FINAL DATA SUMMARY REPORT

UPPER BLACKFOOT MINING COMPLEX SECTION 35 DESIGN INVESTIGATION

Prepared for:

DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation Division
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SECTION 35 DESIGN INVESTIGATION

Prepared by:

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EXECUTIVE SUMMARY

This Data Summary Report (DSR) summarizes the data collected and gathered during the Upper Blackfoot Mining Complex (UBMC) Section 35 Repository Design Investigation. Field work for the investigation was performed in October and November 2012.

All work completed on this project followed the protocols described in the Section 35 Repository Design Investigation Sampling and Analysis Plan (SAP) (DEQ-Pioneer Technical Services, 2012a). Data presented in this report will be utilized in the Section 35 Repository Design and the UBMC remedial designs.

The following information is included in this DSR:

- Objectives of the investigation;
- Locations of all test pits and soil borings;
- Cross sections of subsurface soil, bedrock, and groundwater levels;
- Description of field sampling methods;
- Field documentation;
- Geochemical laboratory analytical test results;
- Geotechnical test results:
- Water level measurements;
- Deviations from the SAP; and
- Data validation of the laboratory analytical sample results.

A total of 13 test pits were located, field logged, and sampled during this investigation. Field data collection consisted of test pit location; date and time; weather conditions; soil profile/lithology descriptions including field soil classification using the Unified Soil Classification System (USCS); sample numbers; sample depth intervals; personnel present; and associated organization. Bulk/Grab soil samples were collected from the test pits during the investigation and selected samples were analyzed for geotechnical and chemical properties.

A total of 20 boreholes were located, drilled, sampled, and logged. Field data collection consisted of soil boring location; date and time; soil profile/lithology descriptions, including field USCS soil classification; sample numbers; sample depth intervals; personnel present; and associated organization. Selected samples from the soil borings were analyzed for geotechnical properties.

A total of 53 nested piezometers and/or monitoring wells were installed in the test pits and soil borings as described in the SAP or as determined appropriate during the investigation. Water level measurements were recorded after the installation of each piezometer and monitoring well. Water level data from previously installed monitoring wells (DEQ-Terragraphics, 2010) also were collected by Portage Inc. All available water level data for Section 35 were compiled into a single database to be used during repository design.

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LIST OF DOCUMENT REVISIONS

Revision No.	Author	Version	Description	Date
Rev 0	Team	Draft	For Client Review	1/22/13
Rev 1	Team	Revised	Additional Client Review, DVR	3/28/13
		Draft	revisions	
Rev 2	Team	Final	Final for Distribution	4/5/13
Rev 3				
Rev 4				

1.0 INTRODUCTION

This Data Summary Report (DSR) presents the results of field sampling and laboratory analysis activities that were completed between October 2, 2012 and January 18, 2013 to support the evaluation and design of a potential repository at Section 35 within the Upper Blackfoot Mining Complex (UBMC) located near Lincoln, Montana. Section 35 refers to the portion of section 35 northeast of Highway 279 in Township 15 N, Range 7 W. The information contained in this DSR was gathered following the objectives and procedures documented in the Section 35 Repository Design Investigation Sampling and Analysis Plan (SAP) (DEQ-Pioneer Technical Services, 2012a). Data presented in this DSR are intended to be used to evaluate alternatives and facilitate engineering design of a repository under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

This DSR presents the results of the investigation at Section 35. Duties completed under this investigation and described in this DSR include:

- 1. Geochemical/Geotechnical Investigation test pitting and/or geotechnical soil boring investigation completed to define the nature and extent of the topsoil, native glacial till, buried alluvium/glacial outwash, and buried bedrock;
- 2. Geotechnical Sampling bulk samples of the native glacial till, buried alluvium/glacial outwash, and bedrock were collected for geotechnical analysis to determine material classification, permeability, settlement, and strength information; and
- 3. Groundwater Investigation the existing well network and new monitoring wells and piezometers were used to determine the configuration of the underlying alluvium, measure groundwater elevations, and determine groundwater flow direction and boundaries (if present). The well and piezometer network will be used to measure groundwater fluctuations and collect the data necessary to determine the cause of fluctuating water levels in the wells.

The following information is included in this report:

- Objectives of the investigation;
- Locations of all test pits and soil borings;
- Cross sections of subsurface soil, bedrock, and groundwater levels;
- Description of field sampling methods;
- Field documentation;
- Geochemical laboratory analytical test results;
- Geotechnical test results:
- Water level measurements;
- Deviations from the SAP; and
- Data validation of the laboratory analytical sample results.

1.1 <u>INVESTIGATION OBJECTIVES</u>

The purpose of this investigation, per the Task Order, was to "collect data to determine the cause of fluctuating water levels in the wells, choose the most protective location within Section 35 for

a repository, and ensure a protective design of that repository which meets applicable or relevant and appropriate legal requirements (ARARs)." Specifically, under the SAP, Pioneer Technical Services was tasked to:

- 1. Complete an investigation of Section 35 to identify the best location for a repository that is large enough to contain and isolate 1,000,000 cubic yards of mine waste and that blends the repository into the natural topography to the extent practical;
- 2. Collect the data necessary to determine the cause of fluctuating water levels across Section 35: and.
- 3. Collect additional data and information necessary to design a repository that meets ARARs.

The investigation and data collected from Section 35 to meet these objectives are summarized and presented in this DSR.

