	0.0467	1	10.2	1	664	1	0.341	0	1.87	1	57	1	0.248	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
G	BKGDPT56-03-4	0.0085	1	15.2	1	616	1	0.382	0	1.3	1	82	1	0.242	1
G	BKGDPT56-03-6	0.0046	0	16.3	1	648	1	0.375	1	0.28	1	122	1	0.208	1
G	BKGDPT56-03-8	0.0203	1	11.4	1	845	1	0.356	1	0.71	1	194	1	0.257	1
G	BKGDPT57-03-10	0.0232	0	22.5	1	1425	1	0.843	1	0.65	0	99	1	0.44	1
G	BKGDPT57-03-12	0.0231	0	24.3	1	1185	1	0.44	1	0.64	0	90	1	0.131	0
G	BKGDPT57-03-14	0.0227	0	24.2	1	1270	1	0.386	1	0.66	0	87	1	0.135	0
G	BKGDPT57-03-2	0.0245	0	21.7	1	2044	1	0.856	1	0.66	0	119	1	0.135	0
G	BKGDPT57-03-4	0.0232	0	22.4	1	1665	1	0.581	1	0.65	0	187	1	0.132	0
G	BKGDPT57-03-6	0.0231	0	21.2	1	1791	1	0.575	0	1.68	1	178	1	0.344	0
G	BKGDPT57-03-8	0.0221	0	14.7	1	1332	1	0.69	1	0.62	0	102	1	0.252	1
G	BKGDPT58-03-10	0.0214	1	30.1	1	1149	1	0.409	1	0.23	1	292	1	0.289	1
G	BKGDPT58-03-12	0.0308	1	35.9	1	1393	1	0.391	1	0.11	0	265	1	0.274	1
G	BKGDPT58-03-14	0.0142	1	17.7	1	974	1	0.375	1	0.61	1	167	1	0.15	1
G	BKGDPT58-03-2	0.022	1	4.9	1	287	1	0.349	1	0.11	0	36	1	0.218	1
G	BKGDPT58-03-4	0.0139	1	7.7	1	420	1	0.373	1	0.11	0	124	1	0.208	1
G	BKGDPT58-03-6	0.0048	1	34.7	1	1147	1	0.367	0	0.39	1	275	1	0.259	1
G	BKGDPT58-03-8	0.0086	1	42.9	1	1576	1	0.401	1	0.12	0	389	1	0.281	1
G	BKGDPT59-03-10	0.0236	0	20.3	1	1175	1	0.538	1	0.65	0	98	1	0.229	1
G	BKGDPT59-03-12	0.0222	0	21.9	1	1284	1	0.545	1	0.67	0	88	1	0.138	0
G	BKGDPT59-03-14	0.0218	0	16.6	1	1344	1	0.358	1	0.64	0	81	1	0.13	0
G	BKGDPT59-03-2	0.0248	0	43.5	1	2659	1	0.302	1	0.68	0	178	1	0.14	0
G	BKGDPT59-03-4	0.0239	0	44.8	1	2621	1	0.239	0	0.7	0	244	1	0.142	0
G	BKGDPT59-03-6	0.0227	0	19.2	1	1797	1	0.232	0	0.68	0	145	1	0.139	0
G	BKGDPT59-03-8	0.0251	0	25.8	1	3071	1	0.239	0	0.7	0	234	1	0.142	0
G	BKGDPT60-03-10	0.0045	0	20.7	1	568	1	0.384	1	0.12	0	76	1	0.377	1
G	BKGDPT60-03-12	0.0079	1	28.6	1	569	1	0.37	1	0.11	0	86	1	0.391	1
G	BKGDPT60-03-14	0.0249	1	23	1	615	1	0.385	1	0.12	0	82	1	0.355	1
G	BKGDPT60-03-2	0.0345	1	16.1	1	505	1	0.464	1	0.12	0	22	1	0.185	1
G	BKGDPT60-03-4	0.0262	1	11.2	1	553	1	0.387	1	0.11	0	49	1	0.197	1
G	BKGDPT60-03-6	0.0181	1	11.2	1	526	1	0.366	1	0.11	0	44	1	0.123	1
G	BKGDPT60-03-8	0.0046	0	12.7	1	765	1	0.364	0	0.57	1	52	1	0.145	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
D	BKGDPT31-03-2	3.93	1	26.3	1	89.4	1
D	BKGDPT31-03-4	6.71	1	46.8	1	222.6	1
D	BKGDPT32-03-10	2.83	1	36	1	43.2	1
D	BKGDPT32-03-12	4.17	1	77.1	1	172.3	1
D	BKGDPT32-03-2	3.67	1	40	1	83.9	1
D	BKGDPT32-03-4	2.98	1	29.3	1	57.2	1
D	BKGDPT32-03-6	3.58	1	31.2	1	47.5	1
D	BKGDPT32-03-8	3.01	1	22.2	1	47.6	1
D	BKGDPT33-03-2	2.95	1	31.7	1	31.1	1
D	BKGDPT33-03-4	3.10	1	47.7	1	54.7	1
D	BKGDPT33-03-6	2.89	1	48.2	1	56.9	1
E	BKGDPT34-03-10	3.52	1	31.5	1	41.9	1
E	BKGDPT34-03-12	2.83	1	28.2	1	54.9	1
E	BKGDPT34-03-14	3.52	1	31.4	1	51.1	1
E	BKGDPT34-03-2	3.31	1	31.6	1	31.6	1
E	BKGDPT34-03-4	4.02	1	41.1	1	56.2	1
E	BKGDPT34-03-6	3.40	1	35.6	1	49.2	1
E	BKGDPT34-03-8	3.28	1	27.5	1	30.3	1
E	BKGDPT35-03-10	4.08	1	43.3	1	57.2	1
E	BKGDPT35-03-12	3.73	1	33	1	52.9	1
E	BKGDPT35-03-14	4.23	1	32.4	1	59.8	1
E	BKGDPT35-03-2	2.89	1	64	1	59.6	1
E	BKGDPT35-03-4	4.62	1	27.3	1	32.4	1
E	BKGDPT35-03-6	5.04	1	44.6	1	49.9	1
E	BKGDPT35-03-8	3.73	1	41.4	1	42.3	1
E	BKGDPT36-03-10	3.37	1	34.8	1	34.1	1
E	BKGDPT36-03-12	3.43	1	45.8	1	55.4	1
E	BKGDPT36-03-14	4.65	1	50.1	1	111.7	1
E	BKGDPT36-03-2	3.58	1	35.2	1	31.5	1
E	BKGDPT36-03-4	3.28	1	38.6	1	22	1
E	BKGDPT36-03-6	3.37	1	39.2	1	29.4	1
E	BKGDPT36-03-8	3.75	1	51.6	1	52.9	1
E	BKGDPT37-03-10	3.22	1	31.7	1	56.1	1
E	BKGDPT37-03-12	3.61	1	57.8	1	68	1
E	BKGDPT37-03-14	3.49	1	31.4	1	60.9	1
E	BKGDPT37-03-2	3.52	1	36.1	1	37.1	1
E	BKGDPT37-03-4	3.73	1	37.2	1	38.6	1
E	BKGDPT37-03-6	3.87	1	36.4	1	49.2	1
E	BKGDPT37-03-8	3.49	1	29.7	1	57.5	1
F	BKGDPT38-03-10	4.23	1	26.2	1	38.1	1
F	BKGDPT38-03-12	3.25	1	38.2	1	50	1
F	BKGDPT38-03-14	3.25	1	25.1	1	30.7	1
F	BKGDPT38-03-2	2.83	1	16.9	1	16.5	1
F	BKGDPT38-03-4	3.58	1	23.8	1	21.6	1
F	BKGDPT38-03-6	3.22	1	34.3	1	36.3	1
F	BKGDPT38-03-8	3.55	1	34.3	1	76.9	1
F	BKGDPT39-03-10	4.02	1	28.3	1	58.9	1
F	BKGDPT39-03-12	3.40	1	18.6	1	14.1	1
F	BKGDPT39-03-14	3.22	1	39.2	1	44.2	1
F	BKGDPT39-03-2	2.59	1	31.6	1	33.8	1
F	BKGDPT39-03-4	2.21	1	33.6	1	37.1	1
F	BKGDPT39-03-6	4.44	1	30.5	1	75.2	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
F	BKGDPT39-03-8	3.43	1	37.2	1	84.6	1
F	BKGDPT40-03-10	6.26	1	38.7	1	79.6	1
F	BKGDPT40-03-12	3.96	1	29	1	76.4	1
F	BKGDPT40-03-14	3.96	1	33.7	1	73.4	1
F	BKGDPT40-03-2	2.68	1	62.3	1	62.8	1
F	BKGDPT40-03-4	3.13	1	17.9	1	31.7	1
F	BKGDPT40-03-6	2.80	1	30.6	1	36.8	1
F	BKGDPT40-03-8	3.40	1	27.8	1	38.7	1
F	BKGDPT41-03-10	3.84	1	29.5	1	74.6	1
F	BKGDPT41-03-12	4.26	1	29.2	1	69	1
F	BKGDPT41-03-14	3.64	1	30.1	1	69.1	1
F	BKGDPT41-03-2	3.25	1	46.6	1	20.2	1
F	BKGDPT41-03-4	2.53	1	23.3	1	18.5	1
F	BKGDPT41-03-6	4.14	1	28.6	1	64.7	1
F	BKGDPT41-03-8	4.08	1	33.9	1	72	1
F	BKGDPT42-03-2	2.65	1	68.9	1	28.3	1
F	BKGDPT42-03-4	3.19	1	33.8	1	71.8	1
F	BKGDPT42-03-6	3.55	1	24.4	1	68.1	1
F	BKGDPT43-03-10	4.11	1	39.1	1	118.8	1
F	BKGDPT43-03-12	3.22	1	27	1	49.2	1
F	BKGDPT43-03-14	3.64	1	38.8	1	60.4	1
F	BKGDPT43-03-2	3.84	1	47	1	63.8	1
F	BKGDPT43-03-4	3.90	1	44.2	1	92.2	1
F	BKGDPT43-03-6	4.08	1	45.2	1	82.5	1
F	BKGDPT43-03-8	4.05	1	44.7	1	88.5	1
F	BKGDPT44-03-10	4.02	1	33.5	1	79.1	1
F	BKGDPT44-03-12	3.22	1	30.1	1	68.4	1
F	BKGDPT44-03-14	3.52	1	31.6	1	38.3	1
F	BKGDPT44-03-2	3.04	1	21.4	1	26.3	1
F	BKGDPT44-03-4	2.80	1	32.8	1	31.6	1
F	BKGDPT44-03-6	4.29	1	40.1	1	114.9	1
F	BKGDPT44-03-8	4.11	1	35.9	1	83.6	1
F	BKGDPT45-03-2	2.92	1	43.6	1	23.8	1
F	BKGDPT45-03-4	2.77	1	26.5	1	84.2	1
F	BKGDPT46-03-2	3.04	1	29.3	1	36.3	1
F	BKGDPT46-03-4	2.50	1	32	1	48.1	1
F	BKGDPT46-03-6	2.83	1	37.8	1	64	1
F	BKGDPT47-03-10	2.92	1	30.3	1	49.5	1
F	BKGDPT47-03-12	3.31	1	29.8	1	53.7	1
F	BKGDPT47-03-14	3.19	1	38.3	1	64	1
F	BKGDPT47-03-2	2.80	1	45.3	1	64.4	1
F	BKGDPT47-03-4	2.77	1	58.9	1	71.4	1
F	BKGDPT47-03-6	3.37	1	31	1	41.5	1
F	BKGDPT47-03-8	3.25	1	34.8	1	53.1	1
G	BKGDPT48-03-10	3.28	1	48.4	1	94.9	1
G	BKGDPT48-03-12	2.89	1	34.9	1	64.6	1
G	BKGDPT48-03-14	3.78	1	36.5	1	54.8	1
G	BKGDPT48-03-2	3.10	1	33.3	1	37.3	1
G	BKGDPT48-03-4	2.71	1	100.6	1	92.9	1
G	BKGDPT48-03-6	3.10	1	35.4	1	86.5	1
G	BKGDPT48-03-8	3.22	1	65.1	1	99.3	1
G	BKGDPT49-03-10	4.11	1	38	1	84.1	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
G	BKGDPT49-03-12	4.23	1	37.2	1	87	1
G	BKGDPT49-03-14	3.84	1	36.9	1	83.5	1
G	BKGDPT49-03-2	3.34	1	52.4	1	58.3	1
G	BKGDPT49-03-4	4.05	1	33.9	1	71.4	1
G	BKGDPT49-03-6	3.93	1	34.7	1	90.2	1
G	BKGDPT49-03-8	3.96	1	34.7	1	79.6	1
G	BKGDPT50-03-10	3.46	1	33.6	1	77.8	1
G	BKGDPT50-03-12	3.73	1	35.1	1	76.5	1
G	BKGDPT50-03-14	3.67	1	44.6	1	52.4	1
G	BKGDPT50-03-2	3.28	1	32.6	1	20	1
G	BKGDPT50-03-4	3.49	1	36.8	1	66.3	1
G	BKGDPT50-03-6	3.22	1	33	1	67.5	1
G	BKGDPT50-03-8	4.11	1	31.1	1	77.8	1
G	BKGDPT51-03-10	3.73	1	33.3	1	59.9	1
G	BKGDPT51-03-12	2.86	1	38	1	71.1	1
G	BKGDPT51-03-14	3.28	1	30.1	1	58.4	1
G	BKGDPT51-03-2	4.02	1	50	1	39.5	1
G	BKGDPT51-03-4	4.29	1	35	1	60.2	1
G	BKGDPT51-03-6	3.55	1	28.7	1	51.6	1
G	BKGDPT51-03-8	3.43	1	22.5	1	44.7	1
G	BKGDPT52-03-10	3.87	1	33.8	1	110.8	1
G	BKGDPT52-03-12	3.25	1	34.9	1	77.2	1
G	BKGDPT52-03-14	2.68	1	34.3	1	95.2	1
G	BKGDPT52-03-2	3.07	1	76.1	1	62.1	1
G	BKGDPT52-03-4	3.07	1	45	1	107.6	1
G	BKGDPT52-03-6	3.73	1	38	1	148	1
G	BKGDPT52-03-8	2.68	1	38	1	105.1	1
G	BKGDPT53-03-10	3.73	1	38.7	1	45.6	1
G	BKGDPT53-03-12	3.73	1	33.6	1	42.9	1
G	BKGDPT53-03-14	3.81	1	35.4	1	44.8	1
G	BKGDPT53-03-2	3.96	1	50.6	1	61.4	1
G	BKGDPT53-03-4	4.92	1	42.3	1	64.2	1
G	BKGDPT53-03-6	4.20	1	43.8	1	82.8	1
G	BKGDPT53-03-8	3.13	1	41.9	1	71.6	1
G	BKGDPT54-03-10	3.37	1	31.2	1	32.8	1
G	BKGDPT54-03-12	3.25	1	30.1	1	40.4	1
G	BKGDPT54-03-14	3.58	1	29.8	1	48.5	1
G	BKGDPT54-03-2	4.29	1	40.5	1	56.4	1
G	BKGDPT54-03-4	3.64	1	28.3	1	58.5	1
G	BKGDPT54-03-6	2.98	1	29.5	1	58.2	1
G	BKGDPT54-03-8	3.07	1	42	1	26.8	1
G	BKGDPT55-03-10	2.80	1	59.1	1	92.6	1
G	BKGDPT55-03-12	3.07	1	45.2	1	87.7	1
G	BKGDPT55-03-14	3.01	1	41.4	1	69.8	1
G	BKGDPT55-03-2	3.37	1	42.5	1	84.6	1
G	BKGDPT55-03-4	3.90	1	33.4	1	56.9	1
G	BKGDPT55-03-6	2.86	1	38.3	1	45.3	1
G	BKGDPT55-03-8	3.19	1	50.5	1	85.3	1
G	BKGDPT56-03-10	4.35	1	32.7	1	55.9	1
G	BKGDPT56-03-12	3.84	1	32.5	1	80.2	1
G	BKGDPT56-03-14	3.46	1	36.1	1	75.5	1
G	BKGDPT56-03-2	3.28	1	35.7	1	43.2	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
G	BKGDPT56-03-4	3.81	1	30.9	1	46.7	1
G	BKGDPT56-03-6	3.43	1	26.1	1	35.8	1
G	BKGDPT56-03-8	3.43	1	43	1	29.5	1
G	BKGDPT57-03-10	4.44	1	44.9	1	71.9	1
G	BKGDPT57-03-12	3.73	1	42	1	71.6	1
G	BKGDPT57-03-14	3.22	1	44.6	1	75.8	1
G	BKGDPT57-03-2	3.61	1	43.8	1	59.6	1
G	BKGDPT57-03-4	3.52	1	35.3	1	49.5	1
G	BKGDPT57-03-6	3.75	1	48.1	1	43.5	1
G	BKGDPT57-03-8	3.34	1	31.3	1	48.8	1
G	BKGDPT58-03-10	3.64	1	31.6	1	71.8	1
G	BKGDPT58-03-12	3.64	1	29.8	1	69.8	1
G	BKGDPT58-03-14	4.65	1	45.9	1	45.2	1
G	BKGDPT58-03-2	3.07	1	24.3	1	11.2	1
G	BKGDPT58-03-4	2.71	1	26	1	15	1
G	BKGDPT58-03-6	3.64	1	33.4	1	65.7	1
G	BKGDPT58-03-8	4.26	1	32.8	1	70.1	1
G	BKGDPT59-03-10	4.35	1	34.8	1	58.7	1
G	BKGDPT59-03-12	3.96	1	41.6	1	64.3	1
G	BKGDPT59-03-14	4.08	1	39.6	1	59	1
G	BKGDPT59-03-2	3.67	1	44.9	1	66.3	1
G	BKGDPT59-03-4	3.78	1	34.4	1	75.1	1
G	BKGDPT59-03-6	3.49	1	26.8	1	56.4	1
G	BKGDPT59-03-8	3.93	1	38.8	1	75.8	1
G	BKGDPT60-03-10	3.75	1	35.8	1	60.3	1
G	BKGDPT60-03-12	4.29	1	36.4	1	77.1	1
G	BKGDPT60-03-14	5.07	1	32.8	1	74.5	1
G	BKGDPT60-03-2	2.65	1	60	1	35.4	1
G	BKGDPT60-03-4	3.64	1	31.1	1	27.4	1
G	BKGDPT60-03-6	2.80	1	25.9	1	24.9	1
G	BKGDPT60-03-8	3.01	1	45.9	1	51.7	1