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The UBMC is located approximately 15 miles east of Lincoln, Montana, in the headwaters area of the upper Blackfoot River (Figure 1). Section 35 is located approximately five miles west-southwest of the Mike Horse Dam and impounded tailings and is within the Upper Blackfoot Mining Complex (UBMC) (Figures 1 and 2).

2.2 SECTION 35 DESCRIPTION

Section 35 is located northeast of Highway 279 in the N1/2 of Section 35, T15N, R7W, and is approximately 360 acres in size (Figure 2).

Vegetation at Section 35 generally consists of native Douglas fir and lodge pole pine trees, harvest areas with sub-mature regeneration, sagebrush, and grasslands. Nora Creek, a small perennial creek, bisects Section 35, and the Blackfoot River flows through the west side of Section 35.

Surface geology of the Rogers Pass Area was mapped in 1987 by Whipple et al. (USGS, 1987). A portion of this map includes Section 35. The area, including Section 35, was mapped as Pleistocene glacial deposits. To the north and east of Section 35, the Spokane Formation (maroon to grayish red siltite and thinly interlaminated dark-red argillite) was mapped along with late Proterozoic diorite sills. Southwest of Section 35, the Crater Mountain volcanics cover an expansive area, and directly west the valley floor is mapped as Pleistocene glacial deposits and Quaternary alluvium. Directly northwest of Section 35, along the Blackfoot river, small sections of andesite and trachyte are mapped (USGS, 1987). Observations reported in previous Data Summary Reports for the UBMC have confirmed the presence of glacial deposits and volcanics within Section 35. (DEQ-Terragraphics, 2010).

2.3 PROJECT BACKGROUND AND SITE HISTORY

Historic mining activities in the UBMC resulted in the accumulation of large volumes of mine waste materials in the Mike Horse mine tailings dam and impoundment as well as mine waste materials and impacted soils placed or accumulated in Mike Horse Creek, Beartrap Creek, and Upper Blackfoot River and their associated floodplains. In 1975, a catastrophic flood caused the Mike Horse Dam to fail and release tailings, dam materials, and several thousand yards of hillside materials from the east end of the dam. A more complete description of the facility and regulatory and permitting history of the UBMC can be found in the Final Remedial Investigation Work Plan, Upper Blackfoot Mining Complex (DEQ-TetraTech, 2007).

The 2007 Action Memorandum (USFS, Helena National Forest, 2007) provided a recommendation for the removal of the Mike Horse Dam, impounded tailings, and tailings in the streams and floodplains of Lower Mike Horse Creek, Beartrap Creek, and Upper Blackfoot River. In January of 2009, per the Watershed Restoration Agreement (DEQ/EPA/USFS, 2008), the State hired engineering firms to complete design-level investigations of the wastes in the impoundment and to perform a detailed analysis of the Paymaster repository site, which was selected by the USFS in the Action Memorandum as the preferred repository location. These investigations raised serious concerns regarding the cost and suitability of the Paymaster repository site. Because of these concerns, a search for other suitable repository sites in and near the UBMC was initiated. In late 2009 and early 2010, through visual observation and site reconnaissance, Section 35 was identified as a potential repository and borrow site. In the summer of 2010, an investigation of Section 35 was conducted (DEQ-Terragraphics, 2010), which indicated multiple potential areas within Section 35 might be suitable for a repository.

In the summer of 2010 three monitoring wells and one piezometer were installed during an investigation of Section 35 (DEQ-Terragraphics, 2010) in the vicinity of Region 1 (see Figure 2). Analysis of the data collected in 2010 indicated that Region 1 could be a suitable repository site, but additional design-level data would be needed to support a protective repository design that would meet all applicable requirements (DEQ-Pioneer Technical Services, 2011b).

In the spring of 2011, DEQ tasked Pioneer Technical Services to complete an independent review of the process utilized to select a repository site, to identify issues with that process, and to prepare a repository siting study for the UBMC. Results of the review and siting study are presented in the Final Repository Siting Study (DEQ-Pioneer Technical Services, 2011a), which identified Section 35 as the preferred repository alternative for the UBMC cleanup. The study was released for public comment in September of 2011 and in July 2012, the USFS selected Section 35 as the preferred repository location for mine waste from the UBMC (USFS, Helena National Forest, 2012).

3.0 TEST PITTING

3.1 <u>SAMPLING METHODS</u>

Test pit sampling was performed at 13 test pit locations within Region 1 of Section 35 in accordance with Section 2.3 of the SAP (DEQ-Pioneer Technical Services, 2012a). Deviations from the SAP are discussed in Section 8.0.

Test pits were excavated between October 2, 2012 and October 5, 2012 by Streamworks Inc. using a Komatsu PC200 excavator. Test pits were observed and logged by Pioneer personnel. Figure 3 shows the locations of the test pit locations within Region 1 of Section 35 overlaid on a 2011 National Agriculture Imagery Program (NAIP) image of Section 35 (State of Montana, 2011).

Field data collection consisted of test pit location; date and time; weather conditions; soil profile/lithology descriptions, including Universal Soil Classification System (USCS) soil classification; sample numbers; sample depth intervals; personnel present; and presence of the groundwater during excavation. Field logs and test pit logs are provided in Appendix A.1. Digital photographs were collected from each test pit location. The test pit photo log is provided in Appendix B.1.

Bulk samples were collected from each stratigraphic layer identified per the SAP and at specific depths, as requested by the Field Sampling Leader. Each stratigraphic layer was carefully observed as it was exposed and visual soil classification and texture (according to American Society of Testing Materials [ASTM]) Test Method D-2487), moisture condition, gravel/cobble/boulder content, color, depth, the presence of bedrock, groundwater, organic material, and other notable features were recorded in the field logs. Disturbed bulk samples for geotechnical testing were collected in five-gallon buckets, and all other samples were collected and sealed in one-gallon Ziplock® freezer bags. Samples were given a unique sample number, as described in Section 3.1.2 of the SAP.