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
D	BKGDPT31-04-2	0.031	0	0.028	0	0.042	0	0.019	0	0.469	0
D	BKGDPT31-04-4	0.03	0	0.023	0	0.057	0	0.057	0	0.47	0
D	BKGDPT32-04-10	0.033	0	0.069	0	0.058	0	0.038	0	0.444	0
D	BKGDPT32-04-12	0.019	0	0.071	0	0.042	0	0.031	0	0.469	0
D	BKGDPT32-04-2	0.056	0	0.068	0	0.042	0	0.026	0	0.501	0
D	BKGDPT32-04-4	0.052	0	0.063	0	0.031	0	0.043	0	0.46	0
D	BKGDPT32-04-6	0.062	0	0.074	0	0.029	0	0.04	0	0.425	0
D	BKGDPT32-04-8	0.033	0	0.055	0	0.049	0	0.053	0	0.458	0
D	BKGDPT33-04-2	0.065	0	0.054	0	0.025	0	0.025	0	0.456	0
D	BKGDPT33-04-4	0.074	0	0.046	0	0.038	0	0.045	0	0.495	0
D	BKGDPT33-04-6	0.049	0	0.065	0	0.083	0	0.055	0	0.448	0
E	BKGDPT34-04-10	0.035	0	0.024	0	0.034	0	0.047	0	0.418	0
E	BKGDPT34-04-12	0.038	0	0.032	0	0.071	0	0.05	0	0.412	0
E	BKGDPT34-04-14	0.052	0	0.03	0	0.047	0	0.02	0	0.407	0
E	BKGDPT34-04-2	0.035	0	0.048	0	0.046	0	0.025	0	0.401	0
E	BKGDPT34-04-4	0.029	0	0.078	0	0.036	0	0.033	0	0.426	0
E	BKGDPT34-04-6	0.027	0	0.059	0	0.034	0	0.041	0	0.457	0
E	BKGDPT34-04-8	0.03	0	0.067	0	0.027	0	0.027	0	0.411	0
E	BKGDPT35-04-10	0.024	0	0.042	0	0.05	0	0.034	0	0.403	0
E	BKGDPT35-04-12	0.023	0	0.036	0	0.066	0	0.061	0	0.441	0
E	BKGDPT35-04-14	0.017	0	0.037	0	0.063	0	0.038	0	0.431	0
E	BKGDPT35-04-2	0.044	0	0.051	0	0.057	0	0.037	0	0.39	0
E	BKGDPT35-04-4	0.065	0	0.078	0	0.095	0	0.059	0	0.414	0
E	BKGDPT35-04-6	0.032	0	0.051	0	0.042	0	0.058	0	0.407	0
E	BKGDPT35-04-8	0.032	0	0.035	0	0.05	0	0.042	0	0.42	0
E	BKGDPT36-04-10	0.042	0	0.039	0	0.035	0	0.033	0	0.413	0
E	BKGDPT36-04-12	0.054	0	0.04	0	0.033	0	0.039	0	0.415	0
E	BKGDPT36-04-14	0.025	0	0.046	0	0.02	0	0.02	0	0.416	0
E	BKGDPT36-04-2	0.019	0	0.052	0	0.046	0	0.029	0	0.445	0
E	BKGDPT36-04-4	0.048	0	0.056	0	0.047	0	0.021	0	0.438	0
E	BKGDPT36-04-6	0.042	0	0.043	0	0.05	0	0.041	0	0.417	0
E	BKGDPT36-04-8	0.036	0	0.062	0	0.033	0	0.018	0	0.448	0
E	BKGDPT37-04-10	0.058	0	0.077	0	0.063	0	0.045	0	0.422	0
E	BKGDPT37-04-12	0.094	0	0.044	0	0.044	0	0.019	0	0.425	0
E	BKGDPT37-04-14	0.08	0	0.072	0	0.042	0	0.047	0	0.466	0
E	BKGDPT37-04-2	0.046	0	0.043	0	0.029	0	0.029	0	0.472	0
E	BKGDPT37-04-4	0.029	0	0.04	0	0.028	0	0.018	0	0.402	0
E	BKGDPT37-04-6	0.016	0	0.035	0	0.079	0	0.079	0	0.452	0
E	BKGDPT37-04-8	0.015	0	0.034	0	0.057	0	0.054	0	0.365	0
F	BKGDPT38-04-10	0.053	0	0.068	0	0.037	0	0.037	0	0.465	0
F	BKGDPT38-04-12	0.029	0	0.06	0	0.029	0	0.029	0	0.426	0
F	BKGDPT38-04-14	0.033	0	0.054	0	0.089	0	0.056	0	0.461	0
F	BKGDPT38-04-2	0.077	0	0.061	0	0.026	0	0.026	0	0.488	0
F	BKGDPT38-04-4	0.043	0	0.072	0	0.056	0	0.056	0	0.449	0
F	BKGDPT38-04-6	0.079	0	0.102	0	0.026	0	0.026	0	0.486	0
F	BKGDPT38-04-8	0.069	0	0.119	0	0.024	0	0.039	0	0.425	0
F	BKGDPT39-04-10	0.046	0	0.061	0	0.041	0	0.041	0	0.442	0
F	BKGDPT39-04-12	0.045	0	0.049	0	0.026	0	0.042	0	0.403	0
F	BKGDPT39-04-14	0.03	0	0.053	0	0.043	0	0.079	0	0.463	0
F	BKGDPT39-04-2	0.026	0	0.035	0	0.073	0	0.04	0	0.366	0
F	BKGDPT39-04-4	0.027	0	0.037	0	0.054	0	0.054	0	0.392	0
F	BKGDPT39-04-6	0.04	0	0.054	0	0.047	0	0.047	0	0.479	0
F	BKGDPT39-04-8	0.037	0	0.06	0	0.027	0	0.027	0	0.497	0
F	BKGDPT40-04-10	0.046	0	0.103	0	0.039	0	0.024	0	0.439	0
F	BKGDPT40-04-12	0.027	0	0.074	0	0.033	0	0.052	0	0.462	0
F	BKGDPT40-04-14	0.044	0	0.076	0	0.031	0	0.03	0	0.412	0
F	BKGDPT40-04-2	0.049	0	0.061	0	0.051	0	0.051	0	0.37	0
F	BKGDPT40-04-4	0.023	0	0.055	0	0.023	0	0.023	0	0.355	0

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
F	BKGDPT40-04-6	0.026	0	0.055	0	0.02	0	0.02	0	0.298	0
F	BKGDPT40-04-8	0.057	0	0.047	0	0.017	0	0.017	0	0.307	0
F	BKGDPT41-04-10	0.034	0	0.048	0	0.035	0	0.033	0	0.463	0
F	BKGDPT41-04-12	0.056	0	0.054	0	0.04	0	0.029	0	0.473	0
F	BKGDPT41-04-14	0.045	0	0.052	0	0.032	0	0.017	0	0.469	0
F	BKGDPT41-04-2	0.036	0	0.038	0	0.079	0	0.073	0	0.39	0
F	BKGDPT41-04-4	0.041	0	0.056	0	0.04	0	0.04	0	0.417	0
F	BKGDPT41-04-6	0.021	0	0.047	0	0.042	0	0.029	0	0.509	0
F	BKGDPT41-04-8	0.057	0	0.021	0	0.017	0	0.03	0	0.476	0
F	BKGDPT42-04-2	0.039	0	0.082	0	0.03	0	0.039	0	0.387	0
F	BKGDPT42-04-4	0.033	0	0.056	0	0.05	0	0.032	0	0.358	0
F	BKGDPT42-04-6	0.018	0	0.056	0	0.046	0	0.037	0	0.37	0
F	BKGDPT43-04-10	0.03	0	0.038	0	0.034	0	0.048	0	0.432	0
F	BKGDPT43-04-12	0.056	0	0.056	0	0.047	0	0.047	0	0.441	0
F	BKGDPT43-04-14	0.043	0	0.077	0	0.032	0	0.038	0	0.444	0
F	BKGDPT43-04-2	0.036	0	0.027	0	0.031	0	0.045	0	0.433	0
F	BKGDPT43-04-4	0.041	0	0.07	0	0.031	0	0.031	0	0.458	0
F	BKGDPT43-04-6	0.061	0	0.063	0	0.047	0	0.021	0	0.438	0
F	BKGDPT43-04-8	0.052	0	0.051	0	0.061	0	0.057	0	0.428	0
F	BKGDPT44-04-10	0.023	0	0.057	0	0.041	0	0.034	0	0.467	0
F	BKGDPT44-04-12	0.041	0	0.034	0	0.028	0	0.028	0	0.496	0
F	BKGDPT44-04-14	0.039	0	0.035	0	0.032	0	0.041	0	0.478	0
F	BKGDPT44-04-2	0.018	0	0.077	0	0.017	0	0.038	0	0.498	0
F	BKGDPT44-04-4	0.031	0	0.028	0	0.034	0	0.029	0	0.453	0
F	BKGDPT44-04-6	0.02	0	0.066	0	0.029	0	0.029	0	0.49	0
F	BKGDPT44-04-8	0.023	0	0.035	0	0.027	0	0.027	0	0.443	0
F	BKGDPT45-04-2	0.054	0	0.066	0	0.033	0	0.02	0	0.385	0
F	BKGDPT45-04-4	0.052	0	0.065	0	0.025	0	0.025	0	0.373	0
F	BKGDPT46-04-2	0.023	0	0.05	0	0.047	0	0.047	0	0.4	0
F	BKGDPT46-04-4	0.017	0	0.064	0	0.037	0	0.023	0	0.455	0
F	BKGDPT46-04-6	0.035	0	0.066	0	0.043	0	0.043	0	0.413	0
F	BKGDPT47-04-10	0.041	0	0.043	0	0.062	0	0.034	0	0.405	0
F	BKGDPT47-04-12	0.038	0	0.063	0	0.025	0	0.025	0	0.452	0
F	BKGDPT47-04-14	0.045	0	0.044	0	0.034	0	0.034	0	0.428	0
F	BKGDPT47-04-2	0.043	0	0.028	0	0.036	0	0.036	0	0.428	0
F	BKGDPT47-04-4	0.046	0	0.037	0	0.024	0	0.024	0	0.399	0
F	BKGDPT47-04-6	0.049	0	0.028	0	0.027	0	0.044	0	0.411	0
F	BKGDPT47-04-8	0.04	0	0.042	0	0.026	0	0.048	0	0.351	0
G	BKGDPT48-04-10	0.125	0	0.051	0	0.047	0	0.054	0	0.408	0
G	BKGDPT48-04-12	0.074	0	0.041	0	0.087	0	0.054	0	0.375	0
G	BKGDPT48-04-14	0.067	0	0.063	0	0.071	0	0.056	0	0.409	0
G	BKGDPT48-04-2	0.073	0	0.045	0	0.057	0	0.039	0	0.36	0
G	BKGDPT48-04-4	0.04	0	0.061	0	0.044	0	0.064	0	0.387	0
G	BKGDPT48-04-6	0.003	1	0.055	0	0.038	0	0.078	0	0.366	0
G	BKGDPT48-04-8	0.031	0	0.11	0	0.035	0	0.032	0	0.348	0
G	BKGDPT49-04-10	0.061	0	0.046	0	0.098	0	0.072	0	0.572	0
G	BKGDPT49-04-12	0.037	0	0.039	0	0.111	0	0.034	0	0.534	0
G	BKGDPT49-04-14	0.03	0	0.036	0	0.101	0	0.077	0	0.565	0
G	BKGDPT49-04-2	0.06	0	0.05	0	0.123	0	0.058	0	0.532	0
G	BKGDPT49-04-4	0.08	0	0.066	0	0.076	0	0.049	0	0.556	0
G	BKGDPT49-04-6	0.076	0	0.033	0	0.05	0	0.04	0	0.563	0
G	BKGDPT49-04-8	0.028	0	0.05	0	0.068	0	0.054	0	0.588	0
G	BKGDPT50-04-10	0.037	0	0.038	0	0.018	0	0.037	0	0.453	0
G	BKGDPT50-04-12	0.029	0	0.043	0	0.034	0	0.05	0	0.453	0
G	BKGDPT50-04-14	0.068	0	0.062	0	0.039	0	0.039	0	0.374	0
G	BKGDPT50-04-2	0.05	0	0.066	0	0.043	0	0.064	0	0.426	0
G	BKGDPT50-04-4	0.032	0	0.05	0	0.038	0	0.033	0	0.428	0
G	BKGDPT50-04-6	0.047	0	0.056	0	0.05	0	0.046	0	0.382	0

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
G	BKGDPT50-04-8	0.074	0	0.048	0	0.035	0	0.047	0	0.4	0
G	BKGDPT51-04-10	0.021	0	0.028	0	0.034	0	0.017	0	0.381	0
G	BKGDPT51-04-12	0.019	0	0.061	0	0.051	0	0.046	0	0.33	0
G	BKGDPT51-04-14	0.044	0	0.088	0	0.055	0	0.051	0	0.423	0
G	BKGDPT51-04-2	0.056	0	0.076	0	0.054	0	0.035	0	0.476	0
G	BKGDPT51-04-4	0.038	0	0.056	0	0.033	0	0.048	0	0.432	0
G	BKGDPT51-04-6	0.053	0	0.049	0	0.04	0	0.037	0	0.416	0
G	BKGDPT51-04-8	0.042	0	0.06	0	0.039	0	0.039	0	0.427	0
G	BKGDPT52-04-10	0.118	0	0.06	0	0.029	0	0.029	0	0.381	0
G	BKGDPT52-04-12	0.105	0	0.05	0	0.045	0	0.038	0	0.379	0
G	BKGDPT52-04-14	0.111	0	0.073	0	0.041	0	0.028	0	0.382	0
G	BKGDPT52-04-2	0.141	0	0.074	0	0.029	0	0.036	0	0.376	0
G	BKGDPT52-04-4	0.087	0	0.075	0	0.02	0	0.032	0	0.415	0
G	BKGDPT52-04-6	0.058	0	0.058	0	0.05	0	0.033	0	0.385	0
G	BKGDPT52-04-8	0.067	0	0.063	0	0.051	0	0.04	0	0.414	0
G	BKGDPT53-04-10	0.071	0	0.05	0	0.055	0	0.065	0	0.324	0
G	BKGDPT53-04-12	0.043	0	0.052	0	0.033	0	0.033	0	0.308	0
G	BKGDPT53-04-14	0.025	0	0.026	0	0.039	0	0.035	0	0.299	0
G	BKGDPT53-04-2	0.027	0	0.062	0	0.022	0	0.034	0	0.334	0
G	BKGDPT53-04-4	0.054	0	0.028	0	0.071	0	0.05	0	0.329	0
G	BKGDPT53-04-6	0.045	0	0.082	0	0.043	0	0.029	0	0.348	0
G	BKGDPT53-04-8	0.028	0	0.042	0	0.065	0	0.047	0	0.298	0
G	BKGDPT54-04-10	0.052	0	0.135	0	0.065	0	0.042	0	0.403	0
G	BKGDPT54-04-12	0.046	0	0.052	0	0.052	0	0.041	0	0.372	0
G	BKGDPT54-04-14	0.03	0	0.06	0	0.031	0	0.04	0	0.38	0
G	BKGDPT54-04-2	0.018	0	0.058	0	0.047	0	0.025	0	0.369	0
G	BKGDPT54-04-4	0.038	0	0.078	0	0.045	0	0.049	0	0.432	0
G	BKGDPT54-04-6	0.04	0	0.052	0	0.033	0	0.029	0	0.372	0
G	BKGDPT54-04-8	0.052	0	0.058	0	0.041	0	0.035	0	0.379	0
G	BKGDPT55-04-10	0.027	0	0.048	0	0.027	0	0.017	0	0.359	0
G	BKGDPT55-04-12	0.043	0	0.07	0	0.048	0	0.031	0	0.333	0
G	BKGDPT55-04-14	0.04	0	0.041	0	0.042	0	0.033	0	0.362	0
G	BKGDPT55-04-2	0.042	0	0.058	0	0.036	0	0.03	0	0.339	0
G	BKGDPT55-04-4	0.046	0	0.047	0	0.017	0	0.017	0	0.39	0
G	BKGDPT55-04-6	0.07	0	0.042	0	0.083	0	0.061	0	0.423	0
G	BKGDPT55-04-8	0.064	0	0.026	0	0.089	0	0.056	0	0.366	0
G	BKGDPT56-04-10	0.057	0	0.077	0	0.042	0	0.039	0	0.418	0
G	BKGDPT56-04-12	0.044	0	0.084	0	0.027	0	0.037	0	0.472	0
G	BKGDPT56-04-14	0.029	0	0.067	0	0.039	0	0.057	0	0.466	0
G	BKGDPT56-04-2	0.018	0	0.029	0	0.029	0	0.026	0	0.473	0
G	BKGDPT56-04-4	0.017	0	0.053	0	0.04	0	0.031	0	0.428	0
G	BKGDPT56-04-6	0.024	0	0.036	0	0.028	0	0.032	0	0.43	0
G	BKGDPT56-04-8	0.044	0	0.046	0	0.021	0	0.039	0	0.416	0
G	BKGDPT57-04-10	0.036	0	0.051	0	0.064	0	0.05	0	0.391	0
G	BKGDPT57-04-12	0.041	0	0.035	0	0.078	0	0.048	0	0.517	0
G	BKGDPT57-04-14	0.028	0	0.066	0	0.082	0	0.045	0	0.505	0
G	BKGDPT57-04-2	0.035	0	0.04	0	0.033	0	0.037	0	0.428	1
G	BKGDPT57-04-4	0.038	0	0.041	0	0.041	0	0.032	0	0.383	0
G	BKGDPT57-04-6	0.028	0	0.031	0	0.059	0	0.021	0	0.413	0
G	BKGDPT57-04-8	0.017	0	0.057	0	0.031	0	0.031	0	0.383	0
G	BKGDPT58-04-10	0.043	0	0.038	0	0.083	0	0.044	0	0.415	0
G	BKGDPT58-04-12	0.051	0	0.04	0	0.064	0	0.04	0	0.434	0
G	BKGDPT58-04-14	0.085	0	0.057	0	0.063	0	0.035	0	0.393	0
G	BKGDPT58-04-2	0.027	0	0.035	0	0.096	0	0.065	0	0.358	0
G	BKGDPT58-04-4	0.066	0	0.036	0	0.09	0	0.027	0	0.411	0
G	BKGDPT58-04-6	0.044	0	0.027	0	0.025	0	0.029	0	0.382	0
G	BKGDPT58-04-8	0.071	0	0.037	0	0.067	0	0.024	0	0.469	0
G	BKGDPT59-04-10	0.048	0	0.031	0	0.051	0	0.047	0	0.506	0

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
G	BKGDPT59-04-12	0.039	0	0.043	0	0.034	0	0.046	0	0.523	0
G	BKGDPT59-04-14	0.051	0	0.043	0	0.049	0	0.072	0	0.5	0
G	BKGDPT59-04-2	0.051	0	0.058	0	0.072	0	0.04	0	0.546	0
G	BKGDPT59-04-4	0.018	0	0.036	0	0.075	0	0.048	0	0.541	0
G	BKGDPT59-04-6	0.041	0	0.056	0	0.106	0	0.077	0	0.52	0
G	BKGDPT59-04-8	0.027	0	0.04	0	0.049	0	0.033	0	0.575	0
G	BKGDPT60-04-10	0.072	0	0.068	0	0.04	0	0.034	0	0.383	0
G	BKGDPT60-04-12	0.077	0	0.068	0	0.043	0	0.021	0	0.416	0
G	BKGDPT60-04-14	0.055	0	0.05	0	0.02	0	0.041	0	0.384	0
G	BKGDPT60-04-2	0.047	0	0.048	0	0.061	0	0.052	0	0.371	0
G	BKGDPT60-04-4	0.08	0	0.046	0	0.045	0	0.045	0	0.464	0
G	BKGDPT60-04-6	0.056	0	0.065	0	0.061	0	0.046	0	0.368	0
G	BKGDPT60-04-8	0.071	0	0.041	0	0.055	0	0.054	0	0.381	0

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
D	BKGDPT31-04-2	1.31	1	1	1	1.4	1	1.03	1	0.048	1	1.32	1
D	BKGDPT31-04-4	1.68	1	2.81	1	1.37	1	2.03	1	0.112	1	2.25	1
D	BKGDPT32-04-10	1.23	1	1.09	1	1.06	1	1.06	1	0.077	0	0.95	1
D	BKGDPT32-04-12	1.24	1	1.46	1	1.19	1	1.27	1	0.065	0	1.4	1
D	BKGDPT32-04-2	1.45	1	1.57	1	1.17	1	1.39	1	0.096	0	1.23	1
D	BKGDPT32-04-4	1.08	1	1.13	1	1.38	1	1.06	1	0.129	0	1	1
D	BKGDPT32-04-6	1.33	1	1.32	1	1.19	1	1.38	1	0.064	1	1.2	1
D	BKGDPT32-04-8	1.28	1	1.16	1	1.05	1	0.84	1	0.061	0	1.01	1
D	BKGDPT33-04-2	1.34	1	0.95	1	1.05	1	0.88	1	0.08	0	0.99	1
D	BKGDPT33-04-4	1.34	1	1.05	1	1.22	1	0.89	1	0.063	1	1.04	1
D	BKGDPT33-04-6	1.45	1	1.02	1	1.26	1	0.97	1	0.051	0	0.97	1
E	BKGDPT34-04-10	1.18	1	1.25	1	1.27	1	1.24	1	0.054	0	1.18	1
E	BKGDPT34-04-12	1.46	1	1.24	1	1.56	1	0.99	1	0.074	0	0.95	1
E	BKGDPT34-04-14	1.49	1	1.18	1	1.42	1	1.05	1	0.048	0	1.18	1
E	BKGDPT34-04-2	1.3	1	1.36	1	1.33	1	1.09	1	0.059	0	1.11	1
E	BKGDPT34-04-4	1.27	1	1.19	1	1.42	1	1.37	1	0.083	1	1.35	1
E	BKGDPT34-04-6	1.33	1	1.15	1	1.39	1	1.4	1	0.071	1	1.14	1
E	BKGDPT34-04-8	1.46	1	1.26	1	1.53	1	1.3	1	0.074	1	1.1	1
E	BKGDPT35-04-10	1.25	1	1.39	1	0.98	1	1.22	1	0.042	1	1.37	1
E	BKGDPT35-04-12	1.01	1	1.33	1	1.03	1	1.29	1	0.108	1	1.25	1
E	BKGDPT35-04-14	1.2	1	1.33	1	1.22	1	1.33	1	0.076	1	1.42	1
E	BKGDPT35-04-2	1.28	1	1.41	1	1.4	1	0.98	1	0.074	1	0.97	1
E	BKGDPT35-04-4	1.42	1	1.88	1	1.32	1	1.62	1	0.074	1	1.55	1
E	BKGDPT35-04-6	1.37	1	1.71	1	1.28	1	1.72	1	0.077	1	1.69	1
E	BKGDPT35-04-8	1.35	1	1.6	1	1.33	1	1.04	1	0.063	1	1.25	1
E	BKGDPT36-04-10	1.46	1	1.21	1	1.19	1	1.15	1	0.107	1	1.13	1
E	BKGDPT36-04-12	1.17	1	1.37	1	1.14	1	1.11	1	0.062	0	1.15	1
E	BKGDPT36-04-14	1.21	1	1.59	1	1.08	1	1.61	1	0.082	1	1.56	1
E	BKGDPT36-04-2	1.32	1	1.4	1	1.22	1	0.95	1	0.077	0	1.2	1
E	BKGDPT36-04-4	1.33	1	1.1	1	1.08	1	1.05	1	0.076	1	1.1	1
E	BKGDPT36-04-6	1.26	1	0.9	1	1.15	1	1.13	1	0.066	1	1.13	1
E	BKGDPT36-04-8	1.47	1	1.36	1	1.34	1	1.08	1	0.128	1	1.26	1
E	BKGDPT37-04-10	1.41	1	1.17	1	1.43	1	1.06	1	0.08	1	1.08	1
E	BKGDPT37-04-12	1.46	1	1.3	1	1.39	1	0.95	1	0.063	1	1.21	1
E	BKGDPT37-04-14	1.42	1	1.48	1	1.47	1	1.11	1	0.054	0	1.17	1
E	BKGDPT37-04-2	1.52	1	1	1	1.35	1	1.17	1	0.08	1	1.18	1
E	BKGDPT37-04-4	1.45	1	1.25	1	1.49	1	1.14	1	0.105	1	1.25	1
E	BKGDPT37-04-6	1.67	1	1.27	1	1.44	1	1.09	1	0.079	1	1.3	1
E	BKGDPT37-04-8	1.58	1	1.25	1	1.71	1	1.28	1	0.073	1	1.17	1
F	BKGDPT38-04-10	1.49	1	1.36	1	1.49	1	1.13	1	0.04	0	1.42	1
F	BKGDPT38-04-12	1.63	1	1.33	1	1.62	1	1.29	1	0.104	1	1.09	1
F	BKGDPT38-04-14	1.44	1	1.32	1	1.32	1	0.94	1	0.076	0	1.09	1
F	BKGDPT38-04-2	1.03	1	1.02	1	1.11	1	0.92	1	0.065	1	0.95	1
F	BKGDPT38-04-4	1.45	1	1.01	1	1.3	1	1	1	0.065	0	1.2	1
F	BKGDPT38-04-6	1.38	1	1.15	1	1.37	1	1.31	1	0.078	0	1.08	1
F	BKGDPT38-04-8	1.46	1	1.5	1	1.54	1	1.11	1	0.052	1	1.19	1
F	BKGDPT39-04-10	1.42	1	1.16	1	1.42	1	1.12	1	0.066	0	1.35	1
F	BKGDPT39-04-12	1.3	1	1.15	1	1.12	1	1.19	1	0.108	0	1.14	1
F	BKGDPT39-04-14	1.45	1	1.16	1	1.42	1	1.22	1	0.091	1	1.08	1
F	BKGDPT39-04-2	1.16	1	1.02	1	1.16	1	1.06	1	0.052	0	0.87	1
F	BKGDPT39-04-4	0.79	1	0.85	1	0.86	1	0.81	1	0.075	0	0.74	1
F	BKGDPT39-04-6	1.73	1	1.41	1	1.78	1	1.5	1	0.125	1	1.49	1
F	BKGDPT39-04-8	1.61	1	1.17	1	1.58	1	1.29	1	0.08	1	1.15	1
F	BKGDPT40-04-10	1.76	1	1.76	1	1.52	1	1.64	1	0.121	1	2.1	1
F	BKGDPT40-04-12	1.51	1	1.57	1	1.62	1	1.34	1	0.076	0	1.33	1
F	BKGDPT40-04-14	1.62	1	1.38	1	1.6	1	1.51	1	0.073	1	1.33	1
F	BKGDPT40-04-2	1.2	1	0.85	1	1.04	1	0.88	1	0.053	0	0.9	1
F	BKGDPT40-04-4	1.34	1	1.41	1	1.23	1	1.04	1	0.051	0	1.05	1

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
F	BKGDPT40-04-6	1.31	1	1.16	1	1.13	1	0.79	1	0.078	1	0.94	1
F	BKGDPT40-04-8	1.44	1	1.34	1	1.11	1	1.1	1	0.04	0	1.14	1
F	BKGDPT41-04-10	1.68	1	1.88	1	1.55	1	1.31	1	0.048	1	1.29	1
F	BKGDPT41-04-12	1.75	1	1.4	1	1.62	1	1.22	1	0.099	1	1.43	1
F	BKGDPT41-04-14	1.99	1	1.95	1	1.85	1	1.14	1	0.044	1	1.22	1
F	BKGDPT41-04-2	1.32	1	1.19	1	1.47	1	1.04	1	0.044	0	1.09	1
F	BKGDPT41-04-4	1.41	1	1.44	1	1.26	1	0.99	1	0.052	1	0.85	1
F	BKGDPT41-04-6	1.6	1	1.39	1	1.65	1	1.53	1	0.093	1	1.39	1
F	BKGDPT41-04-8	1.52	1	1.68	1	1.52	1	1.53	1	0.101	1	1.37	1
F	BKGDPT42-04-2	1.54	1	1.2	1	1.44	1	0.93	1	0.078	1	0.89	1
F	BKGDPT42-04-4	1.81	1	1.11	1	1.45	1	1.07	1	0.106	0	1.07	1
F	BKGDPT42-04-6	1.68	1	1.21	1	1.61	1	0.96	1	0.092	1	1.19	1
F	BKGDPT43-04-10	1.64	1	1.63	1	1.86	1	1.28	1	0.055	0	1.38	1
F	BKGDPT43-04-12	1.31	1	1.28	1	1.49	1	1.03	1	0.029	0	1.08	1
F	BKGDPT43-04-14	1.31	1	1.19	1	1.38	1	1.07	1	0.053	0	1.22	1
F	BKGDPT43-04-2	1.73	1	1.47	1	1.92	1	1.48	1	0.054	0	1.29	1
F	BKGDPT43-04-4	1.7	1	1.34	1	1.82	1	1.15	1	0.138	0	1.31	1
F	BKGDPT43-04-6	2.1	1	1.62	1	1.89	1	1.02	1	0.058	0	1.37	1
F	BKGDPT43-04-8	1.46	1	1.43	1	1.53	1	1.24	1	0.063	0	1.36	1
F	BKGDPT44-04-10	1.41	1	1.2	1	1.35	1	1.26	1	0.066	1	1.35	1
F	BKGDPT44-04-12	1.38	1	1.05	1	1.38	1	0.84	1	0.038	0	1.08	1
F	BKGDPT44-04-14	1.32	1	1.22	1	1.03	1	1.17	1	0.053	0	1.18	1
F	BKGDPT44-04-2	0.98	1	1.05	1	1.06	1	0.89	1	0.061	0	1.02	1
F	BKGDPT44-04-4	1.47	1	1.27	1	1.42	1	0.97	1	0.069	1	0.94	1
F	BKGDPT44-04-6	1.47	1	1.49	1	1.47	1	1.44	1	0.077	1	1.44	1
F	BKGDPT44-04-8	1.82	1	1.52	1	1.76	1	1.16	1	0.048	1	1.38	1
F	BKGDPT45-04-2	1.78	1	1.05	1	1.37	1	0.99	1	0.075	1	0.98	1
F	BKGDPT45-04-4	1.78	1	1.24	1	1.6	1	0.9	1	0.041	1	0.93	1
F	BKGDPT46-04-2	1.1	1	0.9	1	1.25	1	0.92	1	0.05	0	1.02	1
F	BKGDPT46-04-4	1.23	1	0.88	1	0.98	1	0.71	1	0.048	0	0.84	1
F	BKGDPT46-04-6	1.67	1	1.18	1	1.47	1	1.19	1	0.072	1	0.95	1
F	BKGDPT47-04-10	1.44	1	0.99	1	1.49	1	1.12	1	0.074	0	0.98	1
F	BKGDPT47-04-12	1.45	1	1.16	1	1.4	1	0.93	1	0.049	0	1.11	1
F	BKGDPT47-04-14	1.77	1	1.11	1	1.47	1	1.05	1	0.062	0	1.07	1
F	BKGDPT47-04-2	0.96	1	1.13	1	0.96	1	0.82	1	0.054	0	0.94	1
F	BKGDPT47-04-4	1.24	1	1.13	1	1.17	1	0.93	1	0.054	1	0.93	1
F	BKGDPT47-04-6	1.58	1	1.33	1	1.33	1	1.05	1	0.044	0	1.13	1
F	BKGDPT47-04-8	1.34	1	1.19	1	1.54	1	1.01	1	0.092	1	1.09	1
G	BKGDPT48-04-10	1.56	1	1.17	1	1.46	1	1.07	1	0.072	0	1.1	1
G	BKGDPT48-04-12	1.58	1	1.17	1	1.51	1	0.97	1	0.051	1	0.97	1
G	BKGDPT48-04-14	1.67	1	1.11	1	1.81	1	1.13	1	0.061	1	1.27	1
G	BKGDPT48-04-2	1.46	1	1.11	1	1.49	1	1.12	1	0.115	1	1.04	1
G	BKGDPT48-04-4	1.37	1	1.25	1	1.31	1	1.2	1	0.065	1	0.91	1
G	BKGDPT48-04-6	1.61	1	1.21	1	1.43	1	0.98	1	0.023	0	1.04	1
G	BKGDPT48-04-8	1.56	1	0.86	1	1.31	1	0.89	1	0.034	1	1.08	1
G	BKGDPT49-04-10	1.68	1	1.54	1	1.54	1	1.21	1	0.091	0	1.38	1
G	BKGDPT49-04-12	1.51	1	1.18	1	1.31	1	1.14	1	0.116	1	1.42	1
G	BKGDPT49-04-14	1.8	1	1.19	1	1.93	1	1.29	1	0.084	0	1.29	1
G	BKGDPT49-04-2	1.53	1	1.45	1	1.43	1	1.06	1	0.093	0	1.12	1
G	BKGDPT49-04-4	1.56	1	1.52	1	1.39	1	1.57	1	0.076	1	1.36	1
G	BKGDPT49-04-6	1.8	1	1.3	1	1.8	1	1.17	1	0.085	1	1.32	1
G	BKGDPT49-04-8	1.65	1	1.33	1	1.74	1	1.21	1	0.066	0	1.33	1
G	BKGDPT50-04-10	1.53	1	1.32	1	1.66	1	1.43	1	0.036	0	1.16	1
G	BKGDPT50-04-12	1.7	1	1.28	1	1.62	1	1.07	1	0.035	1	1.25	1
G	BKGDPT50-04-14	1.39	1	1.1	1	1.27	1	1.03	1	0.062	1	1.23	1
G	BKGDPT50-04-2	1.42	1	1.07	1	1.27	1	0.95	1	0.06	1	1.1	1
G	BKGDPT50-04-4	1.68	1	1.14	1	1.56	1	1.11	1	0.08	0	1.17	1
G	BKGDPT50-04-6	1.67	1	1.25	1	1.52	1	1.12	1	0.05	1	1.08	1

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
G	BKGDPT50-04-8	1.79	1	1.23	1	1.62	1	1.09	1	0.051	0	1.38	1
G	BKGDPT51-04-10	1.53	1	1.06	1	1.53	1	1.08	1	0.089	1	1.25	1
G	BKGDPT51-04-12	1.53	1	1.16	1	1.65	1	0.92	1	0.084	1	0.96	1
G	BKGDPT51-04-14	1.59	1	1.37	1	1.28	1	1.18	1	0.089	1	1.1	1
G	BKGDPT51-04-2	1.73	1	1.42	1	1.5	1	1.16	1	0.07	1	1.35	1
G	BKGDPT51-04-4	1.53	1	1.33	1	1.35	1	1.44	1	0.073	1	1.44	1
G	BKGDPT51-04-6	1.93	1	1.67	1	1.7	1	1.18	1	0.038	1	1.19	1
G	BKGDPT51-04-8	1.42	1	1.27	1	1.68	1	1.26	1	0.075	0	1.15	1
G	BKGDPT52-04-10	1.74	1	1.17	1	1.74	1	1.23	1	0.038	1	1.3	1
G	BKGDPT52-04-12	1.76	1	0.89	1	1.57	1	1.28	1	0.053	1	1.09	1
G	BKGDPT52-04-14	1.61	1	1.22	1	1.74	1	1.05	1	0.073	1	0.9	1
G	BKGDPT52-04-2	1.7	1	1.26	1	1.48	1	1.03	1	0.103	1	1.03	1
G	BKGDPT52-04-4	1.8	1	1.32	1	1.81	1	1.03	1	0.065	1	1.03	1
G	BKGDPT52-04-6	1.85	1	1.7	1	1.66	1	1.76	1	0.062	1	1.25	1
G	BKGDPT52-04-8	1.95	1	1.21	1	1.73	1	0.95	1	0.045	1	0.9	1
G	BKGDPT53-04-10	1.67	1	1.42	1	1.79	1	0.96	1	0.055	1	1.25	1
G	BKGDPT53-04-12	1.36	1	1.19	1	1.39	1	1.05	1	0.046	1	1.25	1
G	BKGDPT53-04-14	1.58	1	2.03	1	2.38	1	1.51	1	0.071	1	1.28	1
G	BKGDPT53-04-2	1.33	1	1.18	1	1.42	1	1.14	1	0.057	1	1.33	1
G	BKGDPT53-04-4	1.75	1	1.46	1	1.69	1	1.4	1	0.093	0	1.65	1
G	BKGDPT53-04-6	1.85	1	1.47	1	1.69	1	1.02	1	0.116	1	1.41	1
G	BKGDPT53-04-8	1.97	1	1.48	1	1.71	1	1.24	1	0.112	1	1.05	1
G	BKGDPT54-04-10	1.35	1	1.31	1	1.58	1	1.3	1	0.066	1	1.13	1
G	BKGDPT54-04-12	1.52	1	1.37	1	1.45	1	1.25	1	0.093	1	1.09	1
G	BKGDPT54-04-14	1.58	1	1.25	1	1.55	1	1.3	1	0.134	1	1.2	1
G	BKGDPT54-04-2	1.22	1	1.52	1	1.34	1	1.28	1	0.105	1	1.44	1
G	BKGDPT54-04-4	1	1	1.37	1	1.29	1	0.98	1	0.085	1	1.22	1
G	BKGDPT54-04-6	1.24	1	1.28	1	1.25	1	1.1	1	0.083	1	1	1
G	BKGDPT54-04-8	1.32	1	1.27	1	1.51	1	1.26	1	0.05	1	1.03	1
G	BKGDPT55-04-10	1.23	1	0.89	1	1.29	1	0.83	1	0.061	1	0.94	1
G	BKGDPT55-04-12	1.45	1	1.28	1	1.59	1	1.02	1	0.061	1	1.03	1
G	BKGDPT55-04-14	1.37	1	1.07	1	1.42	1	0.96	1	0.029	0	1.01	1
G	BKGDPT55-04-2	1.45	1	1.09	1	1.35	1	1.03	1	0.074	1	1.13	1
G	BKGDPT55-04-4	1.5	1	1.29	1	1.35	1	1.28	1	0.054	0	1.31	1
G	BKGDPT55-04-6	1.42	1	1.13	1	1.56	1	1.01	1	0.048	1	0.96	1
G	BKGDPT55-04-8	1.37	1	1	1	1.4	1	1.14	1	0.056	0	1.07	1
G	BKGDPT56-04-10	1.79	1	1.46	1	1.7	1	1.52	1	0.089	0	1.46	1
G	BKGDPT56-04-12	1.8	1	1.35	1	1.78	1	1.13	1	0.103	1	1.29	1
G	BKGDPT56-04-14	1.4	1	1.28	1	1.43	1	1.21	1	0.079	1	1.16	1
G	BKGDPT56-04-2	1.25	1	1.46	1	1.23	1	1	1	0.05	1	1.1	1
G	BKGDPT56-04-4	1.26	1	1.28	1	1.24	1	1.06	1	0.027	0	1.28	1
G	BKGDPT56-04-6	1.15	1	1.17	1	1.21	1	1.02	1	0.067	1	1.15	1
G	BKGDPT56-04-8	1.46	1	0.93	1	1.29	1	0.98	1	0.072	0	1.15	1
G	BKGDPT57-04-10	1.33	1	1.58	1	1.11	1	1.36	1	0.134	1	1.49	1
G	BKGDPT57-04-12	1.6	1	1.62	1	1.17	1	1.26	1	0.082	1	1.25	1
G	BKGDPT57-04-14	1.1	1	1.27	1	1.2	1	1.07	1	0.059	1	1.08	1
G	BKGDPT57-04-2	1.29	1	1.14	1	1.55	1	1.18	1	0.052	1	1.21	1
G	BKGDPT57-04-4	1.58	1	1.41	1	1.46	1	1.22	1	0.05	1	1.18	1
G	BKGDPT57-04-6	1.29	1	1.23	1	1.6	1	1.36	1	0.1	1	1.26	1
G	BKGDPT57-04-8	1.39	1	1.19	1	1.33	1	1.19	1	0.114	1	1.12	1
G	BKGDPT58-04-10	1.73	1	1.45	1	1.69	1	1.08	1	0.06	1	1.22	1
G	BKGDPT58-04-12	1.43	1	1.29	1	1.52	1	1.41	1	0.122	1	1.22	1
G	BKGDPT58-04-14	1.59	1	1.38	1	1.53	1	1.72	1	0.042	0	1.56	1
G	BKGDPT58-04-2	1.05	1	1.05	1	1.08	1	1	1	0.074	1	1.03	1
G	BKGDPT58-04-4	1.43	1	1.19	1	1.27	1	0.96	1	0.066	1	0.91	1
G	BKGDPT58-04-6	1.75	1	1.34	1	1.6	1	1.16	1	0.076	1	1.22	1
G	BKGDPT58-04-8	1.52	1	1.23	1	1.74	1	1.39	1	0.109	0	1.43	1
G	BKGDPT59-04-10	1.19	1	1.58	1	1.01	1	1.36	1	0.117	1	1.46	1

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
G	BKGDPT59-04-12	1.43	1	1.34	1	1.34	1	1.32	1	0.061	1	1.33	1
G	BKGDPT59-04-14	1.3	1	1.2	1	1.34	1	1.16	1	0.102	1	1.37	1
G	BKGDPT59-04-2	1.76	1	1.56	1	1.69	1	1.53	1	0.165	1	1.23	1
G	BKGDPT59-04-4	1.93	1	1.58	1	1.81	1	1.4	1	0.076	1	1.27	1
G	BKGDPT59-04-6	1.62	1	1.16	1	1.5	1	1.19	1	0.068	1	1.17	1
G	BKGDPT59-04-8	1.4	1	1.15	1	1.47	1	1.11	1	0.066	1	1.32	1
G	BKGDPT60-04-10	1.55	1	1.35	1	1.27	1	1.45	1	0.074	1	1.26	1
G	BKGDPT60-04-12	1.23	1	1.33	1	1.22	1	1.11	1	0.074	1	1.44	1
G	BKGDPT60-04-14	1.34	1	1.45	1	1.14	1	1.37	1	0.054	1	1.7	1
G	BKGDPT60-04-2	1.42	1	1.13	1	1.28	1	0.96	1	0.055	1	0.89	1
G	BKGDPT60-04-4	1.34	1	1.37	1	1.29	1	1.21	1	0.07	0	1.22	1
G	BKGDPT60-04-6	1.22	1	1.01	1	1.13	1	0.76	1	0.046	0	0.94	1
G	BKGDPT60-04-8	1.09	1	1.24	1	0.99	1	1.08	1	0.07	1	1.01	1