All samples were transported to the Pioneer Geotechnical Laboratory for compositing (if applicable), additional classification according to ASTM Test Method D-2488 (USCS classification), and preparation for testing.

After logging and sampling was completed, the test pits were backfilled with the existing soils. The backfill was tamped in place with the excavator bucket and the stripped topsoil was replaced on the surface prior to leaving each test pit location

3.2 TEST PIT LOGS AND FIELD LOGBOOKS

A field log book was maintained during field sampling. Appendix A.1 provides the test pit logs and copies of the field log book. The logs provide USCS soil classification, resource grade GPS location, total depth, and the presence of water (when applicable). Field log books and original field data sheets for this investigation are maintained on file at the Pioneer office in Helena, Montana and duplicated in Appendix A.

3.3 <u>SELECTION OF SAMPLES FOR LABORATORY ANALYSIS</u>

The primary purpose of the test pitting investigation was to identify physical (geotechnical) properties of the soils for repository and borrow area design. Sixty-one discrete bulk samples were chosen to represent the various material types identified by the geotechnical engineer.

Six composite bulk samples were created from the discrete bulk samples along several of the repository transects shown on Figure 3. The composite bulk samples were selected and created to simulate potential average soil properties of different phases of repository excavation and/or borrow area development. Samples used to create the composite samples and the composite sample numbers are provided in Table 1.

Six samples and one duplicate sample were selected and submitted for Target Analyte List (TAL) metals analysis to determine if the alluvium materials are suitable for use as clean backfill for reclamation at the UBMC. Table 2 summarizes the results of laboratory data provided in Appendix D. Deviations from the SAP are presented in Section 8.0.

3.4 SAMPLE ANALYSIS RESULTS

Discrete and composite bulk soil samples were analyzed in the Pioneer Technical Services geotechnical laboratories in Helena and Belgrade, Montana. Appendix C.1 provides the laboratory-reported geotechnical test results. Table 2 presents a summary of the test pit laboratory results. Table 3 presents a summary of the particle size distributions (material gradations). A Standard Proctor analysis was attempted on bulk sample from Test Pit S35TP-113, but the sample was too coarse-grained and no values were obtained.

The bagged analytical laboratory soil samples were sent to the Pioneer Technical Services geotechnical laboratory in Helena, Montana where they were screened through a number 10 mesh screen, re-bagged with appropriate identification, and sent to Energy Labs in Helena, Montana for laboratory analyses for agronomic properties, physical properties, ABA/SMP, and TAL metals. Appendix D provides the raw laboratory soil geochemical results, which include agronomic properties, physical properties, ABA/SMP, and TAL metals and the chain-of-custody forms that accompanied the samples that were sent to the lab. A summary of the geochemical laboratory results is also presented in Table 2.

The total metals results are all within their respective Screening Level (as defined in the footnotes of Table 2), with the exception of lead in samples S35-CS-01 and S35-CS-01 (Duplicate). These samples were composited using base course and topsoil from the surface of Test Pit S35TP-101 and topsoil from the surface of Test Pits S35TP-112 and S35TP-113. Total lead concentrations in these two samples range from 548 to 630 mg/kg, which exceed the Risk Screening Levels (RSLs) of 400 mg/kg (for Residential use) and are an order of magnitude higher than the lead levels in all other test pits. According to the Agency for Toxic Substances and Disease Registry, higher levels of lead are often found in surface soils found near roadways, due to the exhaust of leaded gasoline by passing vehicles. Because Test Pit S35TP-101 is located at the centerline of the old highway between Lincoln and Helena, it is hypothesized that the elevated lead levels in S35-CS-01 and S35-CS-01 (Duplicate) may be related to years of

deposition of leaded gasoline exhaust from vehicles. This theory could be verified by submitting a sample from the surface of S35TP-101 for total lead analysis; however, the sample location is outside of the proposed Region 1 repository and does not represent soil to be utilized during reclamation. Institutional controls currently in place prohibit residential development at the site, and the sample concentrations fall below applicable Industrial (800 mg/kg) and Recreational (3,920 mg/kg) RSLs.

3.5 QUALITY ASSURANCE, QUALITY CONTROL, AND DATA VALIDATION

QA/QC summary reports are provided with the raw laboratory soil geochemical results from Energy Labs in Appendix D. One duplicate sample was collected for TAL metals analysis. Table 2 provides the results for the duplicate sample, which was used in the data validation process. Per the QAPP and as stated in the SAP, field blanks and field duplicate samples were not collected for geotechnical samples collected during the investigation. Geotechnical testing was completed in Pioneer's accredited laboratory using standard test methods which provide adequate QA/QC measures for geotechnical testing and reporting.

The quality of the analytical data in this investigation in terms of accuracy, precision, representativeness, and completeness was evaluated based on protocol established in the QAPP. Data quality for the analytical samples is discussed in Section 7.0.

3.6 WATER LEVEL DATA

Single piezometers were installed in eight (8) of the test pits and two (2) nested piezometers sets were installed in two (2) of the test pits. Piezometers were installed if water or evidence suggesting water may be present was observed. Piezometer depths and screened intervals were determined by the Field Sampling Leader and DEQ Project Officer, when available, in order to target the specific soil units. Total depth, screen interval, and other pertinent information about the piezometers are provided in the field logs provided in Appendix A.1. Piezometer completion information is presented in Section 5.0 and summarized in Table 6.