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
E	BKGDPT35-03-16	8443	1	0.36	1	21.4	1	50.7	1	0.56	1	0.03	0	435	1
E	BKGDPT35-03-18	8806	1	0.9	1	31.4	1	49.1	1	0.75	1	0.02	0	460	1
E	BKGDPT35-03-20	8489	1	0.67	1	25.6	1	45.7	1	0.62	1	0.02	0	444	1
E	BKGDPT35-03-22	7827	1	1.26	1	45.8	1	64.8	1	0.96	1	0.12	0	299	1
E	BKGDPT36-03-20	8583	1	2.42	1	20.9	1	48.7	1	0.76	1	0.28	1	515	1
F	BKGDPT41-03-18	5594	1	0.5	1	2.4	1	36.7	1	0.42	1	0.12	1	459	1
F	BKGDPT41-03-20	5678	1	0.42	0	8.3	1	42	1	0.46	1	0.12	1	423	1
F	BKGDPT41-03-22	6197	1	0.51	1	2	1	50.8	1	0.48	1	0.11	1	428	1
G	BKGDPT57-03-16	10616	1	1.12	1	19.2	1	49.6	1	0.72	1	0.02	0	779	1
G	BKGDPT57-03-18	9801	1	1.07	1	21.8	1	43.7	1	0.58	1	0.11	1	728	1
G	BKGDPT57-03-20	8508	1	1.43	1	15.1	1	34.8	1	0.66	1	0.33	1	489	1
G	BKGDPT57-03-22	9975	1	1.25	1	7.2	1	43.1	1	0.81	1	0.21	1	569	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
E	BKGDPT35-03-16	11.4	1	7.5	1	12.2	1	23412	1	8.6	1	51.4	1	1035	1	137	1
E	BKGDPT35-03-18	14.1	1	8.6	1	11.5	1	30639	1	9.6	1	66	1	1017	1	130	1
E	BKGDPT35-03-20	12.2	1	6.3	1	8.6	1	26328	1	8.8	1	59	1	1031	1	103	1
E	BKGDPT35-03-22	20.8	1	11.8	1	18.8	1	47547	1	12.9	1	105.1	1	804	1	402	1
E	BKGDPT36-03-20	12.6	1	8.5	1	18	1	30132	1	13.2	1	51.4	1	1162	1	102	1
F	BKGDPT41-03-18	10.9	1	12.2	1	14.6	1	18825	1	11.2	1	20.7	1	1562	1	235	1
F	BKGDPT41-03-20	11.6	1	15.2	1	14	1	17686	1	13	1	23.4	1	1689	1	214	1
F	BKGDPT41-03-22	12.9	1	9.5	1	12.2	1	16261	1	9.2	1	24.1	1	1818	1	233	1
G	BKGDPT57-03-16	16.1	1	10.2	1	17.7	1	26759	1	8.3	1	67.6	1	1307	1	187	1
G	BKGDPT57-03-18	19.1	1	7.3	1	12.1	1	26675	1	7.4	1	68.6	1	1177	1	101	1
G	BKGDPT57-03-20	14.2	1	10.6	1	15.8	1	26658	1	9.2	1	65.4	1	995	1	119	1
G	BKGDPT57-03-22	17.8	1	12.8	1	17.2	1	17669	1	10.1	1	52.3	1	1328	1	121	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
E	BKGDPT35-03-16	0.024	0	18.6	1	1070	1	0.455	1	0.7	0	48	1	0.142	0
E	BKGDPT35-03-18	0.0229	0	22.6	1	1075	1	0.432	1	0.61	0	48	1	0.125	0
E	BKGDPT35-03-20	0.023	0	20.3	1	1129	1	0.491	1	0.66	0	48	1	0.164	1
E	BKGDPT35-03-22	0.0208	0	31.2	1	937	1	1.1	0	3.22	1	49	1	0.737	1
E	BKGDPT36-03-20	0.0218	0	31.8	1	1309	1	0.216	0	2.03	1	61	1	0.323	1
F	BKGDPT41-03-18	0.0095	1	17	1	547	1	0.439	1	1.34	1	92	1	0.095	1
F	BKGDPT41-03-20	0.013	1	14.4	1	616	1	0.419	1	1.28	1	82	1	0.101	1
F	BKGDPT41-03-22	0.009	1	14.7	1	689	1	0.421	1	1.18	1	74	1	0.11	1
G	BKGDPT57-03-16	0.0358	1	21.9	1	1144	1	0.352	1	0.67	0	127	1	0.211	1
G	BKGDPT57-03-18	0.0303	1	22.5	1	1048	1	0.548	1	0.62	0	75	1	0.132	1
G	BKGDPT57-03-20	0.023	0	35.7	1	1087	1	0.358	1	0.66	0	71	1	0.134	0
G	BKGDPT57-03-22	0.0264	1	31.7	1	1303	1	0.376	1	0.67	0	91	1	0.153	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
E	BKGDPT35-03-16	3.93	1	30.5	1	61.9	1
E	BKGDPT35-03-18	4.41	1	38.7	1	71.4	1
E	BKGDPT35-03-20	3.58	1	38.4	1	63	1
E	BKGDPT35-03-22	4.26	1	47.4	1	105.5	1
E	BKGDPT36-03-20	6.02	1	54.1	1	105.2	1
F	BKGDPT41-03-18	2.38	1	20.7	1	51.4	1
F	BKGDPT41-03-20	3.10	1	23.9	1	49.2	1
F	BKGDPT41-03-22	2.74	1	19	1	51	1
G	BKGDPT57-03-16	3.84	1	36.4	1	69.6	1
G	BKGDPT57-03-18	3.28	1	33.7	1	64	1
G	BKGDPT57-03-20	4.41	1	45.4	1	85.1	1
G	BKGDPT57-03-22	3.40	1	39.7	1	94	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
E	BKGDPT35-04-16	0.013	0	0.048	0	0.05	0	0.042	0	0.422	0
E	BKGDPT35-04-18	0.012	0	0.023	0	0.052	0	0.035	0	0.387	0
E	BKGDPT35-04-20	0.064	0	0.055	0	0.052	0	0.038	0	0.419	0
E	BKGDPT35-04-22	0.045	0	0.04	0	0.054	0	0.044	0	0.407	0
E	BKGDPT36-04-20	0.058	0	0.058	0	0.042	0	0.05	0	0.429	0
F	BKGDPT41-04-18	0.042	0	0.035	0	0.043	0	0.018	0	0.514	0
F	BKGDPT41-04-20	0.039	0	0.071	0	0.036	0	0.033	0	0.488	0
F	BKGDPT41-04-22	0.037	0	0.056	0	0.031	0	0.034	0	0.433	0
G	BKGDPT57-04-16	0.033	0	0.062	0	0.05	0	0.032	0	0.518	0
G	BKGDPT57-04-18	0.054	0	0.046	0	0.035	0	0.016	0	0.419	0
G	BKGDPT57-04-20	0.047	0	0.034	0	0.053	0	0.07	0	0.411	0
G	BKGDPT57-04-22	0.028	0	0.06	0	0.016	0	0.036	0	0.409	0

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
E	BKGDPT35-04-16	1.46	1	1.74	1	1.22	1	1.24	1	0.089	1	1.32	1
E	BKGDPT35-04-18	1.33	1	1.46	1	1.41	1	1.4	1	0.12	1	1.48	1
E	BKGDPT35-04-20	1.3	1	1.26	1	1.13	1	1.25	1	0.062	1	1.2	1
E	BKGDPT35-04-22	1.17	1	1.4	1	0.95	1	1.37	1	0.061	1	1.43	1
E	BKGDPT36-04-20	1.21	1	2.34	1	1.2	1	1.98	1	0.115	1	2.02	1
F	BKGDPT41-04-18	1.28	1	1.16	1	1.1	1	0.7	1	0.03	1	0.8	1
F	BKGDPT41-04-20	1.23	1	1.45	1	1.37	1	0.95	1	0.085	1	1.04	1
F	BKGDPT41-04-22	1.46	1	1.24	1	1.18	1	0.91	1	0.078	1	0.92	1
G	BKGDPT57-04-16	1.33	1	1.37	1	1.01	1	1.15	1	0.138	1	1.29	1
G	BKGDPT57-04-18	1.24	1	1.48	1	1.35	1	1	1	0.085	1	1.1	1
G	BKGDPT57-04-20	1.27	1	1.58	1	1.14	1	1.1	1	0.047	0	1.48	1
G	BKGDPT57-04-22	1.28	1	1.43	1	1.16	1	1.27	1	0.078	0	1.14	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
D	BKGDPT32-03-14	8126	1	3.45	1	90.1	1	74.7	1	0.76	1	0.71	1	662	1
E	BKGDPT34-03-CP2	6168	1	2.93	1	25.2	1	41.6	1	1.44	1	2.07	1	505	1
E	BKGDPT34-07-CP2	5199	1	2.93	1	24.6	1	41.6	1	0.86	1	0.69	1	424	1
E	BKGDPT35-03-CMP	8014	1	1.65	1	23.2	1	56.3	1	0.78	1	0.06	0	564	1
E	BKGDPT36-03-CMP	8535	1	6.07	1	74.9	1	54.7	1	1.43	1	0.12	0	466	1
E	BKGDPT37-03-CMP	6622	1	2.15	1	8.5	1	28.1	1	0.72	1	0.15	1	463	1
F	BKGDPT38-03-CMP	4091	1	1.76	0	34.8	1	36.1	1	0.85	1	1.02	1	1732	1
F	BKGDPT39-03-CMP	6120	1	4.43	1	13.9	1	44.2	1	1.02	1	1.06	1	10460	1
F	BKGDPT40-03-CMP	4932	1	1.67	0	23.6	1	42.2	1	0.76	1	0.34	1	1783	1
F	BKGDPT41-03-CMP	5955	1	0.37	0	1.7	1	32.6	1	0.5	1	0.56	1	559	1
F	BKGDPT43-03-CMP	5229	1	2.18	1	37.6	1	36.8	1	0.93	1	1.18	1	464	1
F	BKGDPT44-03-CMP	6068	1	0.99	1	3.3	1	26.7	1	0.54	1	0.2	1	155	1
F	BKGDPT47-03-CMP	10564	1	1.75	0	22.4	1	56.4	1	1.4	1	0.19	1	730	1
G	BKGDPT48-03-38	7658	1	0.73	1	15.8	1	54.1	1	0.6	1	0.22	1	634	1
G	BKGDPT48-03-40	10875	1	0.54	1	21	1	86.6	1	0.83	1	0.14	1	991	1
G	BKGDPT48-03-42	11480	1	1.11	1	20.6	1	70.4	1	0.87	1	0.12	1	1156	1
G	BKGDPT48-03-44	10567	1	0.59	1	16.4	1	69.9	1	0.83	1	0.11	1	1125	1
G	BKGDPT48-03-46	10151	1	0.64	1	8.4	1	54.9	1	1.05	1	0.12	1	960	1
G	BKGDPT48-03-CMP	13220	1	2.16	1	2.9	1	60.6	1	0.82	1	0.15	1	716	1
G	BKGDPT49-03-CMP	4628	1	0.8	1	53.2	1	32.7	1	0.53	1	0.36	1	1294	1
G	BKGDPT49-03-CP2	5078	1	1.63	0	9.9	1	32.2	1	0.89	1	0.25	1	1376	1
G	BKGDPT49-07-CP2	4888	1	1.74	1	9.8	1	32.2	1	0.89	1	0.25	1	1141	1
G	BKGDPT50-03-CMP	5110	1	0.76	1	8.5	1	46.7	1	0.72	1	0.27	1	1731	1
G	BKGDPT50-07-CMP	5110	1	1.77	0	8.5	1	46.7	1	0.72	1	0.19	1	1312	1
G	BKGDPT51-03-CMP	6085	1	2.23	1	29.7	1	60.9	1	0.94	1	0.75	1	569	1
G	BKGDPT53-03-CMP	8199	1	1.31	1	23.6	1	67.3	1	0.78	1	0.02	0	509	1
G	BKGDPT54-03-CMP	5374	1	1.92	0	8.6	1	106.2	1	0.64	1	0.4	1	842	1
G	BKGDPT55-03-CMP	5092	1	1.59	1	12.2	1	48.6	1	0.52	1	0.42	1	2691	1
G	BKGDPT55-03-CP2	5656	1	12.89	1	9.6	1	29.6	1	0.71	1	0.76	1	1678	1
G	BKGDPT56-03-CMP	5488	1	4.07	1	157	1	42.9	1	1.07	1	1.59	1	406	1
G	BKGDPT57-03-CMP	9080	1	3.23	1	23.9	1	62.6	1	0.88	1	0.12	1	481	1
G	BKGDPT58-03-CMP	4794	1	0.94	1	16	1	47.3	1	0.72	1	0.46	1	384	1
G	BKGDPT59-03-CMP	10541	1	2.96	1	30.9	1	60.1	1	1.42	1	0.11	0	408	1
G	BKGDPT60-03-CMP	7059	1	1.73	0	16.1	1	58.8	1	0.74	1	0.71	1	599	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
D	BKGDPT32-03-14	10.6	1	21.5	1	14.1	1	66514	1	16.6	1	168	1	925	1	706	1
E	BKGDPT34-03-CP2	21.1	1	12	1	14.3	1	80257	1	27.3	1	12.1	1	1180	1	646	1
E	BKGDPT34-07-CP2	19.7	1	11.9	1	11.1	1	80257	1	18.1	1	12.1	1	917	1	646	1
E	BKGDPT35-03-CMP	16.2	1	12.6	1	25.4	1	51300	1	17.7	1	140.7	1	1217	1	475	1
E	BKGDPT36-03-CMP	5.6	1	21.6	1	20.8	1	99760	1	26.2	1	229.3	1	980	1	687	1
E	BKGDPT37-03-CMP	11.3	1	10.5	1	13.4	1	30639	1	11	1	81.4	1	935	1	282	1
F	BKGDPT38-03-CMP	13.9	1	14.9	1	13.8	1	62285	1	11	1	8.5	1	844	1	989	1
F	BKGDPT39-03-CMP	24.5	1	16.9	1	18.8	1	142689	1	31.3	1	12.4	1	1333	1	3054	1
F	BKGDPT40-03-CMP	17.8	1	14.6	1	10.9	1	76298	1	16.1	1	13.5	1	1332	1	977	1
F	BKGDPT41-03-CMP	16.3	1	8.9	1	13	1	18523	1	15.1	1	20	1	1782	1	205	1
F	BKGDPT43-03-CMP	17.9	1	25.2	1	12.6	1	75459	1	21.9	1	9.7	1	1170	1	798	1
F	BKGDPT44-03-CMP	18.3	1	6.7	1	11.6	1	10746	1	14.4	1	16.5	1	1266	1	100	1
F	BKGDPT47-03-CMP	18.5	1	21.7	1	19.1	1	63406	1	23.1	1	28.8	1	2267	1	974	1
G	BKGDPT48-03-38	23.8	1	12.2	1	10.4	1	30856	1	12.4	1	31.4	1	2331	1	285	1
G	BKGDPT48-03-40	20.1	1	13.9	1	18.2	1	33606	1	14.5	1	45.6	1	3384	1	225	1
G	BKGDPT48-03-42	20.8	1	12	1	19.1	1	32717	1	16.2	1	46.5	1	3919	1	222	1
G	BKGDPT48-03-44	20.4	1	14.9	1	16	1	32986	1	16.1	1	47.3	1	3750	1	291	1
G	BKGDPT48-03-46	16.8	1	12.6	1	15.5	1	42491	1	20.3	1	36.3	1	2771	1	340	1
G	BKGDPT48-03-CMP	14.6	1	9.1	1	133.3	1	106554	1	31.5	1	26	1	2079	1	1175	1
G	BKGDPT49-03-CMP	17	1	14	1	10.3	1	50549	1	12.9	1	11.9	1	1270	1	634	1
G	BKGDPT49-03-CP2	19.2	1	15	1	11.1	1	73937	1	16.7	1	13.1	1	1879	1	793	1
G	BKGDPT49-07-CP2	19	1	15	1	11.1	1	53244	1	16.7	1	13.1	1	1879	1	648	1
G	BKGDPT50-03-CMP	23	1	13.5	1	11.6	1	69222	1	26.4	1	17.4	1	1777	1	1336	1
G	BKGDPT50-07-CMP	23	1	11	1	10.6	1	69222	1	10.7	1	17.3	1	1545	1	1094	1
G	BKGDPT51-03-CMP	26.7	1	17.2	1	12.4	1	80139	1	16.3	1	13.7	1	1099	1	651	1
G	BKGDPT53-03-CMP	10.7	1	12.7	1	11.6	1	35322	1	13.7	1	69.6	1	998	1	301	1
G	BKGDPT54-03-CMP	16.2	1	11.6	1	9.8	1	62319	1	9.6	1	12.2	1	1112	1	760	1
G	BKGDPT55-03-CMP	19.2	1	10.9	1	10.3	1	104388	1	11.9	1	12.9	1	2725	1	1559	1
G	BKGDPT55-03-CP2	16	1	9.5	1	12.7	1	125556	1	18	1	11.1	1	1511	1	1039	1
G	BKGDPT56-03-CMP	27.9	1	24.1	1	18.6	1	114302	1	17.4	1	7.9	1	763	1	619	1
G	BKGDPT57-03-CMP	20	1	15.1	1	20	1	39904	1	21.5	1	85.9	1	996	1	524	1
G	BKGDPT58-03-CMP	16.6	1	12.6	1	10.1	1	37220	1	11.2	1	9.7	1	697	1	344	1
G	BKGDPT59-03-CMP	8.5	1	22.6	1	13.9	1	83065	1	48.7	1	118.7	1	1060	1	695	1
G	BKGDPT60-03-CMP	24.4	1	12.1	1	13.3	1	62588	1	15.8	1	16.9	1	1506	1	396	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
D	BKGDPT32-03-14	0.0209	0	76.9	1	822	1	0.511	0	1.5	0	43	1	0.606	1
E	BKGDPT34-03-CP2	0.0121	1	69.7	1	609	1	0.349	0	7.07	1	57	1	0.261	1
E	BKGDPT34-07-CP2	0.0081	1	42.4	1	472	1	0.375	0	7.07	1	57	1	0.225	1
E	BKGDPT35-03-CMP	0.0227	0	37.4	1	1164	1	0.779	1	1.58	0	50	1	0.444	1
E	BKGDPT36-03-CMP	0.0257	1	61	1	957	1	1.067	0	3.12	1	70	1	0.637	0
E	BKGDPT37-03-CMP	0.0359	1	26.8	1	888	1	0.446	1	0.67	0	59	1	0.136	0
F	BKGDPT38-03-CMP	0.0085	1	34.6	1	296	1	0.83	1	4.94	1	76	1	0.246	1
F	BKGDPT39-03-CMP	0.017	1	29.8	1	420	1	0.751	1	10.99	1	121	1	0.284	1
F	BKGDPT40-03-CMP	0.0102	1	31.2	1	497	1	0.366	0	6.07	1	63	1	0.191	1
F	BKGDPT41-03-CMP	0.0086	1	20.4	1	808	1	0.381	1	0.68	1	83	1	0.22	1
F	BKGDPT43-03-CMP	0.0039	1	58.7	1	817	1	0.378	1	1.55	1	61	1	0.229	1
F	BKGDPT44-03-CMP	0.0101	1	13.8	1	788	1	0.36	0	0.73	1	53	1	0.125	1
F	BKGDPT47-03-CMP	0.0143	1	30.5	1	1146	1	0.371	0	5.62	1	131	1	0.116	1
G	BKGDPT48-03-38	0.0697	1	22.3	1	963	1	0.35	1	2.39	1	86	1	0.112	1
G	BKGDPT48-03-40	0.0041	0	29.1	1	1669	1	0.368	1	2.66	1	124	1	0.167	1
G	BKGDPT48-03-42	0.0045	0	29.4	1	1595	1	0.362	1	2.67	1	149	1	0.17	1
G	BKGDPT48-03-44	0.0045	0	31.9	1	1516	1	0.381	1	2.55	1	134	1	0.162	1
G	BKGDPT48-03-46	0.0392	1	29.6	1	1099	1	0.334	1	3.32	1	154	1	0.147	1
G	BKGDPT48-03-CMP	0.0125	1	24.5	1	904	1	0.369	1	9.11	1	94	1	0.128	1
G	BKGDPT49-03-CMP	0.0092	1	26.9	1	502	1	0.375	0	4.21	1	63	1	0.195	1
G	BKGDPT49-03-CP2	0.0283	1	37.8	1	531	1	0.328	0	6.14	1	52	1	0.166	1
G	BKGDPT49-07-CP2	0.0185	1	37.8	1	531	1	0.366	1	4.09	1	48	1	0.166	1
G	BKGDPT50-03-CMP	0.0157	1	33.7	1	754	1	0.338	0	0.85	1	87	1	0.185	1
G	BKGDPT50-07-CMP	0.0137	1	26.1	1	754	1	0.343	1	0.85	1	82	1	0.185	1
G	BKGDPT51-03-CMP	0.113	1	43.4	1	819	1	0.359	1	0.96	1	76	1	0.361	1
G	BKGDPT53-03-CMP	0.0229	0	31.3	1	1112	1	0.212	0	0.62	0	42	1	0.126	0
G	BKGDPT54-03-CMP	0.022	1	26.1	1	700	1	0.356	0	0.7	1	75	1	0.169	1
G	BKGDPT55-03-CMP	0.0126	1	21.6	1	515	1	0.401	1	8.89	1	97	1	0.164	1
G	BKGDPT55-03-CP2	0.0121	1	26.6	1	406	1	0.346	1	10.39	1	54	1	0.128	1
G	BKGDPT56-03-CMP	0.0079	1	65.3	1	712	1	0.364	1	4.38	1	37	1	0.327	1
G	BKGDPT57-03-CMP	0.0238	0	34.3	1	1127	1	1.493	1	1.66	0	65	1	0.381	1
G	BKGDPT58-03-CMP	0.0093	1	35.3	1	503	1	0.379	1	0.43	1	28	1	0.193	1
G	BKGDPT59-03-CMP	0.021	0	57.1	1	1406	1	1.021	0	7.95	1	43	1	0.611	0
G	BKGDPT60-03-CMP	0.0142	1	49.6	1	972	1	0.342	1	1.01	1	88	1	0.392	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
D	BKGDPT32-03-14	4.71	1	36.8	1	233.1	1
E	BKGDPT34-03-CP2	4.62	1	57.6	1	130.8	1
E	BKGDPT34-07-CP2	4.62	1	43.9	1	119.2	1
E	BKGDPT35-03-CMP	4.11	1	51.1	1	109.6	1
E	BKGDPT36-03-CMP	7.81	1	55.5	1	190.9	1
E	BKGDPT37-03-CMP	3.90	1	37.3	1	82.1	1
F	BKGDPT38-03-CMP	3.87	1	31.4	1	84.8	1
F	BKGDPT39-03-CMP	4.38	1	72.3	1	138	1
F	BKGDPT40-03-CMP	2.74	1	35.3	1	78.6	1
F	BKGDPT41-03-CMP	3.25	1	24	1	60	1
F	BKGDPT43-03-CMP	4.14	1	46	1	135.3	1
F	BKGDPT44-03-CMP	3.73	1	37.5	1	63.5	1
F	BKGDPT47-03-CMP	2.65	1	49.8	1	106.6	1
G	BKGDPT48-03-38	2.59	1	57.3	1	66.7	1
G	BKGDPT48-03-40	2.83	1	39.4	1	94.9	1
G	BKGDPT48-03-42	2.95	1	41	1	91.7	1
G	BKGDPT48-03-44	3.31	1	38.8	1	90.9	1
G	BKGDPT48-03-46	0.12	0	42.7	1	98.7	1
G	BKGDPT48-03-CMP	2.89	1	77.1	1	111.4	1
G	BKGDPT49-03-CMP	3.84	1	30.6	1	81.9	1
G	BKGDPT49-03-CP2	3.81	1	47.7	1	92.1	1
G	BKGDPT49-07-CP2	3.61	1	36	1	79.3	1
G	BKGDPT50-03-CMP	3.22	1	55.6	1	73.4	1
G	BKGDPT50-07-CMP	3.19	1	55.6	1	73.4	1
G	BKGDPT51-03-CMP	5.10	1	52.4	1	151.3	1
G	BKGDPT53-03-CMP	3.64	1	40.1	1	97	1
G	BKGDPT54-03-CMP	3.40	1	46.9	1	102.3	1
G	BKGDPT55-03-CMP	3.31	1	36.1	1	69.5	1
G	BKGDPT55-03-CP2	3.55	1	70.3	1	292.2	1
G	BKGDPT56-03-CMP	4.77	1	71.3	1	189.5	1
G	BKGDPT57-03-CMP	5.36	1	55.2	1	95.9	1
G	BKGDPT58-03-CMP	4.20	1	34	1	79.3	1
G	BKGDPT59-03-CMP	6.35	1	92.6	1	182	1
G	BKGDPT60-03-CMP	7.87	1	45.6	1	156.5	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
D	BKGDPT32-04-14	0.032	0	0.069	0	0.057	0	0.047	0	0.418	0
E	BKGDPT34-04-CP2	0.015	0	0.048	0	0.021	0	0.021	0	0.401	0
E	BKGDPT34-08-CP2	0.015	0	0.048	0	0.021	0	0.021	0	0.399	0
E	BKGDPT35-04-CMP	0.017	0	0.024	0	0.083	0	0.055	0	0.387	0
E	BKGDPT36-04-CMP	0.035	0	0.036	0	0.07	0	0.053	0	0.436	0
E	BKGDPT37-04-CMP	0.027	0	0.039	0	0.047	0	0.042	0	0.468	0
F	BKGDPT38-04-CMP	0.042	0	0.054	0	0.028	0	0.052	0	0.457	0
F	BKGDPT39-04-CMP	0.044	0	0.044	0	0.048	0	0.048	0	0.43	0
F	BKGDPT40-04-CMP	0.046	0	0.06	0	0.029	0	0.029	0	0.385	0
F	BKGDPT41-04-CMP	0.052	0	0.058	0	0.044	0	0.091	0	0.402	0
F	BKGDPT43-04-CMP	0.044	0	0.05	0	0.042	0	0.054	0	0.436	0
F	BKGDPT44-04-CMP	0.018	0	0.033	0	0.022	0	0.022	0	0.388	0
F	BKGDPT47-04-CMP	0.038	0	0.072	0	0.027	0	0.031	0	0.422	0
G	BKGDPT48-04-38	0.083	0	0.054	0	0.049	0	0.037	0	0.365	0
G	BKGDPT48-04-40	0.067	0	0.049	0	0.018	0	0.04	0	0.331	0
G	BKGDPT48-04-42	0.163	0	0.056	0	0.045	0	0.036	0	0.384	0
G	BKGDPT48-04-44	0.069	0	0.084	0	0.046	0	0.039	0	0.346	0
G	BKGDPT48-04-46	0.067	0	0.048	0	0.034	0	0.041	0	0.364	0
G	BKGDPT48-04-CMP	0.054	0	0.076	0	0.036	0	0.048	0	0.358	0
G	BKGDPT49-02-CMP	0.029	0	0.051	0	0.037	0	0.023	0	0.436	0
G	BKGDPT49-04-CP2	0.018	0	0.071	0	0.058	0	0.051	0	0.34	0
G	BKGDPT49-08-CP2	0.019	0	0.072	0	0.102	0	0.072	0	0.365	0
G	BKGDPT50-04-CMP	0.027	0	0.049	0	0.025	0	0.016	0	0.397	0
G	BKGDPT50-08-CMP	0.033	0	0.048	0	0.026	0	0.016	0	0.395	0
G	BKGDPT51-04-CMP	0.047	0	0.064	0	0.068	0	0.083	0	0.363	0
G	BKGDPT53-04-CMP	0.024	0	0.043	0	0.049	0	0.045	0	0.305	0
G	BKGDPT54-04-CMP	0.082	0	0.04	0	0.026	0	0.036	0	0.393	0
G	BKGDPT55-04-CMP	0.067	0	0.034	0	0.068	0	0.023	0	0.397	0
G	BKGDPT55-04-CP2	0.046	0	0.107	0	0.036	0	0.036	0	0.364	0
G	BKGDPT56-04-CMP	0.023	0	0.058	0	0.039	0	0.039	0	0.427	0
G	BKGDPT57-04-CMP	0.026	0	0.068	0	0.04	0	0.053	0	0.4	0
G	BKGDPT58-04-CMP	0.063	0	0.057	0	0.057	0	0.02	0	0.392	0
G	BKGDPT59-04-CMP	0.032	0	0.048	0	0.067	0	0.049	0	0.461	0
G	BKGDPT60-04-CMP	0.08	0	0.07	0	0.055	0	0.08	0	0.373	0