3.7 **SURVEY DATA**

Appendix E provides the survey data for actual test pit locations surveyed by the DEQ-contracted surveyor (DJ&A). The survey data report the northing, easting, ground elevation, and the monitoring point elevation of the piezometer casings as constructed.

4.0 GEOTECHNICAL SOIL BORINGS AND MONITORING WELLS

4.1 <u>SAMPLING METHODS</u>

The geotechnical soil boring investigation involved drilling and the collection of soil and bedrock samples. The samples were collected using the methods stated in the SAP. Deviations from the SAP are discussed in Section 7.0.

A total of 20 soil borings were completed, field logged, and sampled during the investigation.

Soil boring locations were field identified and adjusted as necessary to accommodate equipment access. Figure 3 shows the locations of the soil boring locations within Region 1 of Section 35 overlaid on a 2011 NAIP image of Section 35 (State of Montana, 2011).

Field data collection consisted of soil boring location; date and time; weather conditions; soil profile/lithology descriptions, including USCS soil classification; sample numbers; sample depth intervals; personnel present; and associated organization. Notes also were made regarding the presence of water observed during the drilling.

Sampling was completed at either the prescribed intervals or at specific depths determined by the geotechnical engineer. The coarse-grained soils were sampled with split spoon samplers of varying size. It is not possible to obtain undisturbed samples of coarse-grained soils without special measures, so only disturbed samples suitable for classification purposes were obtained in the coarse-grained soils. Samples obtained by the grab, or bulk, method are similarly disturbed and suitable only for classification purposes. Fine-grained soils can be sampled with 2.8-inch thin-walled tubes or in brass liners installed into larger split spoon samplers. Thin-walled samplers are used where the soils are soft enough to push them into the undisturbed soil ahead of the bit using the hydraulic pressure of the drill. In locations where the finer-grained material was too stiff to sample with a thin-walled sampler, a 3-inch outside diameter split spoon with brass liners was used to obtain relatively undisturbed samples. Every attempt was made to sample fine-grained material with thin-walled samplers to minimize sample disturbance.

Each sample was carefully observed as it was recovered and soil classification, moisture condition, and the presence of organic and other notable features were recorded in the field logs. Disturbed samples were sealed in thick plastic bags and/or five-gallon buckets and transported to the Pioneer Technical Services Geotechnical Laboratory in Belgrade, Montana for testing and additional classification.

All soils were visually classified in accordance with ASTM Test Method D-2487 (USCS). Subsurface conditions interpreted from the field observations, drill performance, and water production from the hole during the drilling process was noted on the drilling logs.

The stratification lines shown on the borehole logs represent the approximate boundary between soil types as observed in the boreholes. The actual *insitu* transition may be either gradual or abrupt and typically changes within the limits of the investigation. Due to the depositional characteristics of natural soils, care should be taken in interpolating subsurface conditions beyond the location of the boreholes.

After sampling was finished, one or two piezometers or a single monitoring well was installed into each of the soil borings. Piezometer and monitoring well depths and screened intervals were constructed per the direction of the geotechnical engineer and the DEQ Project Officer, when available, to target the bedrock and specific soil units when possible. Figure 3 shows the locations of the soils borings, monitoring wells, and piezometers installed at Section 35.

After all data were collected and the boring logs completed, the soil boring data were used to develop five (5) east-west and three (3) north-south geologic cross sections of Region 1 (Figures

4-12). These data will be used to develop a three-dimensional geologic model of the repository area for use in repository and borrow area design and stability analyses. Preliminary interpretation of the data indicates that the repository could be constructed entirely in the glacial till/outwash materials.

4.2 <u>SOIL BORING, PIEZOMETER AND MONITORING WELL LOGS</u>

Appendix A.2 provides the soil boring logs. The logs provide soil boring location; date and time; soil profile/lithology descriptions, including USCS soil classification; sample numbers; sample depth intervals; piezometer and monitoring well installation records; preliminary water level readings; personnel present; and associated organization. Notes also were made regarding the presence of the groundwater observation during the drilling. Field log books and original field data sheets for this investigation are on file at the Pioneer offices in Helena, Montana.

4.3 <u>SELECTION OF SAMPLES FOR LABORATORY ANALYSIS</u>

All samples from the soil borings were collected as described above and returned to the Pioneer geotechnical laboratory located in Belgrade, Montana. Representative samples for the various geologic units at Section 35 were selected and prepared for laboratory testing according to the methods specified in the SAP.

4.4 <u>SAMPLE ANALYSIS RESULTS</u>

The selected soil samples were analyzed at the Pioneer geotechnical laboratory located in Belgrade, Montana. The laboratory performed geotechnical analyses on selected samples per applicable testing standards. The Section 35 Repository Design Investigation soil boring laboratory data and testing methods are summarized in Table 4. A summary of the particle size distributions is presented in Table 5. Appendix C.2 provides the laboratory geotechnical reports.

4.5 QUALITY ASSURANCE, QUALITY CONTROL, AND DATA VALIDATION

The quality of the analytical data, for the soil boring investigation, in terms of accuracy and precision, was evaluated based on protocol established in the QAPP (DEQ-Pioneer Technical Services, 2012b). Per the QAPP and as stated in the SAP, field blanks and field duplicate samples were not collected for geotechnical samples collected during the investigation. Geotechnical testing was completed in Pioneer's accredited laboratory using standard test methods which provide adequate QA/QC measures for geotechnical testing and reporting.