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
D	BKGDPT32-04-14	1	1	1.75	1	1.06	1	1.6	1	0.134	1	1.58	1
E	BKGDPT34-04-CP2	1.09	1	1.54	1	1.25	1	1.45	1	0.052	0	1.55	1
E	BKGDPT34-08-CP2	1.08	1	1.53	1	1.24	1	1.42	1	0.052	0	1.55	1
E	BKGDPT35-04-CMP	1.07	1	1.48	1	1.39	1	1.35	1	0.104	1	1.38	1
E	BKGDPT36-04-CMP	1	1	2.68	1	1.08	1	2.39	1	0.175	1	2.62	1
E	BKGDPT37-04-CMP	1.2	1	1.38	1	0.96	1	1.31	1	0.111	1	1.31	1
F	BKGDPT38-04-CMP	0.96	1	1.36	1	1.03	1	1.06	1	0.085	0	1.3	1
F	BKGDPT39-04-CMP	1.11	1	1.44	1	0.92	1	1.5	1	0.082	1	1.47	1
F	BKGDPT40-04-CMP	0.94	1	0.97	1	0.85	1	1	1	0.057	1	0.92	1
F	BKGDPT41-04-CMP	1.21	1	1.2	1	1.36	1	1.07	1	0.043	1	1.09	1
F	BKGDPT43-04-CMP	0.8	1	1.16	1	0.89	1	1.04	1	0.029	1	1.39	1
F	BKGDPT44-04-CMP	1.34	1	1.11	1	1.22	1	1.18	1	0.083	1	1.25	1
F	BKGDPT47-04-CMP	1.67	1	1.27	1	1.43	1	0.76	1	0.041	0	0.89	1
G	BKGDPT48-04-38	1.07	1	0.83	1	0.88	1	0.75	1	0.05	0	0.87	1
G	BKGDPT48-04-40	1.66	1	1.05	1	1.3	1	0.92	1	0.085	1	0.95	1
G	BKGDPT48-04-42	1.43	1	1.05	1	1.34	1	0.99	1	0.071	0	0.99	1
G	BKGDPT48-04-44	1.56	1	1.24	1	1.81	1	1.18	1	0.102	0	1.11	1
G	BKGDPT48-04-46	1.64	1	1.2	1	1.5	1	1.14	1	0.133	0	0.04	0
G	BKGDPT48-04-CMP	1.55	1	1.07	1	1.49	1	0.73	1	0.062	0	0.97	1
G	BKGDPT49-02-CMP	1.1	1	1.34	1	0.93	1	1.01	1	0.068	1	1.29	1
G	BKGDPT49-04-CP2	1.05	1	1.19	1	0.91	1	1.13	1	0.091	1	1.28	1
G	BKGDPT49-08-CP2	0.97	1	1.15	1	0.91	1	1.1	1	0.053	1	1.21	1
G	BKGDPT50-04-CMP	1.27	1	1.06	1	1.18	1	1.16	1	0.03	0	1.08	1
G	BKGDPT50-08-CMP	1.08	1	1.02	1	0.76	1	1.15	1	0.06	0	1.07	1
G	BKGDPT51-04-CMP	1.3	1	1.99	1	1.14	1	1.72	1	0.064	0	1.71	1
G	BKGDPT53-04-CMP	0.9	1	1.43	1	0.76	1	1.16	1	0.093	1	1.22	1
G	BKGDPT54-04-CMP	1.06	1	1.12	1	0.92	1	1.35	1	0.085	0	1.14	1
G	BKGDPT55-04-CMP	1.07	1	1.04	1	1.12	1	1.18	1	0.046	0	1.11	1
G	BKGDPT55-04-CP2	1.2	1	1.1	1	1.13	1	0.96	1	0.067	0	1.19	1
G	BKGDPT56-04-CMP	0.88	1	1.9	1	1.07	1	1.71	1	0.073	1	1.6	1
G	BKGDPT57-04-CMP	1.25	1	1.96	1	1.34	1	1.73	1	0.128	1	1.8	1
G	BKGDPT58-04-CMP	0.92	1	1.16	1	0.88	1	1.17	1	0.062	1	1.41	1
G	BKGDPT59-04-CMP	1.12	1	1.98	1	0.98	1	2.13	1	0.146	1	2.13	1
G	BKGDPT60-04-CMP	1.19	1	3.04	1	1.05	1	2.45	1	0.092	1	2.64	1

D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

Table I.13. PORTS Background Data: Areas H, I and J (0-1 feet below ground surface) Metals

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
H	BKGHA01-03-SS	11747	1	0.62	1	6	1	111.9	1	0.82	1	0.04	1	567	1
H	BKGHA02-03-SS	14085	1	0.58	0	6.5	1	74.9	1	0.65	1	0.01	0	335	1
H	BKGHA03-03-SS	11671	1	0.97	1	36.6	1	55.9	1	1.19	1	0.07	0	285	1
H	BKGHA04-03-SS	11066	1	0.85	1	4.9	1	87.4	1	0.34	1	0.01	0	1105	1
H	BKGHA05-03-SS	9625	1	0.68	1	4.2	1	42.6	1	0.26	1	0.01	0	156	1
H	BKGHA06-03-SS	12517	1	0.93	1	6.2	1	86.8	1	0.67	1	0.01	0	601	1
H	BKGHA07-03-SS	14935	1	1.23	1	8.6	1	63.2	1	0.5	1	0.01	0	229	1
H	BKGHA08-03-SS	15239	1	1.42	1	8.6	1	59.6	1	0.49	1	0.01	0	281	1
H	BKGHA09-03-SS	13595	1	1.08	1	6.8	1	62	1	0.63	1	0.01	0	175	1
H	BKGHA10-03-SS	14928	1	0.66	0	8.8	1	79.3	1	0.64	1	0.13	1	211	1
H	BKGHA11-03-SS	13111	1	0.93	1	8	1	56.8	1	0.62	1	0.01	0	278	1
H	BKGHA12-03-SS*	8342	1	1.46	1	11.2	1	97.7	1	0.69	1	0.37	1	2915	1
H	BKGHA13-03-SS*	9352	1	2.37	1	15.3	1	151.6	1	0.94	1	0.48	1	4340	1
H	BKGHA14-03-SS	9152	1	1.88	1	12.7	1	110.3	1	0.73	1	0.29	1	4195	1
H	BKGHA15-03-SS	12043	1	0.76	1	11.7	1	93.9	1	0.82	1	0.03	0	321	1
H	BKGHA16-03-SS	6686	1	6.45	1	48	1	44	1	1.27	1	0.12	0	887	1
H	BKGHA17-03-SS	11499	1	5.33	1	42.9	1	100.3	1	0.81	1	0.52	1	2987	1
H	BKGHA18-03-SS	16905	1	2.76	1	29.4	1	98.4	1	1.19	1	0.21	1	217	1
H	BKGHA19-03-SS**	13630	1	1.29	1	67	1	111.5	1	61.07	1	57.27	1	368	1
H	BKGHA20-03-SS	12079	1	1.34	1	6.9	1	92.4	1	0.8	1	0.04	1	1599	1
H	BKGHA21-03-SS	12425	1	2.73	1	19.2	1	153.4	1	1.15	1	0.76	1	2301	1
H	BKGHA22-03-SS	10742	1	1.42	1	15.3	1	127.9	1	1.12	1	0.93	1	3769	1
H	BKGHA23-03-SS	11023	1	1.44	1	10.4	1	49.6	1	0.77	1	0.01	0	549	1
H	BKGHA24-03-SS	10490	1	0.78	1	8	1	102.2	1	0.8	1	0.01	0	814	1
H	BKGHA25-03-SS	11220	1	0.93	1	8.4	1	108.7	1	0.87	1	0.09	1	565	1

*BKGHA12-03-SS, BKGHA13-03-SS removed
**BKGHA19-03-SS outliers removed (Be, Cd, Se, Ag and Tl)
D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations mg/kg (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Aluminum	D_Aluminum	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Calcium	D_Calcium
I	BKGHA26-03-SS	14060	1	0.53	0	7.6	1	76.6	1	0.73	1	0.01	0	202	1
I	BKGHA27-03-SS	9148	1	0.52	0	5.3	1	76.9	1	0.68	1	0.48	1	732	1
I	BKGHA28-03-SS	10636	1	0.51	0	6.1	1	60.4	1	0.56	1	0.06	1	729	1
I	BKGHA29-03-SS	15700	1	2.79	1	7.8	1	53.3	1	0.54	1	0.01	0	291	1
I	BKGHA30-03-SS	11606	1	0.53	0	11.1	1	93.1	1	0.85	1	0.01	0	401	1
I	BKGHA31-03-SS	13316	1	0.85	1	9.3	1	98.7	1	1.24	1	0.07	0	595	1
I	BKGHA32-03-SS	23438	1	1.42	1	12.7	1	79	1	1.09	1	0.07	0	1078	1
I	BKGHA33-03-SS	11511	1	0.7	1	7.7	1	34.5	1	0.4	1	0.01	0	71	1
I	BKGHA34-03-SS	12760	1	0.53	0	6.1	1	82.5	1	0.78	1	0.01	0	356	1
I	BKGHA35-03-SS	10719	1	0.51	0	4.9	1	37.1	1	0.36	1	0.01	0	100	1
I	BKGHA36-03-SS	9136	1	0.52	0	4.6	1	60.3	1	0.49	1	0.01	0	416	1
I	BKGHA37-03-SS	13926	1	1.78	1	6.7	1	64.2	1	0.81	1	0.13	1	135	1
I	BKGHA38-03-SS	10175	1	1.66	1	28.7	1	85.1	1	1.31	1	0.06	0	537	1
I	BKGHA39-03-SS	14428	1	0.51	0	6.6	1	34.8	1	0.41	1	0.01	0	81	1
I	BKGHA40-03-SS	10617	1	0.74	1	7.6	1	124.3	1	1.23	1	0.17	1	765	1
I	BKGHA41-03-SS	15056	1	1.91	1	19.4	1	67.3	1	1.76	1	0.07	0	158	1
I	BKGHA42-03-SS	11855	1	1.88	1	27.8	1	61.9	1	1.16	1	0.06	0	89	1
I	BKGHA43-03-SS	6450	1	0.75	1	7.2	1	25	1	0.34	1	0.01	0	343	1
I	BKGHA44-03-SS	7063	1	0.55	1	5.9	1	33.3	1	0.29	1	0.01	0	81	1
I	BKGHA45-03-SS	13086	1	0.53	0	6.3	1	91.9	1	0.92	1	0.01	0	328	1
I	BKGHA46-03-SS	7304	1	0.6	1	6	1	31.9	1	0.47	1	0.01	0	114	1
I	BKGHA47-03-SS	8812	1	0.64	1	7.7	1	40	1	0.32	1	0.01	0	1426	1
I	BKGHA48-03-SS	8096	1	0.5	0	4.8	1	52.6	1	0.42	1	0.02	1	448	1
I	BKGHA49-03-SS	9553	1	0.51	0	4	1	46.3	1	0.47	1	0.01	0	115	1
I	BKGHA50-03-SS	13270	1	1.8	1	18.2	1	157.4	1	1.28	1	0.03	0	1235	1
I	BKGHA51-03-SS	11822	1	0.55	0	8.2	1	138.4	1	0.78	1	0.07	1	692	1
I	BKGHA52-03-SS	10816	1	0.54	0	7	1	140.1	1	0.94	1	0.01	0	691	1
I	BKGHA53-03-SS	13631	1	0.71	1	8.1	1	138.8	1	1.07	1	0.03	0	658	1
I	BKGHA54-03-SS	12034	1	0.58	0	6.3	1	142.7	1	0.76	1	0.01	0	725	1
I	BKGHA55-03-SS	11550	1	0.54	0	4.8	1	148.2	1	0.83	1	0.02	1	531	1
J	BKGHA56-03-SS	8491	1	1.25	1	14.4	1	58.3	1	0.71	1	0.06	0	1059	1
J	BKGHA57-03-SS	4871	1	0.48	0	4.3	1	52.6	1	0.4	1	0.02	1	676	1
J	BKGHA58-03-SS	8263	1	0.5	0	5.8	1	81.8	1	0.45	1	0.01	0	534	1
J	BKGHA59-03-SS	3640	1	0.51	0	4.7	1	46.8	1	0.39	1	0.09	1	802	1
J	BKGHA60-03-SS	3849	1	0.58	1	5.1	1	70.1	1	0.42	1	0.18	1	2581	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
H	BKGHA01-03-SS	13	1	14.1	1	14	1	11226	1	19.6	1	19.7	1	997	1	1213	1
H	BKGHA02-03-SS	14.6	1	13.3	1	10	1	13507	1	19.3	1	19.4	1	1286	1	831	1
H	BKGHA03-03-SS	13.2	1	13.5	1	8.2	1	67352	1	33.4	1	96.3	1	1077	1	528	1
H	BKGHA04-03-SS	10.7	1	7.2	1	5.5	1	10282	1	15.1	1	21.9	1	1275	1	472	1
H	BKGHA05-03-SS	9.2	1	5.8	1	3.9	1	8365	1	29.8	1	16.5	1	814	1	126	1
H	BKGHA06-03-SS	13.4	1	12.2	1	5.8	1	12136	1	16.1	1	16.3	1	1052	1	940	1
H	BKGHA07-03-SS	15.1	1	9.2	1	7.8	1	15195	1	14.8	1	38.3	1	1178	1	371	1
H	BKGHA08-03-SS	15.4	1	9.8	1	10.1	1	16877	1	12.7	1	30.6	1	1385	1	355	1
H	BKGHA09-03-SS	10.6	1	13.9	1	6.5	1	15556	1	14.1	1	26.8	1	1105	1	656	1
H	BKGHA10-03-SS	15.8	1	19.1	1	7.4	1	15582	1	18.8	1	27.1	1	1171	1	1239	1
H	BKGHA11-03-SS	16.2	1	11.7	1	6.7	1	16967	1	14.4	1	26.9	1	1031	1	545	1
H	BKGHA12-03-SS*	13.3	1	11.8	1	12.4	1	18593	1	13.8	1	35.6	1	1734	1	598	1
H	BKGHA13-03-SS*	19.2	1	14.7	1	14.9	1	25183	1	18	1	38.6	1	2482	1	743	1
H	BKGHA14-03-SS	6.2	1	12.7	1	18	1	18391	1	32	1	33.6	1	1292	1	746	1
H	BKGHA15-03-SS	19.5	1	14.1	1	6.1	1	31091	1	19.5	1	35.4	1	975	1	1409	1
H	BKGHA16-03-SS	4.3	0	16.9	1	5.6	0	76905	1	26.9	1	85.2	1	1128	1	964	1
H	BKGHA17-03-SS	44.6	1	33.3	1	5.8	0	106228	1	36.4	1	64.9	1	2191	1	2134	1
H	BKGHA18-03-SS	12.9	1	16.8	1	19.4	1	25748	1	26.9	1	53.7	1	1573	1	1625	1
H	BKGHA19-03-SS**	70.9	1	63.3	1	66.1	1	17955	1	68.2	1	82.2	1	1796	1	467	1
H	BKGHA20-03-SS	9.6	1	7.8	1	10.2	1	15867	1	11.4	1	29.4	1	2042	1	556	1
H	BKGHA21-03-SS	12.3	1	24.5	1	14.7	1	16712	1	22.2	1	51.1	1	1300	1	1521	1
H	BKGHA22-03-SS	6.6	1	12.1	1	15.6	1	20920	1	18.8	1	41.2	1	1182	1	1119	1
H	BKGHA23-03-SS	7.4	1	10.2	1	8.8	1	18149	1	10.9	1	38.6	1	1340	1	440	1
H	BKGHA24-03-SS	7.1	1	10.8	1	7.3	1	15097	1	13.4	1	26.5	1	1147	1	932	1
H	BKGHA25-03-SS	7.2	1	15.2	1	10.3	1	11370	1	16.3	1	29.8	1	1141	1	1011	1