4.6 WATER LEVEL DATA

A total of 41 nested piezometers and/or monitoring wells were installed in soil borings as described in the SAP or as determined appropriate during the investigation. Piezometers were installed in each geologic formation to measure groundwater elevations throughout Section 35 and to assist with the planned pumping test.

Piezometer depths and screened intervals were determined by the Field Sampling Leader and the

DEQ Project Officer, when available, in order to target the specific stratigraphic units. Total depth, screen interval, and other pertinent information about the piezometers are provided in the logs provided in Appendix A.2. Table 6 presents piezometer completion information based on the surveyed locations and elevations.

4.7 **SURVEY DATA**

Appendix E presents the survey data for actual soil boring locations that were surveyed by the DEQ-contracted surveyor (DJ&A). The survey data report the northing, easting, ground elevation, and the monitoring point elevation of the monitoring wells and piezometer casings as constructed.

5.0 MONITORING WELL AND PIEZOMETER INSTALLATION

5.1 PIEZOMETER AND MONITORING WELL LOGS

Appendix A.2 provides the soil boring logs. The logs provide soil boring location; date and time; soil profile/lithology descriptions, including USCS soil classification; sample numbers; sample depth intervals; piezometer and monitoring well installation records; preliminary water level readings; personnel present; and associated organization. Notes also were made regarding the presence of water observed during the drilling.

Monitoring wells and piezometers were installed in each soil boring as indicated on the logs. Locations of the monitoring wells and piezometers are shown on Figure 3. Stratigraphy, screen information, and water elevations recorded in each piezometer during the investigation are shown on Figures 4 through 12. Table 6 summarizes all of the monitoring well and piezometer installation information.

5.2 WATER LEVEL DATA

After all new wells and piezometers were surveyed, the preliminary water level elevations measured during the soil boring investigation were corrected and added to logs provided in Appendix A.2. The geologic cross sections were updated to reflect elevations relative to the actual surveyed ground surface elevations at each soil boring.

Appendix F provides a table of all previously installed monitoring wells and piezometers at Section 35 including northing and easting, ground and measuring point elevations, total depth, and transducer elevations. Appendix F also presents graphs showing water fluctuation in the existing monitoring wells and piezometers from August 2010 to December 2012.

6.0 PUMPING TEST

A groundwater pumping test (aquifer test) was proposed in the SAP (DEQ-Pioneer 2012 a). The location of the proposed pumping well and monitoring wells are shown on the figures in the SAP.

During the soil boring investigation Pioneer determined that the proposed pumping well location would not produce enough water to complete an effective aquifer test. The investigation was suspended and preliminary geologic cross sections of Section 35 were created in an attempt to find a suitable alternate pumping well location. Pioneer discussed the options with Spectrum Engineering and DEQ, and all parties agreed to eliminate the pumping test from the fall 2012 field work.

Instead of the pumping test, water elevations will be monitored through installation of transducers in 22 of the piezometers installed at Section 35. These data will be collected though the spring of 2013. The need to conduct the pumping test will be reassessed based on the results of the spring 2013 water elevation monitoring. After the spring 2013 monitoring data are analyzed, if DEQ determines that a pumping test still is warranted, the pumping well location and test will be redesigned and completed in the late the spring or early summer of 2013, in accordance with the SAP (DEQ-Pioneer 2012a).

6.1 GROUNDWATER SAMPLING AND FIELD PARAMETER TESTING

Depth-to-water measurements were recorded from each new monitoring well and piezometer within Region 1 after installation according to Pioneer's SOP (PTS-SOP-GW-03), provided in Appendix B of the QAPP (DEQ-Pioneer Technical Services, 2012b), and Section 3 of the SAP (DEQ-Pioneer Technical Services, 2012a). New monitoring well and piezometer I.D.'s, elevations, and depth-to-groundwater measurements recorded on November 19, 2012 are summarized in Table 6.

Water quality parameters and groundwater samples have not been collected from the new Region 1 monitoring wells and piezometers as of the date of this report. Results of water sampling from the monitoring wells at Section 35 in July and August of 2010 (DEQ-Terragraphics, 2010), and subsequent monitoring by Portage (Portage Inc., 2012) indicate that none of the water samples collected from the wells at Section 35 exceeded human health standards for dissolved metals in Circular DEQ-7 (DEQ, 2012). Water quality samples proposed in the SAP were intended to determine if water discharged during the pumping test would exceed standards or require treatment and are not needed for this purpose unless the pumping test is conducted. Depending on the results of the spring groundwater elevation monitoring, the new wells may be sampled in the spring of 2013 in preparation for or in conjunction with the pumping test.

6.2 STAFF GAGES

New staff gages have not been installed in Nora Creek or the Blackfoot River as of the date of this report. The staff gages were to be installed and monitored during the pumping test. Depending on the results of the spring groundwater elevation monitoring, the staff gages may be installed in the spring of 2013 in preparation for or in conjunction with the pumping test.

7.0 DATA VALIDATION

The specific needs for data to be collected during the sampling and investigation work were examined to ensure that project objectives were achieved. The Data Quality Objectives (DQOs) of the investigation are summarized in Tables 1 and 2 of the QAPP for this investigation (DEQ-Pioneer Technical Services, 2012b). A summary of the data quality assurance/quality control (QA/QC) review for the 11 samples submitted to Energy Labs on December 19, 2012 and the 1 duplicate sample (S35-CS-01) submitted to Energy Labs on January 16, 2013 is provided in the Data Validation Report provided in Appendix G.