AREA_LETTER	PROJ_SAMPLE_ID	Chromium	D_Chromium	Cobalt	D_Cobalt	Copper	D_Copper	Iron	D_Iron	Lead	D_Lead	Lithium	D_Lithium	Magnesium	D_Magnesium	Manganese	D_Manganese
I	BKGHA26-03-SS	13.7	1	11.3	1	6.6	1	14980	1	12.5	1	50.5	1	1260	1	741	1
I	BKGHA27-03-SS	7.8	1	8.9	1	7.3	1	9342	1	17.2	1	24.4	1	1074	1	821	1
I	BKGHA28-03-SS	9.2	1	15.6	1	8.4	1	11125	1	12.1	1	33.4	1	1084	1	658	1
I	BKGHA29-03-SS	15.2	1	5.3	1	9.8	1	16304	1	9.7	1	72.2	1	1787	1	103	1
I	BKGHA30-03-SS	13.1	1	11.9	1	5.1	1	12128	1	15.9	1	37.3	1	1020	1	1034	1
I	BKGHA31-03-SS	22.5	1	15.6	1	9	1	26120	1	23.7	1	53	1	1077	1	1254	1
I	BKGHA32-03-SS	28.3	1	8.6	1	14.8	1	30990	1	15.6	1	63	1	2370	1	247	1
I	BKGHA33-03-SS	11.9	1	4.1	1	4.7	1	15356	1	9.2	1	63.3	1	959	1	98	1
I	BKGHA34-03-SS	14.6	1	13.4	1	6.5	1	12733	1	13.7	1	20.6	1	1125	1	714	1
I	BKGHA35-03-SS	10.1	1	4.5	1	3.3	1	9962	1	12.2	1	36.9	1	784	1	130	1
I	BKGHA36-03-SS	9.6	1	6.2	1	4	1	7885	1	19.1	1	16.1	1	819	1	481	1
I	BKGHA37-03-SS	11.6	1	11.9	1	10	1	13395	1	12.2	1	48	1	1235	1	944	1
I	BKGHA38-03-SS	14.2	1	23.6	1	12.9	1	43820	1	36	1	77.8	1	981	1	1885	1
I	BKGHA39-03-SS	16.4	1	3.3	1	5.5	1	14055	1	5.5	1	34.1	1	1036	1	51	1
I	BKGHA40-03-SS	8.9	1	16.8	1	8.5	1	13882	1	24.3	1	32	1	1117	1	1992	1
I	BKGHA41-03-SS	31	1	24.5	1	3.6	1	106775	1	30.6	1	110.3	1	1198	1	1143	1
I	BKGHA42-03-SS	14.9	1	24	1	19.4	1	38374	1	25.3	1	84.4	1	1219	1	743	1
I	BKGHA43-03-SS	6.7	1	3.7	1	4.2	1	15055	1	17.1	1	34.5	1	847	1	158	1
I	BKGHA44-03-SS	6.8	1	2.6	1	4.4	1	9867	1	10.1	1	21.8	1	549	1	56	1
I	BKGHA45-03-SS	10.6	1	16	1	6.5	1	11417	1	18.8	1	41.6	1	1089	1	1364	1
I	BKGHA46-03-SS	7	1	5.2	1	4.3	1	9498	1	13.2	1	25.4	1	615	1	311	1
I	BKGHA47-03-SS	9.7	1	3.7	1	7.3	1	13638	1	9.3	1	35.7	1	1400	1	72	1
I	BKGHA48-03-SS	9.1	1	6.2	1	4.4	1	8071	1	19.9	1	15.5	1	797	1	548	1
I	BKGHA49-03-SS	10.1	1	7.3	1	5.2	1	9454	1	7.7	1	10.7	1	952	1	182	1
I	BKGHA50-03-SS	26.7	1	17.8	1	9.3	1	30665	1	28.9	1	39.5	1	1075	1	1940	1
I	BKGHA51-03-SS	13.4	1	13.2	1	7.8	1	12055	1	31.9	1	12	1	1105	1	1630	1
I	BKGHA52-03-SS	12.5	1	14.1	1	7.4	1	14694	1	18.4	1	19.7	1	969	1	1483	1
I	BKGHA53-03-SS	16.5	1	17.1	1	7.5	1	22057	1	17	1	23.2	1	1139	1	1561	1
I	BKGHA54-03-SS	13.4	1	11.8	1	9.1	1	13121	1	14.3	1	16	1	1239	1	1219	1
I	BKGHA55-03-SS	11.2	1	12.5	1	6.1	1	10189	1	14.6	1	14.2	1	1151	1	1005	1
J	BKGHA56-03-SS	10.2	1	17.1	1	6.5	1	37972	1	21.8	1	63.9	1	1108	1	646	1
J	BKGHA57-03-SS	7.2	1	4.8	1	5.5	1	8897	1	5.5	1	5.3	1	648	1	526	1
J	BKGHA58-03-SS	9.6	1	7.4	1	8	1	11267	1	9.7	1	9.5	1	934	1	597	1
J	BKGHA59-03-SS	4.9	1	4.7	1	6.1	1	8472	1	6.5	1	9.8	1	555	1	467	1
J	BKGHA60-03-SS	5	1	4.6	1	7.1	1	7919	1	13.3	1	9.9	1	729	1	636	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
H	BKGHA01-03-SS	0.055	1	12.1	1	893	1	1.121	1	0.35	0	30	1	1.245	1
H	BKGHA02-03-SS	0.0628	1	13.3	1	990	1	0.803	1	0.39	0	29	1	0.652	1
H	BKGHA03-03-SS	0.0343	1	25.8	1	1127	1	0.623	0	1.83	0	30	1	0.373	0
H	BKGHA04-03-SS	0.0347	1	9.8	1	978	1	0.648	1	0.34	0	27	1	0.263	1
H	BKGHA05-03-SS	0.0282	1	7.4	1	719	1	0.474	1	0.34	0	23	1	0.07	0
H	BKGHA06-03-SS	0.0437	1	11.6	1	872	1	1.091	1	0.38	0	32	1	0.871	1
H	BKGHA07-03-SS	0.0257	0	10.7	1	1271	1	0.722	1	0.36	0	32	1	0.096	1
H	BKGHA08-03-SS	0.0491	1	14.9	1	1155	1	0.739	1	0.35	0	30	1	0.072	0
H	BKGHA09-03-SS	0.0348	1	11.2	1	944	1	0.81	1	0.36	0	27	1	0.074	0
H	BKGHA10-03-SS	0.0386	1	14.9	1	1158	1	1.188	1	0.45	0	33	1	1.172	1
H	BKGHA11-03-SS	0.037	1	16.3	1	924	1	0.892	1	0.36	0	28	1	0.338	1
H	BKGHA12-03-SS*	0.059	1	23.5	1	1148	1	0.683	1	0.35	0	29	1	0.072	0
H	BKGHA13-03-SS*	0.0636	1	31.4	1	1284	1	1.175	1	0.67	0	35	1	0.141	1
H	BKGHA14-03-SS	0.1652	1	13.6	1	1710	1	1.27	1	0.4	0	29	1	0.302	1
H	BKGHA15-03-SS	0.0409	1	19.3	1	815	1	0.961	1	0.71	0	23	1	0.961	1
H	BKGHA16-03-SS	0.0222	0	27.1	1	831	1	1.067	0	3.13	0	30	1	0.639	0
H	BKGHA17-03-SS	0.0227	0	61.7	1	1123	1	1.151	1	3.26	0	32	1	0.668	0
H	BKGHA18-03-SS	0.0689	1	26.4	1	2354	1	3.628	1	0.74	0	51	1	1.795	1
H	BKGHA19-03-SS**	0.0298	1	66.2	1	2346	1	53.997	1	53.87	1	97	1	49.672	1
H	BKGHA20-03-SS	0.0397	1	18.9	1	1943	1	0.814	1	0.34	0	42	1	0.069	0
H	BKGHA21-03-SS	0.0716	1	35.8	1	1575	1	2.041	1	0.38	0	31	1	2.726	1
H	BKGHA22-03-SS	0.0855	1	27.3	1	1325	1	1.766	1	0.42	0	36	1	0.688	1
H	BKGHA23-03-SS	0.0227	0	13.2	1	1267	1	0.503	1	0.34	0	32	1	0.069	0
H	BKGHA24-03-SS	0.0498	1	12.9	1	991	1	0.932	1	0.36	0	26	1	0.39	1
H	BKGHA25-03-SS	0.0533	1	18.4	1	1507	1	1.432	1	0.35	0	31	1	1.152	1

AREA_LETTER	PROJ_SAMPLE_ID	Mercury	D_Mercury	Nickel	D_Nickel	Potassium	D_Potassium	Selenium	D_Selenium	Silver	D_Silver	Sodium	D_Sodium	Thallium	D_Thallium
I	BKGHA26-03-SS	0.0331	1	12.5	1	1076	1	0.904	1	0.37	0	34	1	0.614	1
I	BKGHA27-03-SS	0.036	1	13.3	1	875	1	1.009	1	0.36	0	18	1	0.99	1
I	BKGHA28-03-SS	0.0488	1	13.6	1	758	1	0.96	1	0.34	0	22	1	0.735	1
I	BKGHA29-03-SS	0.0226	0	12.8	1	1667	1	0.516	1	0.56	1	51	1	0.067	0
I	BKGHA30-03-SS	0.0441	1	12.1	1	755	1	1.232	1	0.36	0	22	1	1.124	1
I	BKGHA31-03-SS	0.0323	1	15.7	1	948	1	1.142	1	1.81	0	15	1	0.571	1
I	BKGHA32-03-SS	0.0371	1	17.2	1	1471	1	1.026	1	1.77	0	28	1	0.361	0
I	BKGHA33-03-SS	0.0275	1	7	1	1037	1	0.434	1	0.34	0	32	1	0.069	0
I	BKGHA34-03-SS	0.0389	1	11.3	1	715	1	0.873	1	0.36	0	22	1	0.452	1
I	BKGHA35-03-SS	0.0242	0	9.2	1	702	1	0.591	1	0.35	0	23	1	0.072	0
I	BKGHA36-03-SS	0.0406	1	7.8	1	522	1	0.856	1	0.35	0	17	1	0.359	1
I	BKGHA37-03-SS	0.0408	1	12.8	1	1103	1	1.353	1	0.38	1	32	1	0.686	1
I	BKGHA38-03-SS	0.0371	1	18.6	1	821	1	1.985	1	1.74	0	12	1	1.835	1
I	BKGHA39-03-SS	0.0366	1	7.9	1	964	1	0.396	1	0.35	0	24	1	0.072	0
I	BKGHA40-03-SS	0.0371	1	18.5	1	722	1	2.031	1	0.36	0	19	1	2.648	1
I	BKGHA41-03-SS	0.0442	1	23.8	1	735	1	1.267	1	3.84	1	14	1	0.359	0
I	BKGHA42-03-SS	0.0356	1	162.6	1	950	1	1.155	1	1.68	0	26	1	0.592	1
I	BKGHA43-03-SS	0.0351	1	7.8	1	640	1	0.492	1	0.34	0	17	1	0.069	0
I	BKGHA44-03-SS	0.0314	1	5.2	1	483	1	0.364	1	0.33	0	13	1	0.068	0
I	BKGHA45-03-SS	0.0623	1	12.5	1	879	1	1.43	1	0.72	1	26	1	1.563	1
I	BKGHA46-03-SS	0.0385	1	5.9	1	594	1	0.526	1	0.32	0	16	1	0.146	1
I	BKGHA47-03-SS	0.0403	1	9	1	651	1	0.538	1	0.39	0	22	1	0.08	0
I	BKGHA48-03-SS	0.06	1	7.2	1	569	1	0.88	1	1.01	1	19	1	0.389	1
I	BKGHA49-03-SS	0.027	1	9.8	1	540	1	0.486	1	0.34	0	20	1	0.071	0
I	BKGHA50-03-SS	0.0775	1	18.3	1	1236	1	1.628	1	0.74	0	32	1	1.886	1
I	BKGHA51-03-SS	0.0884	1	13.7	1	810	1	1.671	1	0.39	0	28	1	2.137	1
I	BKGHA52-03-SS	0.0595	1	16.3	1	963	1	1.306	1	0.39	0	29	1	1.619	1
I	BKGHA53-03-SS	0.0581	1	14	1	1088	1	1.05	1	0.69	0	29	1	1.549	1
I	BKGHA54-03-SS	0.0525	1	14.4	1	1086	1	0.922	1	0.4	0	32	1	1.175	1
I	BKGHA55-03-SS	0.052	1	13.2	1	674	1	0.829	1	0.38	0	27	1	0.981	1
J	BKGHA56-03-SS	0.0388	1	11.5	1	693	1	0.596	1	1.6	0	19	1	0.329	0
J	BKGHA57-03-SS	0.0266	1	9.9	1	515	1	0.573	1	0.33	0	21	1	0.48	1
J	BKGHA58-03-SS	0.0302	1	12.1	1	748	1	0.68	1	0.33	0	21	1	0.495	1
J	BKGHA59-03-SS	0.0243	0	10.6	1	378	1	0.524	1	0.34	0	15	1	0.548	1
J	BKGHA60-03-SS	0.0259	1	9.9	1	463	1	0.9	1	0.32	0	19	1	0.771	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
H	BKGHA01-03-SS	3.4568	1	23.2	1	39.5	1
H	BKGHA02-03-SS	3.3078	1	26.5	1	49.9	1
H	BKGHA03-03-SS	2.9204	1	113.5	1	57.6	1
H	BKGHA04-03-SS	3.1886	1	20.3	1	46	1
H	BKGHA05-03-SS	2.8608	1	18.6	1	30.1	1
H	BKGHA06-03-SS	3.278	1	24.5	1	39.6	1
H	BKGHA07-03-SS	4.5594	1	30.6	1	39.2	1
H	BKGHA08-03-SS	5.215	1	30.4	1	58.1	1
H	BKGHA09-03-SS	3.6654	1	28.9	1	38.7	1
H	BKGHA10-03-SS	3.9038	1	32.2	1	54.5	1
H	BKGHA11-03-SS	5.215	1	27.2	1	57.7	1
H	BKGHA12-03-SS*	5.3044	1	30.3	1	98.6	1
H	BKGHA13-03-SS*	6.5262	1	36.8	1	127.1	1
H	BKGHA14-03-SS	3.129	1	30.9	1	138.9	1
H	BKGHA15-03-SS	3.4568	1	37.4	1	62.9	1
H	BKGHA16-03-SS	2.682	1	46.2	1	88.3	1
H	BKGHA17-03-SS	3.3376	1	79.5	1	196.1	1
H	BKGHA18-03-SS	6.3474	1	94.9	1	109	1
H	BKGHA19-03-SS**	3.0098	1	98.7	1	114.7	1
H	BKGHA20-03-SS	3.725	1	30.8	1	54.9	1
H	BKGHA21-03-SS	4.2912	1	64	1	138.4	1
H	BKGHA22-03-SS	2.9204	1	46.3	1	140.1	1
H	BKGHA23-03-SS	2.9502	1	35.6	1	47.1	1
H	BKGHA24-03-SS	3.9634	1	23.7	1	45.2	1
H	BKGHA25-03-SS	3.7548	1	23.2	1	81.1	1

AREA_LETTER	PROJ_SAMPLE_ID	Total Uranium	D_Total Uranium	Vanadium	D_Vanadium	Zinc	D_Zinc
I	BKGHA26-03-SS	3.129	1	28.6	1	42.6	1
I	BKGHA27-03-SS	3.1886	1	16.1	1	50.8	1
I	BKGHA28-03-SS	3.3078	1	20.2	1	44.6	1
I	BKGHA29-03-SS	2.98	1	33.3	1	42.6	1
I	BKGHA30-03-SS	3.278	1	23	1	40.7	1
I	BKGHA31-03-SS	3.5164	1	23	1	55.7	1
I	BKGHA32-03-SS	3.278	1	43.1	1	62.6	1
I	BKGHA33-03-SS	3.3376	1	28.5	1	30.8	1
I	BKGHA34-03-SS	3.4568	1	23.3	1	42.6	1
I	BKGHA35-03-SS	3.3376	1	20.4	1	38	1
I	BKGHA36-03-SS	2.7118	1	17.4	1	37.3	1
I	BKGHA37-03-SS	3.129	1	23.1	1	47.6	1
I	BKGHA38-03-SS	3.4866	1	43.1	1	67.2	1
I	BKGHA39-03-SS	2.9204	1	31.2	1	27.4	1
I	BKGHA40-03-SS	3.427	1	20.7	1	50.5	1
I	BKGHA41-03-SS	3.6356	1	55.5	1	192	1
I	BKGHA42-03-SS	3.2482	1	41.9	1	66.1	1
I	BKGHA43-03-SS	3.0694	1	19.3	1	28	1
I	BKGHA44-03-SS	2.98	1	18.4	1	20.5	1
I	BKGHA45-03-SS	3.278	1	24	1	49.3	1
I	BKGHA46-03-SS	2.8906	1	15.3	1	27	1
I	BKGHA47-03-SS	3.3078	1	20.4	1	38.4	1
I	BKGHA48-03-SS	2.5926	1	13.3	1	39.6	1
I	BKGHA49-03-SS	2.9204	1	18.4	1	30.4	1
I	BKGHA50-03-SS	3.0992	1	40.3	1	53.3	1
I	BKGHA51-03-SS	2.8608	1	23	1	63.4	1
I	BKGHA52-03-SS	3.1588	1	22.2	1	48	1
I	BKGHA53-03-SS	2.9502	1	30.9	1	46.5	1
I	BKGHA54-03-SS	3.2482	1	22.9	1	46	1
I	BKGHA55-03-SS	2.7714	1	20.4	1	53.8	1
J	BKGHA56-03-SS	2.7416	1	26.9	1	56	1
J	BKGHA57-03-SS	2.0264	1	13	1	36.7	1
J	BKGHA58-03-SS	2.682	1	18	1	46.9	1
J	BKGHA59-03-SS	2.0264	1	9.6	1	32.4	1
J	BKGHA60-03-SS	2.2648	1	10.3	1	40.3	1