Because of method blank detections in the samples submitted on December 19, 2012, all detected silver results were qualified with a J+ (the result is an estimated quantity, but the result may be biased high). The barium result from the sample submitted on January 16, 2013 was qualified with a J+ based on matrix spike (MS) results. Potassium results from both submittals were qualified with a J+ based on MS and matrix spike duplicate (MSD) recoveries that were outside of the laboratory control limits. Antimony results from both sample submissions were qualified as UJ (the analyte was analyzed for, but not detected; the reported quantitation limit is approximate and may be inaccurate or imprecise) based on MS and MSD recoveries outside of the laboratory control limits. All mercury results were qualified as UJ; the receiving temperature of the samples was well above the temperature required in the EPA National Functional Guidelines for Inorganic Superfund Data Review (EPA, 2010); and all samples were extracted outside of the recommended holding times. The purpose of this investigation was to collect engineering design data and not to characterize the site for cleanup. As a result, impacts of sampling mercury out of the temperature and holding time range are considered to be negligible. No data were rejected. QC criteria for precision, accuracy, representativeness, and completeness were used to assess and qualify the data and are summarized in the following sections.

7.1 <u>PRECISION</u>

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte. Acceptance or rejection of precision measurements is based on the relative percent difference (RPD) of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result). For total metals, acceptable precision would be a RPD of plus or minus 35% in solid samples and plus or minus 20% in water samples. Precision requirements are derived from the Contract Laboratory Program (CLP) Statement of Work (SOW) (EPA, 1992). For these investigations, precision was assessed only for the laboratory analysis of certain metals on the TAL. The procedures used to assess precision followed the DEQ guidance provided in Appendix A of the QAPP (DEQ-Pioneer Technical Services, 2012b). Precision was determined to be acceptable for all samples collected for TAL analysis.

7.2 ACCURACY

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. The standard deviation (SD) of the laboratory matrix spike was

used to measure accuracy statements for inorganic data. Accuracy acceptance or rejection was based on the percent recovery (% R) of the laboratory matrix spike. Perfect recovery would be 100% (the analysis result is exactly the known concentration of the matrix spike). For total metals, an acceptable accuracy range would be 75% to 125% in solids and in water. Accuracy requirements for this project are derived from the CLP SOW (EPA, 1992). Accuracy was only assessed for the laboratory analysis of metals in the TAL. The procedures used to calculate accuracy followed the DEQ guidance provided in Appendix A of the QAPP (DEQ-Pioneer Technical Services, 2012b). Accuracy was determined to be acceptable for all samples collected for TAL analysis.

7.3 REPRESENTATIVENESS

Representativeness is a qualitative parameter that is addressed through proper design of the sampling program. The sampling program described in the SAP was designed to obtain a sufficient number of samples that adequately represent the range of conditions present in the medium being sampled and specified suitable sampling methods and procedures.

The laboratory results have been reviewed and qualitatively assessed by Pioneer and have been determined to be representative of the conditions at Section 35 and the purpose of this investigation.

7.4 COMPLETENESS

Completeness is assessed to determine if enough valid data have been collected (see Section 10.0 of the QAPP, DEQ-Pioneer Technical Services, 2012b) to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of samples planned for the investigation. The completeness targets for these investigations is 90% or greater. A total of three (3) topsoil composite samples and four (4) base/cover soil and floodplain borrow composite samples were to be tested for metals in the TAL list. Four topsoil composite samples, including one duplicate, and three (3) base/cover soil and floodplain borrow composite samples were actually tested, resulting in 100% sample collection completeness for this investigation. In addition, no results were rejected due to data validation, resulting in 100% sample analysis completeness for this investigation.

7.5 <u>COMPARABILITY</u>

Comparability is assessed to determine if one set of data can be compared to another set of data by determining if an EPA-approved analysis method was used, if values and units are sufficient for the database, if specific sampling points can be established and documented, and if field collection methods were similar. Analysis methods and SOP's for this investigation are included in the QAPP (DEQ-Pioneer Technical Services, 2012b) and sampling locations were documented in the SAP (DEQ-Pioneer Technical Services, 2012a).

The laboratory results have been reviewed and qualitatively assessed by Pioneer and have been determined to be comparable of the conditions at Section 35 and the purpose of this investigation.

8.0 DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

Deviations from the SAP (DEQ-Pioneer Technical Services, 2012a) are as follows:

- The test pit side slopes were to be pushed back to a 1.5H:1V slope and one wall was to be prepared for evaluation and sampling as described in Section 2.3 of the SAP. Due to the consistent *insitu* strength of the soils, the Field Sampling Leader was able to enter all test pits to log and sample to a depth of 4 feet below the ground surface and side slopes did not have to be sloped. Samples were collected from the excavator bucket below 4 feet.
- As anticipated and described in the SAP, the proposed test pit and soil boring locations identified were adjusted as needed in the field based on accessibility and/or field conditions.
- Metals analysis was not conducted on some of the samples collected from the test pit
 investigation. The materials were sampled previously and Pioneer consulted with DEQ
 and determined that collection of certain samples as not necessary. The combination of
 the discrete material samples collected previously and the composite samples collected
 during this investigation provide enough data for design purposes.
- Piezometers were not proposed for the test pits in the SAP. Piezometers were installed in 10 of the 13 test pits as approved by DEQ.
- All new monitoring wells were developed as discussed in Section 2.5.6 of the SAP but will not be sampled unless the pumping test is conducted.
- A pumping well (PW-205O) was to be installed to conduct a pumping test, as described in Section 2.6 of the SAP. The pumping well was not installed for the reasons discussed in Section 6.0. The need for installing the pumping well will be reassessed after the spring 2013 groundwater elevation monitoring work is completed.
- Staff gages were to be installed in Nora Creek and the Blackfoot River, as discussed in Section 2.7 of the SAP. The staff gages were not installed for the reasons discussed in Section 6.0. The need for the installing the staff gages will be reassessed after the spring 2013 groundwater elevation monitoring work is completed.
- A pumping test was to be performed at Section 35, as discussed in Section 2.8 of the SAP. The pumping test was not completed for the reasons discussed in Section 6.0. The need for completing the pumping test will be reassessed after the spring 2013 groundwater elevation monitoring work is completed.
- Two glacial outwash samples were to be submitted for geochemical laboratory testing as shown in Table 2 of the SAP. No glacial outwash samples were collected or tested during the investigation.
- Four base/cover soil and floodplain borrow composite samples were to be submitted for geochemical laboratory testing as shown in Table 2 of the SAP. Only three samples were actually tested. Field duplicate samples were not to be collected for the soil sampling effort. However, one duplicate sample of topsoil was submitted for total metals analysis.
- Groundwater samples were to be collected from all new monitoring wells, as discussed in Sections 2.5.7 and 2.9 of the SAP. Pioneer discussed collection of groundwater analytical samples with DEQ and DEQ determined that the samples collected previously were sufficient and additional sampling was not warranted during this investigation. Therefore samples were not collected or analyzed for this investigation, but may be

- collected prior to the pumping test to determine water discharge quality, if the test is conducted. The need for collecting the groundwater quality samples will be reassessed after the spring 2013 groundwater elevation monitoring work is completed.
- Subsurface data was to be presented in Strater ® logs. Subsurface data is instead presented on GInt® logs.

9.0 HEALTH AND SAFETY

All health and safety procedures were performed in accordance with the Site Specific Health and Safety Plan, which is included as Appendix B of the SAP (DEQ-Pioneer Technical Services, 2012a). Daily Tool Box Meeting Records were completed daily during execution of the field work and will be provided upon request.

No lost time accidents or near misses were recorded during this project.

A cell phone booster was used successfully at Section 35 to improve emergency communication with workers. Pioneer recommends that cell phone boosters be available for use during future design and construction phases of the project.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The data collected during this investigation are suitable to support the repository design. Samples collected from the repository site indicate that the materials will be suitable for constructing the repository cap, and mine site reclamation.

Geotechnical samples and geotechnical drilling results indicate that the site is suitable to construct a repository.

Groundwater elevation data collected at the site indicate that the site should be suitable for siting the repository. Small but manageable quantities of water are present in the glacial materials at some locations as anticipated.

The pumping test was not completed because it was determined that the well location and zone of influence would not yield data relevant to the entire repository site. Instead, Pioneer installed 22 additional transducers and presented a plan for collecting additional spring groundwater water elevation data to support the design effort. After the spring groundwater elevation data are collected and analyzed, if interactions between the water in the overlying outwash and the underlying bedrock aquifer system exist, they can be better defined. The need for a pumping test will be revisited once the spring data are collected and analyzed.

In aggregate, the data collected during this investigation are sufficiently complete to proceed with a repository design.