Table I.14. PORTS Background Data: Areas H, I and J (0-1 feet below ground surface) Radionuclides

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
H	BKGHA01-04-SS	0.023	0	0.057	0	0.017	0	0.014	0	0.442	0
H	BKGHA02-04-SS	0.026	0	0.057	0	0.028	0	0.028	1	0.589	0
H	BKGHA03-04-SS	0.022	0	0.043	0	0.034	0	0.017	0	0.451	0
H	BKGHA04-04-SS	0.017	0	0.042	0	0.03	0	0.015	0	0.445	0
H	BKGHA05-04-SS	0.014	0	0.029	0	0.02	0	0.016	1	0.456	0
H	BKGHA06-04-SS	0.018	0	0.041	0	0.021	0	0.024	0	0.46	0
H	BKGHA07-04-SS	0.025	0	0.048	0	0.041	0	0.025	0	0.44	0
H	BKGHA08-04-SS	0.029	0	0.039	0	0.019	0	0.022	1	0.477	0
H	BKGHA09-04-SS	0.018	0	0.033	0	0.068	0	0.031	0	0.448	0
H	BKGHA10-04-SS	0.041	0	0.056	0	0.103	0	0.04	0	0.66	0
H	BKGHA11-04-SS	0.019	0	0.052	0	0.033	0	0.029	0	0.479	0
H	BKGHA12-04-SS*	0.025	0	0.032	0	0.021	0	0.034	1	0.415	0
H	BKGHA13-04-SS*	0.027	1	0.026	0	0.015	0	0.055	1	8.46	1
H	BKGHA14-04-SS	0.017	0	0.052	0	0.017	0	0.014	0	0.5	0
H	BKGHA15-04-SS	0.034	0	0.06	0	0.03	0	0.024	1	0.481	0
H	BKGHA16-04-SS	0.021	0	0.034	0	0.017	0	0.017	0	0.349	0
H	BKGHA17-04-SS	0.019	0	0.068	0	0.015	0	0.015	0	0.452	0
H	BKGHA18-04-SS	0.024	0	0.03	0	0.018	0	0.027	0	0.415	0
H	BKGHA19-04-SS	0.02	0	0.088	0	0.005	0	0.02	0	0.435	0
H	BKGHA20-04-SS	0.031	0	0.029	0	0.014	0	0.014	0	0.389	0
H	BKGHA21-04-SS	0.017	0	0.055	0	0.021	0	0.024	1	0.548	0
H	BKGHA22-04-SS	0.019	0	0.049	0	0.017	0	0.031	1	0.632	0
H	BKGHA23-04-SS	0.019	0	0.046	0	0.05	0	0.016	0	0.431	0
H	BKGHA24-04-SS	0.017	0	0.047	0	0.036	0	0.018	0	0.418	0
H	BKGHA25-04-SS	0.054	0	0.057	0	0.06	0	0.023	0	0.497	0

*BKGHA12-03-SS, BKGHA13-03-SS removed
D_ChemicalName; 1 = Detect, 0 = Non Detect
All concentrations in pCi/g (dry weight)

AREA_LETTER	PROJ_SAMPLE_ID	Americium-241	D_Americium-241	Neptunium-237	D_Neptunium-237	Plutonium-238	D_Plutonium-238	Plutonium-239/240	D_Plutonium-239/240	Technetium-99	D_Technetium-99
I	BKGHA26-04-SS	0.016	0	0.051	0	0.032	0	0.021	0	0.468	0
I	BKGHA27-04-SS	0.025	0	0.039	0	0.025	0	0.02	0	0.47	0
I	BKGHA28-04-SS	0.033	0	0.039	0	0.006	0	0.006	0	0.419	0
I	BKGHA29-04-SS	0.017	0	0.034	0	0.015	0	0.006	0	0.442	0
I	BKGHA30-04-SS	0.02	0	0.055	0	0.021	0	0.018	0	0.486	0
I	BKGHA31-04-SS	0.026	0	0.069	0	0.025	0	0.027	0	0.567	0
I	BKGHA32-04-SS	0.064	0	0.04	0	0.024	0	0.012	0	1.126	0
I	BKGHA33-04-SS	0.024	0	0.031	0	0.017	0	0.014	0	0.461	0
I	BKGHA34-04-SS	0.061	0	0.054	0	0.018	0	0.024	1	0.505	0
I	BKGHA35-04-SS	0.02	0	0.046	0	0.028	0	0.019	0	0.478	0
I	BKGHA36-04-SS	0.027	0	0.053	0	0.063	0	0.041	0	0.402	0
I	BKGHA37-04-SS	0.024	0	0.033	0	0.018	0	0.018	0	0.487	0
I	BKGHA38-04-SS	0.049	0	0.05	0	0.022	0	0.024	0	0.456	0
I	BKGHA39-04-SS	0.014	0	0.032	0	0.028	0	0.035	0	0.386	0
I	BKGHA40-04-SS	0.04	0	0.054	0	0.017	0	0.017	0	0.514	0
I	BKGHA41-04-SS	0.018	0	0.045	0	0.008	0	0.012	0	0.381	0
I	BKGHA42-04-SS	0.084	0	0.06	0	0.023	0	0.028	0	0.59	0
I	BKGHA43-04-SS	0.053	0	0.036	0	0.024	0	0.024	0	0.399	0
I	BKGHA44-04-SS	0.018	0	0.039	0	0.006	0	0.016	0	0.337	0
I	BKGHA45-04-SS	0.031	0	0.037	0	0.019	0	0.021	0	0.475	0
I	BKGHA46-04-SS	0.014	0	0.048	0	0.025	0	0.015	0	0.379	0
I	BKGHA47-04-SS	0.047	0	0.049	0	0.02	0	0.02	0	1.164	0
I	BKGHA48-04-SS	0.026	0	0.049	0	0.021	0	0.032	0	0.349	0
I	BKGHA49-04-SS	0.072	0	0.044	0	0.032	0	0.023	0	0.583	0
I	BKGHA50-04-SS	0.014	0	0.032	0	0.015	0	0.019	0	0.551	0
I	BKGHA51-04-SS	0.033	0	0.032	0	0.005	0	0.024	0	0.408	0
I	BKGHA52-04-SS	0.03	0	0.055	0	0.026	0	0.024	0	0.448	0
I	BKGHA53-04-SS	0.077	0	0.059	0	0.015	0	0.017	0	0.493	0
I	BKGHA54-04-SS	0.026	0	0.065	0	0.007	0	0.025	0	0.612	0
I	BKGHA55-04-SS	0.047	0	0.085	0	0.034	0	0.023	0	0.592	0
J	BKGHA56-04-SS	0.067	0	0.035	0	0.021	0	0.021	0	0.38	0
J	BKGHA57-04-SS	0.02	0	0.056	0	0.01	0	0.01	0	0.468	0
J	BKGHA58-04-SS	0.023	0	0.025	0	0.021	0	0.021	0	0.356	0
J	BKGHA59-04-SS	0.019	0	0.057	0	0.016	1	0.029	1	0.658	0
J	BKGHA60-04-SS	0.032	0	0.024	0	0.046	0	0.033	0	0.366	0

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
H	BKGHA01-04-SS	1.2	1	1.53	1	1.17	1	1.06	1	0.077	1	1.16	1
H	BKGHA02-04-SS	1.07	1	1.31	1	1.03	1	0.92	1	0.042	0	1.11	1
H	BKGHA03-04-SS	1.26	1	1.26	1	1.23	1	1.01	1	0.071	1	0.98	1
H	BKGHA04-04-SS	1.09	1	1.19	1	1.09	1	1.02	1	0.088	1	1.07	1
H	BKGHA05-04-SS	0.86	1	1.04	1	0.9	1	0.79	1	0.089	1	0.96	1
H	BKGHA06-04-SS	0.8	1	1.37	1	0.88	1	1.16	1	0.066	0	1.1	1
H	BKGHA07-04-SS	1.3	1	1.36	1	1.16	1	1.53	1	0.128	1	1.53	1
H	BKGHA08-04-SS	1.09	1	1.31	1	1.17	1	1.7	1	0.136	1	1.75	1
H	BKGHA09-04-SS	1.1	1	1.11	1	1.12	1	1.15	1	0.062	1	1.23	1
H	BKGHA10-04-SS	1.26	1	1.14	1	1.08	1	1.5	1	0.122	0	1.31	1
H	BKGHA11-04-SS	1.01	1	1.14	1	0.78	1	1.71	1	0.082	1	1.75	1
H	BKGHA12-04-SS	1.11	1	1.39	1	1.01	1	6.07	1	0.271	1	1.78	1
H	BKGHA13-04-SS	1.22	1	1.87	1	0.97	1	7.41	1	0.318	1	2.19	1
H	BKGHA14-04-SS	0.97	1	1.14	1	1.11	1	0.9	1	0.019	0	1.05	1
H	BKGHA15-04-SS	0.89	1	1.13	1	0.76	1	0.99	1	0.056	0	1.16	1
H	BKGHA16-04-SS	0.89	1	0.95	1	0.92	1	0.97	1	0.013	0	0.9	1
H	BKGHA17-04-SS	0.83	1	1.26	1	0.73	1	0.96	1	0.065	1	1.12	1
H	BKGHA18-04-SS	1.39	1	2.6	1	1.52	1	2.09	1	0.098	0	2.13	1
H	BKGHA19-04-SS	0.89	1	1.72	1	1.03	1	1.2	1	0.016	0	1.01	1
H	BKGHA20-04-SS	1.02	1	1.44	1	1.09	1	1.03	1	0.04	0	1.25	1
H	BKGHA21-04-SS	1.29	1	2.49	1	1.21	1	1.25	1	0.084	1	1.44	1
H	BKGHA22-04-SS	1.16	1	1.84	1	1.16	1	0.96	1	0.042	1	0.98	1
H	BKGHA23-04-SS	1.13	1	1.17	1	1.2	1	1.08	1	0.065	1	0.99	1
H	BKGHA24-04-SS	1.11	1	1.2	1	1.11	1	1.21	1	0.063	0	1.33	1
H	BKGHA25-04-SS	1.37	1	1.32	1	1.16	1	1.42	1	0.077	1	1.26	1

AREA_LETTER	PROJ_SAMPLE_ID	Thorium-228	D_Thorium-228	Thorium-230	D_Thorium-230	Thorium-232	D_Thorium-232	Uranium-233/234	D_Uranium-233/234	Uranium-235/236	D_Uranium-235/236	Uranium-238	D_Uranium-238
I	BKGHA26-04-SS	1.03	1	1.05	1	1.03	1	1.2	1	0.062	1	1.05	1
I	BKGHA27-04-SS	1.08	1	1.06	1	0.86	1	0.93	1	0.056	1	1.07	1
I	BKGHA28-04-SS	1.25	1	1.54	1	1.27	1	1.1	1	0.06	1	1.11	1
I	BKGHA29-04-SS	1.35	1	1.16	1	1.43	1	0.93	1	0.084	1	1	1
I	BKGHA30-04-SS	1.07	1	1.41	1	1.07	1	1.07	1	0.054	1	1.1	1
I	BKGHA31-04-SS	1.04	1	1.25	1	1.1	1	0.99	1	0.09	1	1.18	1
I	BKGHA32-04-SS	1.48	1	1.19	1	1.27	1	0.87	1	0.065	1	1.1	1
I	BKGHA33-04-SS	1.18	1	1.03	1	1.09	1	0.94	1	0.091	1	1.12	1
I	BKGHA34-04-SS	1.17	1	1.11	1	1.04	1	0.94	1	0.07	0	1.16	1
I	BKGHA35-04-SS	1.06	1	1.29	1	1.02	1	0.92	1	0.055	1	1.12	1
I	BKGHA36-04-SS	1.03	1	1.08	1	0.9	1	0.86	1	0.072	0	0.91	1
I	BKGHA37-04-SS	1.19	1	1.01	1	0.92	1	0.94	1	0.06	0	1.05	1
I	BKGHA38-04-SS	1.25	1	1.05	1	1.14	1	1.06	1	0.086	1	1.17	1
I	BKGHA39-04-SS	1	1	0.97	1	1.01	1	0.74	1	0.043	0	0.98	1
I	BKGHA40-04-SS	1.34	1	1.11	1	1.25	1	1.05	1	0.074	0	1.15	1
I	BKGHA41-04-SS	1.42	1	1.18	1	1.24	1	1.05	1	0.06	1	1.22	1
I	BKGHA42-04-SS	1.22	1	1.11	1	1.46	1	1.12	1	0.072	0	1.09	1
I	BKGHA43-04-SS	1.33	1	0.98	1	0.91	1	0.84	1	0.063	1	1.03	1
I	BKGHA44-04-SS	1.06	1	0.97	1	0.89	1	0.85	1	0.045	1	1	1
I	BKGHA45-04-SS	1.12	1	1.06	1	0.96	1	0.9	1	0.094	1	1.1	1
I	BKGHA46-04-SS	1.18	1	0.86	1	1.22	1	0.68	1	0.061	1	0.97	1
I	BKGHA47-04-SS	1.18	1	0.99	1	1.05	1	0.94	1	0.051	0	1.11	1
I	BKGHA48-04-SS	0.82	1	0.93	1	0.94	1	0.92	1	0.04	1	0.87	1
I	BKGHA49-04-SS	0.87	1	0.91	1	0.86	1	0.92	1	0.05	0	0.98	1
I	BKGHA50-04-SS	1.23	1	1.26	1	1.17	1	0.92	1	0.043	1	1.04	1
I	BKGHA51-04-SS	0.99	1	0.95	1	1.04	1	0.87	1	0.069	1	0.96	1
I	BKGHA52-04-SS	1.1	1	1.31	1	1.11	1	0.93	1	0.061	0	1.06	1
I	BKGHA53-04-SS	1.25	1	1.13	1	0.88	1	0.97	1	0.068	1	0.99	1
I	BKGHA54-04-SS	0.78	1	1.37	1	1.04	1	1.12	1	0.045	0	1.09	1
I	BKGHA55-04-SS	0.85	1	1.17	1	0.83	1	1.05	1	0.065	1	0.93	1
J	BKGHA56-04-SS	1.07	1	0.87	1	1.08	1	0.86	1	0.041	0	0.92	1
J	BKGHA57-04-SS	0.43	1	0.93	1	0.5	1	0.67	1	0.056	0	0.68	1
J	BKGHA58-04-SS	0.94	1	1.28	1	0.92	1	0.91	1	0.072	1	0.9	1
J	BKGHA59-04-SS	0.35	1	0.92	1	0.41	1	0.65	1	0.031	1	0.68	1
J	BKGHA60-04-SS	0.77	1	1.04	1	0.5	1	0.74	1	0.061	1	0.76	1

APPENDIX J: BACKGROUND CONCENTRATION DEVELOPMENT SUPPORTING DOCUMENTATION

This page is intentionally left blank

Table J-1. Surface Soil (0-1 ft) Areas AB Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	15700	0.994	0.991	0.989	16131	---	16763	16866	---	---	17217	---	---									
Antimony	12	1.38	0.972 (No NDs)	0.964 (ROS Est.)	0.977 (ROS Est.)	1.724	1.616	1.8	1.815	1.779	1.809	2.782	1.936	1.9									
Arsenic	0	13.1	0.976	0.962	0.96	14	---	15	15.01	---	---	15.3	---	---									
Barium	0	138.6	0.971	0.94	---	165	---	187	191	---	---	---	---	---									
Beryllium	0	0.87	0.974	0.948	0.945	1.0	---	1	1.09	---	---	1.142	---	---									
Cadmium	4	0.47	0.985 (No NDs)	---	---	0.534	0.5	---	---	---	---	---	---	---									
Chromium	0	18.7	0.989	0.995	0.994	18.59	---	19	19.49	---	---	19.95	---	---									
Cobalt	0	12.2	0.981	0.974	0.973	13	---	14	13.64	---	---	13.89	---	---									
Copper	0	22.3	0.973	0.956	0.957	25	---	27	27.27	---	---	28.18	---	---									
Iron	0	24758	0.976	0.964	0.965	27241	---	28191	28340	---	---	28839	---	---									
Lead	0	16.6	0.97	0.959	0.957	18	---	19	18.99	---	---	19.39	---	---									
Lithium	0	61	0.947	0.968	0.975	55.25	---	56	56.33	---	---	57	---	---									
Manganese	0	988	0.975	0.959	0.965	1133	---	1228	1245	---	---	1307	---	---									
Mercury	60	0.0455	0.956 (No NDs)	0.978 (No NDs)	0.971 (No NDs)	0.0427	0.0396	0	0.040	---	---	0.0518	0.0404	---									
Nickel	0	29.1	0.993	0.987	0.985	30	---	31	31.24	---	---	31.67	---	---									
Selenium	0	1.039	0.984	0.966	0.958	1.1	---	1	1.319	---	---	1.444	---	---									
Silver	64	2.67	0.952 (No NDs)	0.989 (No NDs)	0.992 (No NDs)	2.128	2.042	2	2.043	---	---	2.626	2	3.125									
Thallium	0	1.199	0.987	0.979	0.98	1.3	---	1	1.48	---	---	1.591	---	---									
Total Uranium	0	5.255	0.988	0.983	0.98	5.5	---	6	5.805	---	---	5.957	---	---									
Vanadium	0	41.9	0.991	0.984	0.969	44	---	45.77	46.12	---	---	47	---	---									
Zinc	0	93.7	0.955	0.928	0.936	111	---	118	119	---	---	123.3	---	---									
Radionuclides																							
Plutonium-239/240	100																						
Thorium-228	0	1.18	0.977	0.964	0.969	1.3	---	1.386	1.398	---	---	1.44	---	---									
Thorium-230	0	2.4	0.981	0.968	0.965	2.6	---	2.739	2.764	---	---	2.9	---	---									
Thorium-232	0	1.23	0.965	---	---	1.4	---	---	---	---	---	---	---	---									
Uranium-233/234	0	1.67	0.988	0.978	0.975	1.8	---	1.878	1.898	---	---	2.0	---	---									
Uranium-235/236	16	0.113	0.979 (No NDs)	0.982 (ROS Est.)	0.986 (ROS Est.)	0.126	0.122	0.135	0.137	0.13	0.136	0.179	0.148	0.14									
Uranium-238	0	1.76	0.987	0.983	0.979	1.8	---	1.934	1.949	---	---	2.0	---	---									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-2. Subsurface Soil (1-10 ft) Areas AB Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	8189	---	---	0.964	---	---	---	---	---	---	11784	---	---									
Antimony	48	1.27	0.983 (No NDs)	0.977 (ROS Est.)	0.975 (No NDs)	1.345	1.3	1	1.454	1.509	1.556	2.032	1.56	1.581									
Arsenic	0	10.6	0.986	0.977	0.975	12	---	13	12.92	---	---	13.53	---	---									
Barium	0	89.9	---	0.968	0.983	---	---	86	87.29	---	---	93	---	---									
Beryllium	8	0.8	0.961 (No NDs)	0.99 (ROS Est.)	0.988 (ROS Est.)	0.702	0.691	1	0.857	0.9	0.902	1.126	1.024	1.013									
Cadmium	56	0.29	0.916 (No NDs)	0.957 (No NDs)	0.985 (ROS Est.)	0.23	0.222	0	0.236	---	---	0.326	0.249	0.3									
Chromium	0	18.2	0.954	0.98	0.99	15.8	---	17	16.94	---	---	18	---	---									
Cobalt	0	11.9	0.905	0.937	0.969	9.688	---	10	9.939	---	---	10	---	---									
Copper	8	21.8	0.943 (No NDs)	0.977 (ROS Est.)	0.986 (ROS Est.)	19.35	18.99	22	22.89	21.19	21.71	31.86	26.49	22									
Iron	0	24086	0.946	0.972	0.984	21026	---	21886	22051	---	---	22658	---	---									
Lead	0	13.4	0.94	0.979	0.983	11.62	---	12	12.49	---	---	13	---	---									
Lithium	0	59.8	0.945	0.979	0.981	54.22	---	57	57.59	---	---	60	---	---									
Manganese	0	888	---	0.929	0.952	---	---	741	744.5	---	---	760	---	---									
Mercury	92	0.047																					
Nickel	0	28.2	0.925	0.957	0.976	23.71	---	24	24.5	---	---	25	---	---									
Selenium	56	2.543	0.979 (No NDs)	0.98 (No NDs)	0.955 (No NDs)	2.145	2.114	2.5	2.598	---	---	3.984	3.119	---									
Silver	60	4.76	0.967 (No NDs)	0.954 (No NDs)	0.971 (No NDs)	4.786	4.665	5	5.578	---	---	9.053	6	---									
Thallium	36	0.964	0.934 (No NDs)	0.977 (ROS Est.)	0.969 (No NDs)	0.858	0.833	1	0.942	1.0	0.998	1.263	1.037	0.95									
Total Uranium	0	3.638	0.946	0.973	0.982	3.219	---	3	3.399	---	---	3.5	---	---									
Vanadium	0	35.4	0.961	0.984	0.987	31.18	---	34.95	35.82	---	---	40	---	---									
Zinc	0	90	0.928	0.962	0.959	73.69	---	80	81.79	---	---	88.99	---	---									
Radionuclides																							
Plutonium-239/240	100																						
Thorium-228	0	1.16	---	---	0.975	---	---	---	---	---	---	1.1	---	---									
Thorium-230	0	1.74	0.956	0.984	0.986	1.62	---	1.718	1.736	---	---	1.8	---	---									
Thorium-232	0	1.15	0.939	0.986	0.992	0.967	---	1.073	1.098	---	---	1.2	---	---									
Uranium-233/234	0	1.31	0.935	0.972	0.98	1.106	---	1.168	1.181	---	---	1.2	---	---									
Uranium-235/236	32	0.048	0.977 (No NDs)	0.977 (ROS Est.)	0.98 (ROS Est.)	0.0536	0.0534	0.0569	0.0575	0.05	0.0545	0.0655	0.0597	0.06									
Uranium-238	0	1.22	0.947	0.973	0.982	1.082	---	1.134	1.144	---	---	1.2	---	---									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-3. Surface Soil (0-1 ft) Areas DEFG Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	22760	---	---	0.971	---	---	---	---	---	---	24477	---	---									
Antimony	37	2.24	0.961 (No NDs)	0.985 (No NDs)	0.98 (ROS Est.)	1.857	1.79	2.0	2.112	2.606	2.918	3.319	2.395	2.527									
Arsenic	0	34.2	---	0.973	0.981	---	---	28	28.71	---	---	31	---	---									
Barium	0	109.2	0.991	0.993	0.988	108.5	---	114	114.4	---	---	117.5	---	---									
Beryllium	0	1.23	0.978	0.995	0.997	1.133	---	1	1.204	---	---	1.2	---	---									
Cadmium	37	0.19	0.941 (No NDs)	0.958 (ROS Est.)	0.97 (ROS Est.)	0.269	0.261	0	0.426	0.235	0.238	1.05	0.661	0.2									
Chromium	0	31.2	0.961	0.987	0.994	29.11	---	31	31.13	---	---	32	---	---									
Cobalt	0	29.5	0.931	0.978	0.981	25.12	---	27	27.08	---	---	28	---	---									
Copper	0	18.2	0.941	0.976	0.979	16.72	---	18	17.82	---	---	19	---	---									
Iron	0	128668	---	---	0.961	---	---	---	---	---	---	86080	---	---									
Lead	0	49.6	---	---	0.925	---	---	---	---	---	---	33	---	---									
Lithium	0	100.3													---	---	---	10	51	---	---	---	113
Manganese	0	1806	0.981	0.972	0.966	1858	---	2399	2556	---	---	3426	---	---									
Mercury	20	0.066	---	0.989 (ROS Est.)	0.982 (ROS Est.)	---	---	0	0.0563	0.060	0.0607	0.0754	0.0577	0.0601									
Nickel	0	25.4	0.941	0.973	0.985	20.93	---	22	21.91	---	---	23	---	---									
Selenium	33	1.468	---	0.971 (ROS Est.)	0.97 (ROS Est.)	---	---	1	1.317	1.8	2.011	1.702	---	1.492									
Silver	47	11.85	---	0.968 (No NDs)	0.981 (ROS Est.)	---	---	7	7.127	---	---	10.83	10.32	11									
Thallium	13	1.706													0.816*	0.921*	0.898*	0.132	0.210	NA	NA	0.3	---
Total Uranium	0	4.232	0.975	0.982	0.986	3.99	---	4	4.032	---	---	4.1	---	---									
Vanadium	0	88.4	0.927	0.973	0.984	70.85	---	74.23	74.99	---	---	78	---	---									
Zinc	0	161.4	---	---	0.936	---	---	---	---	---	---	93	---	---									
Radionuclides																							
Plutonium-239/240	87	0.024																					
Thorium-228	0	1.74	0.965	0.979	0.983	1.6	---	1.626	1.629	---	---	1.6	---	---									
Thorium-230	0	1.66	---	0.965	0.972	---	---	1.581	1.583	---	---	1.6	---	---									
Thorium-232	0	1.63	0.973	0.985	0.989	1.525	---	1.548	1.551	---	---	1.6	---	---									
Uranium-233/234	0	1.35	0.981	0.988	0.991	1.276	---	1.289	1.291	---	---	1.3	---	---									
Uranium-235/236	50	0.09	0.989 (No NDs)	0.991 (No NDs)	0.986 (No NDs)	0.0953	0.0916	0.10	0.1	0.09	0.091	0.124	0.105	0.0909									
Uranium-238	0	1.42	0.975	0.982	0.986	1.339	---	1.351	1.353	---	---	1.4	---	---									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-4. Unsaturated Minford (1-16 ft) Areas DEFG Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	25516	---	---	0.991	---	---	---	---	---	---	20717	---	---									
Antimony	40	4.28													0.900*	0.989*	0.993*	0.27	0.90	NA	NA	1.8	---
Arsenic	0	93													---	---	---	6	15	---	---	---	29
Barium	0	1529													---	---	---	56	88	---	---	---	136
Beryllium	0	2.75	---	---	0.991	---	---	---	---	---	---	1.6	---	---									
Cadmium	35	1.46													0.864*	0.846*	0.989*	0.05	0.14	NA	NA	0.3	---
Chromium	0	38.8	---	0.998	0.994	---	---	29	29.71	---	---	30.78	---	---									
Cobalt	0	77.5	---	---	0.995	---	---	---	---	---	---	37	---	---									
Copper	0	33.9	---	0.998	0.993	---	---	26	26.6	---	---	28.21	---	---									
Iron	0	157025	---	---	0.983	---	---	---	---	---	---	62782	---	---									
Lead	0	349.5													---	---	---	11	16	---	---	---	23
Lithium	0	158.1													---	---	---	18	60	---	---	---	123
Manganese	0	9005	---	---	0.994	---	---	---	---	---	---	1491	---	---									
Mercury	36	0.096	---	0.989 (No NDs)	0.997 (ROS Est.)	---	---	0.0497	0.0512	---	---	0.0599	0.0587	0.052									
Nickel	0	86.4	---	0.984	0.999	---	---	46.68	47.31	---	---	50	---	---									
Selenium	47	9.417													0.562*	0.755*	0.932*	0.221	0.388	NA	NA	0.6	---
Silver	36	14.8	---	0.951 (No NDs)	0.993 (No NDs)	---	---	5.306	5.56	---	---	7.828	7	---									
Thallium	26	19.66													0.427*	0.569*	0.853*	0.11	0.21	NA	NA	0.4	---
Total Uranium	0	6.705	0.961	0.974	0.989	4.671	---	4.701	4.708	---	---	4.7	---	---									
Vanadium	0	100.6	---	---	0.983	---	---	---	---	---	---	58	---	---									
Zinc	0	222.6	---	0.972	---	---	---	117	118.6	---	---	---	---	---									
Radionuclides																							
Plutonium-239/240	100																						
Thorium-228	0	2.1	0.997	0.995	0.991	1.9	---	1.916	1.921	---	---	1.939	---	---									
Thorium-230	0	2.81	---	0.96	0.984	---	---	1.732	1.734	---	---	1.7	---	---									
Thorium-232	0	2.38	0.993	0.995	0.996	1.853	---	1.884	1.888	---	---	1.9	---	---									
Uranium-233/234	0	2.03	---	0.991	0.996	---	---	1.559	1.561	---	---	1.6	---	---									
Uranium-235/236	35	0.165	---	0.996 (ROS Est.)	0.996 (No NDs)	---	---	0.124	0.127	0.12	0.12	0.143	0.136	0.119									
Uranium-238	0	2.25	0.961	0.974	0.989	1.568	---	1.578	1.58	---	---	1.6	---	---									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-5. Saturated Minford (16-30 ft) Areas EFG Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	10616	0.961	0.948	0.943	12698	---	13689	13859	---	---	14463	---	---									
Antimony	8	2.42	0.939 (No NDs)	0.98 (ROS Est.)	0.981 (No NDs)	2.622	2.522	3	3.261	3.5	3.767	5.16	3.995	4.367									
Arsenic	0	45.8	0.969	0.971	0.939	53.06	---	86	97.72	---	---	195.7	---	---									
Barium	0	64.8	0.952	0.96	0.966	67.92	---	70	70.71	---	---	72	---	---									
Beryllium	0	0.96	0.988	0.992	0.991	1.085	---	1.2	1.19	---	---	1.247	---	---									
Cadmium	42	0.33	0.908 (No NDs)	0.965 (ROS Est.)	0.977 (ROS Est.)	0.411	0.396	1	0.713	0.729	0.865	2.489	1.367	0.7									
Chromium	0	20.8	0.953	0.971	0.969	23.4	---	25	25	---	---	25.47	---	---									
Cobalt	0	15.2	0.987	0.995	0.995	17.19	---	19	19	---	---	19.85	---	---									
Copper	0	18.8	0.977	0.965	0.966	23	---	25	25.35	---	---	26.61	---	---									
Iron	0	47547	0.912	0.942	0.955	48976	---	52804	53556	---	---	56423	---	---									
Lead	0	13.2	0.953	0.958	0.967	15.56	---	16	16.41	---	---	13	---	---									
Lithium	0	105.1	0.948	---	0.93	120	---	---	---	---	---	195.9	---	---									
Manganese	0	402	0.887	0.949	0.945	415.1	---	465	475.4	---	---	519.7	---	---									
Mercury	50	0.0358	0.948 (No NDs)	0.944 (No NDs)	0.946 (No NDs)	0.0413	0.041	0	0.0475	---	---	0.0525	0.0524	---									
Nickel	0	35.7	0.961	0.965	0.972	43.49	---	48	49.29	---	---	53	---	---									
Selenium	17	0.548	0.974 (No NDs)	0.984 (ROS Est.)	0.985 (ROS Est.)	0.729	0.634	1	0.709	0.627	0.632	1.25	0.753	0.6									
Silver	58	3.22	0.896 (No NDs)	0.957 (No NDs)	0.953 (ROS Est.)	3.467	3.22	4	3.766	---	---	7.162	4.237	6.164									
Thallium	25	0.737	---	0.934 (ROS Est.)	0.928 (No NDs)	---	---	1	0.719	0.8	0.861	0.985	0.773	0.836									
Total Uranium	0	6.02	0.962	0.977	0.986	6.388	---	7	6.9	---	---	7.2	---	---									
Vanadium	0	54.1	0.987	0.978	0.972	65	---	74.55	76.41	---	---	84	---	---									
Zinc	0	105.5	0.956	0.967	0.97	128	---	139	140.7	---	---	148	---	---									
Radionuclides																							
Plutonium-239/240	100																						
Thorium-228	0	1.46	0.954	0.958	0.962	1.5	---	1.551	1.553	---	---	1.6	---	---									
Thorium-230	0	2.34	---	0.908	0.925	2.336	---	2.383	2.392	---	---	2.4	---	---									
Thorium-232	0	1.41	0.981	0.98	0.982	1.565	---	1.602	1.608	---	---	1.6	---	---									
Uranium-233/234	0	1.98	0.948	0.965	0.975	2.072	---	2.223	2.251	---	---	2.4	---	---									
Uranium-235/236	17	0.138	0.984 (No NDs)	0.982 (ROS Est.)	0.981 (ROS Est.)	0.176	0.17	0.214	0.224	0.21	0.22	0.313	0.274	0.261									
Uranium-238	0	2.02	0.962	0.977	0.986	2.144	---	2.289	2.315	---	---	2.4	---	---									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-6. Gallia Areas DEFG Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	13220													---	---	---	5132	8451	---	---	---	13430
Antimony	24	12.89	---	0.948 (ROS Est.)	0.984 (No NDs)	---	---	7.10	7.283	7.907	8.561	8.862	8.4	8.537									
Arsenic	0	157	---	---	0.98	---	---	---	---	---	---	129	---	---									
Barium	0	106.2	0.965	0.989	0.992	89.43	---	95	95.84	---	---	100	---	---									
Beryllium	0	1.44	---	0.96	0.975	---	---	1.459	1.469	---	---	1.5	---	---									
Cadmium	12	2.07	---	0.996 (ROS Est.)	0.99 (ROS Est.)	---	---	1.86	2.041	2.0	2.26	3.338	3.547	2.603									
Chromium	0	27.9	0.987	---	---	29	---	---	---	---	---	---	---	---									
Cobalt	0	25.2	---	---	0.98	---	---	---	---	---	---	27	---	---									
Copper	0	25.4													---	---	---	11.1	17.65	---	---	---	27
Iron	0	142689	0.983	0.991	0.971	131949	---	155228	161182	---	---	189521	---	---									
Lead	0	48.7	---	---	0.974	---	---	---	---	---	---	38	---	---									
Lithium	0	168													---	---	---	12	46	---	---	---	97
Manganese	0	3054	---	0.947	0.983	---	---	2070	2145	---	---	2558	---	---									
Mercury	24	0.113	---	---	0.956 (No NDs)	---	---	---	---	---	---	0.0776	0.067	---									
Nickel	0	76.9	---	---	0.979	---	---	---	---	---	---	78	---	---									
Selenium	39	0.83													0.911*	0.913*	0.897*	0.256	0.379	NA	0.6	0.48	---
Silver	15	10.99	0.962 (No NDs)	0.97 (No NDs)	0.968 (No NDs)	10.61	10.5	14	15.22	15.93	18.62	23.76	22.46	22.79									
Thallium	12	0.606	---	0.972 (ROS Est.)	0.976 (ROS Est.)	---	---	0.48	0.483	0.489	0.497	0.581	0.502	0.5									
Total Uranium	3	7.867	---	0.965 (ROS Est.)	0.981 (ROS Est.)	---	---	9	9.445	7.207	7.278	18.2	14.37	7.3									
Vanadium	0	92.6	0.961	0.985	0.99	80.75	---	84.34	85.03	---	---	88	---	---									
Zinc	0	292.2	---	---	0.971	---	---	---	---	---	---	244	---	---									
Radionuclides																							
Plutonium-239/240	100																						
Thorium-228	0	1.67	---	0.972	0.979	---	---	1.708	1.713	---	---	1.7	---	---									
Thorium-230	0	3.04	---	---	0.952	---	---	---	---	---	---	2.5	---	---									
Thorium-232	0	1.81	0.974	0.987	0.989	1.644	---	1.691	1.698	---	---	1.7	---	---									
Uranium-233/234	0	2.45	---	---	0.977	---	---	---	---	---	---	2.3	---	---									
Uranium-235/236	44	0.175	0.985 (No NDs)	0.996 (No NDs)	0.987 (No NDs)	0.152	0.151	0.171	0.175	0.17	0.175	0.213	0.195	0.178									
Uranium-238	3	2.64	---	0.965 (ROS Est.)	0.981 (ROS Est.)	2.373	2.355	2.939	3.17	2.419	2.442	6.1	4.821	2.5									

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply

Table J-7. Subsurface Soil (0-1 ft) Areas HIJ Background Concentration Development

Analyte	Percent ND	Maximum Detect	UTL Calculation Work												UB Calculation Work								
			Correlation Coefficient (if distribution determined)			UTL									Correlation Coefficient using ROS Imputed Values			Q1	Q3	UB using ROS Imputed Values			UB for data sets without NDs
			Normal	Gamma	Lognormal	Normal	Normal KM Est.	Gamma WH (KM Est. if NDs)	Gamma HW (KM Est. if NDs)	Gamma ROS-WH	Gamma ROS-HW	Lognormal	Lognormal KM Est.	Lognormal ROS	Normal	Gamma	Lognormal			Normal	Gamma	Lognormal	
Metals																							
Aluminum	0	23438	0.971	---	---	18049	---	---	---	---	---	---	---	---									
Antimony	34	6.45	---	---	0.988 (ROS Est.)	---	---	---	---	---	---	4.188	3.254	4.1									
Arsenic	0	67													---	---	---	6	12	---	---	---	20
Barium	0	157.4	0.979	0.988	0.992	150.4	---	165	168.7	---	---	182	---	---									
Beryllium	0	1.76	0.973	0.988	0.988	1.413	---	2	1.58	---	---	1.7	---	---									
Cadmium	67	0.93	---	0.986 (No NDs)	0.995 (ROS Est.)	---	---	0	0.351	---	---	0.501	0.356	0.9									
Chromium	2	70.9													0.788*	0.901*	0.969*	9.125	14.830	NA	NA	23	---
Cobalt	0	63.3	---	0.926	0.984	---	---	33	33.38	---	---	37	---	---									
Copper	3	66.1													0.676*	0.796*	0.949*	5.500	9.675	NA	NA	16	---
Iron	0	106775													---	---	---	11236	18331	---	---	---	28974
Lead	0	68.2	---	0.957	0.991	---	---	41	41.4	---	---	44	---	---									
Lithium	0	110.3	---	0.994	0.994	---	---	97	100.4	---	---	116	---	---									
Manganese	0	2134	0.979	0.977	---	1919	---	2505	2701	---	---	---	---	---									
Mercury	12	0.165	---	---	0.98 (ROS Est.)	---	---	---	---	---	---	---	---	0.094									
Nickel	0	162.6													---	---	---	11	18	---	---	---	29
Selenium	4	3.628	---	0.959 (No NDs, ROS)	0.99 (No NDs, ROS)	---	---	2	2.206	2.192	2.22	2.4	2.327	2.333									
Silver	91	4																					
Thallium	33	2.726	---	0.992 (No NDs)	0.987 (No NDs)	---	---	3	2.9	3.235	3.855	5.995	4.635	3.361									
Total Uranium	0	6.347													---	---	---	3	3	---	---	---	4.3
Vanadium	0	113.5													---	---	---	20	33	---	---	---	52
Zinc	0	196.1													---	---	---	40	58	---	---	---	86
Radionuclides																							
Plutonium-239/240	86	0.031																					
Thorium-228	0	1.48	0.97	---	---	1.5	---	---	---	---	---	---	---	---									
Thorium-230	0	2.6													---	---	---	1.0	1.3	---	---	---	1.7
Thorium-232	0	1.52	0.974	---	---	1.5	---	---	---	---	---	---	---	---									
Uranium-233/234	0	2.09													---	---	---	0.9	1.1	---	---	---	1.4
Uranium-235/236	38	0.136	0.958 (No NDs)	0.988 (ROS Est.)	0.987 (ROS Est.)	0.111	0.113	0.139	0.146	0.11	0.12	0.168	0.181	0.129									
Uranium-238	0	2.13													---	---	---	1.0	1.2	---	---	---	1.4

All metal concentrations are reported in milligrams per kilogram (mg/kg) and all radionuclide results are reported in picocuries per gram (pCi/g)
Distributions estimated at a 5% significance level
Upper Tolerance Limits (UTLs) represent 95% UTL with 95% coverage
*Regression on Order Statistics (ROS) distribution correlation coefficient recorded; however, data not distributed
NA indicates unreliable data generated using imputed values
Upper Bound (UB) Equation: UB = Q3 + k(Q3-Q1); k value is 1.5; Q1 is the 25th percentile value; Q3 is the 75th percentile value
Yellow highlighted value is the selected background value
KM = Kaplan-Meier
HW = Hawkins-Wixley
WH = Wilson-Hilferty
ND = Non-detected value
--- = Value not determined because distribution or analysis does not apply