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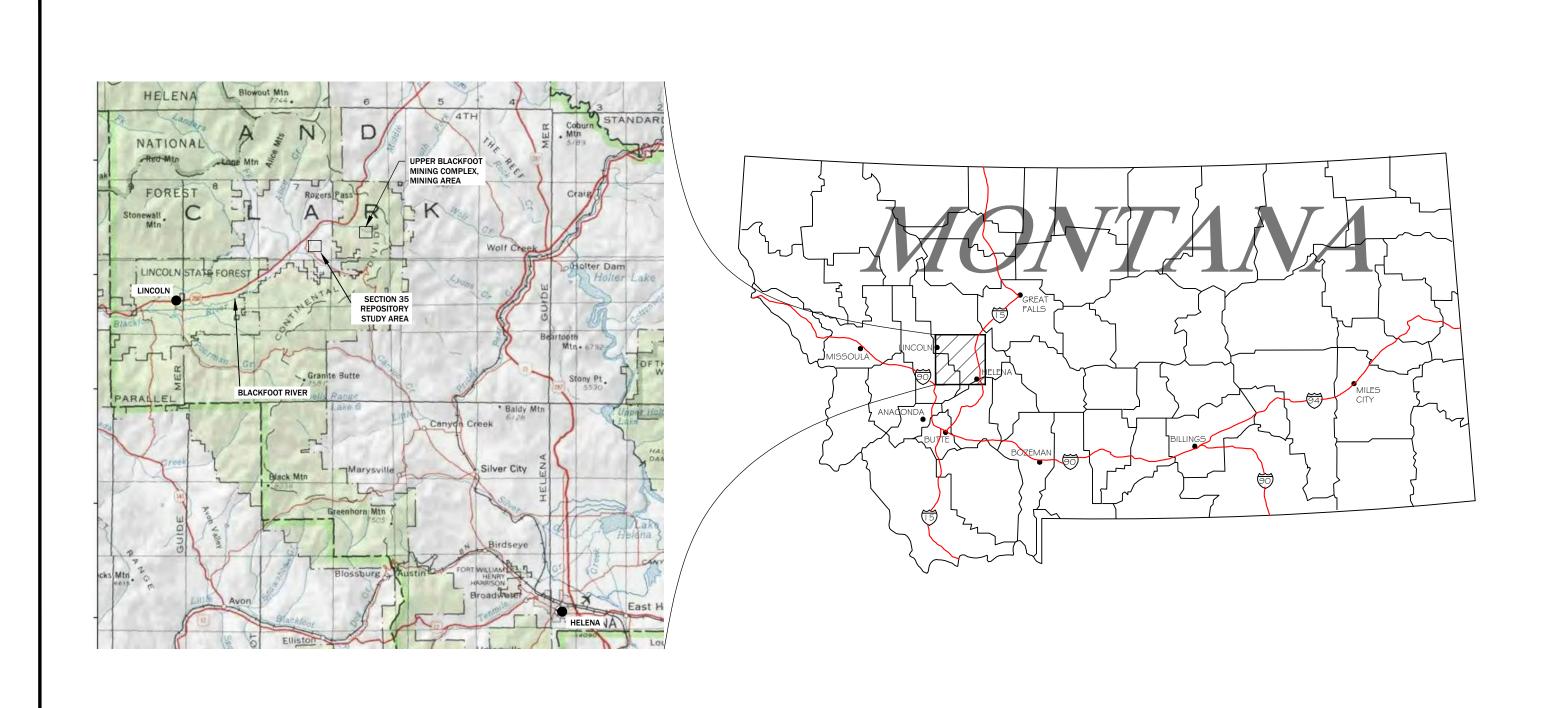
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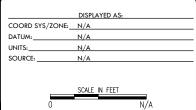
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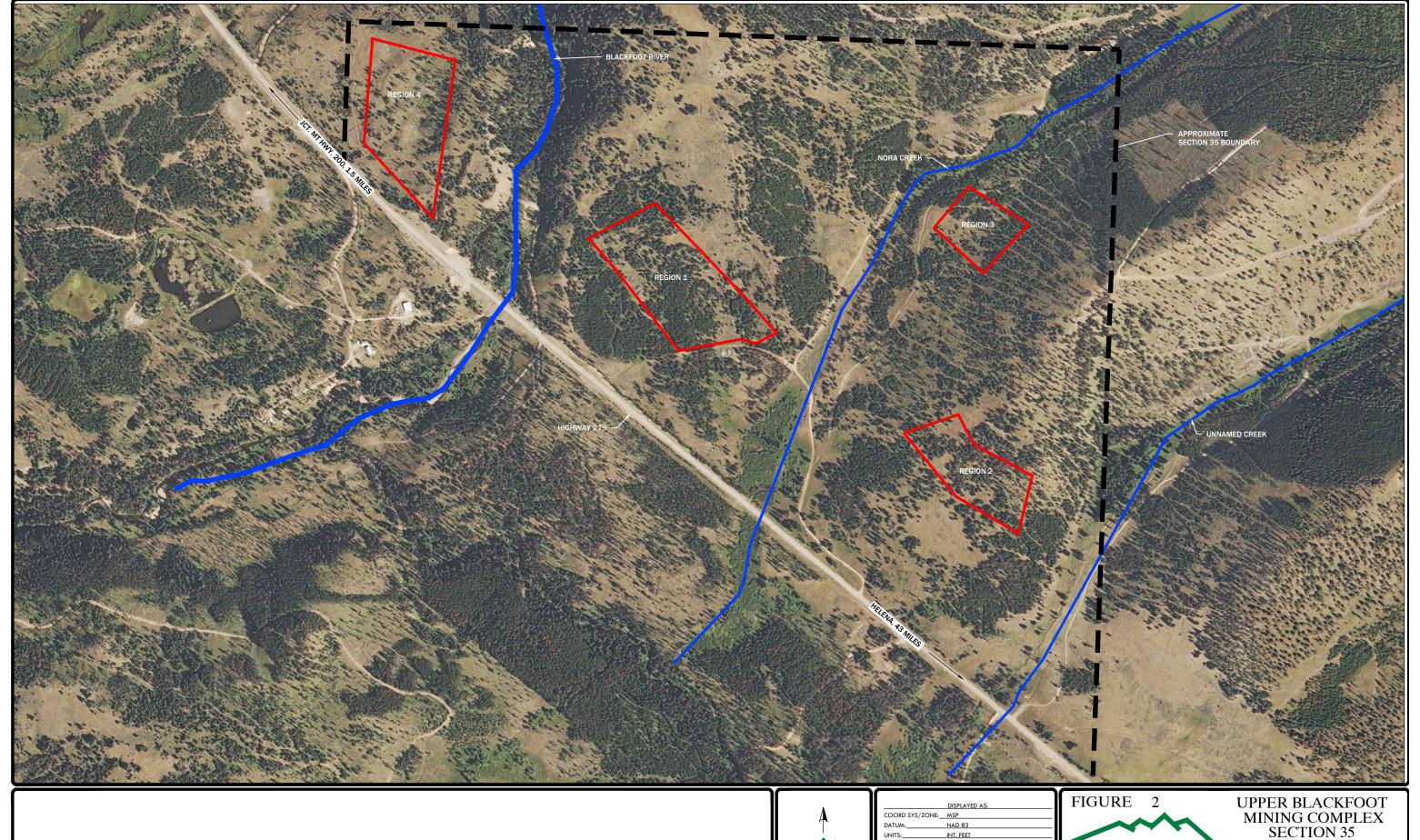


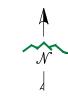




UPPER BLACKFOOT MINING COMPLEX SECTION 35 PROJECT LOCATION MAP

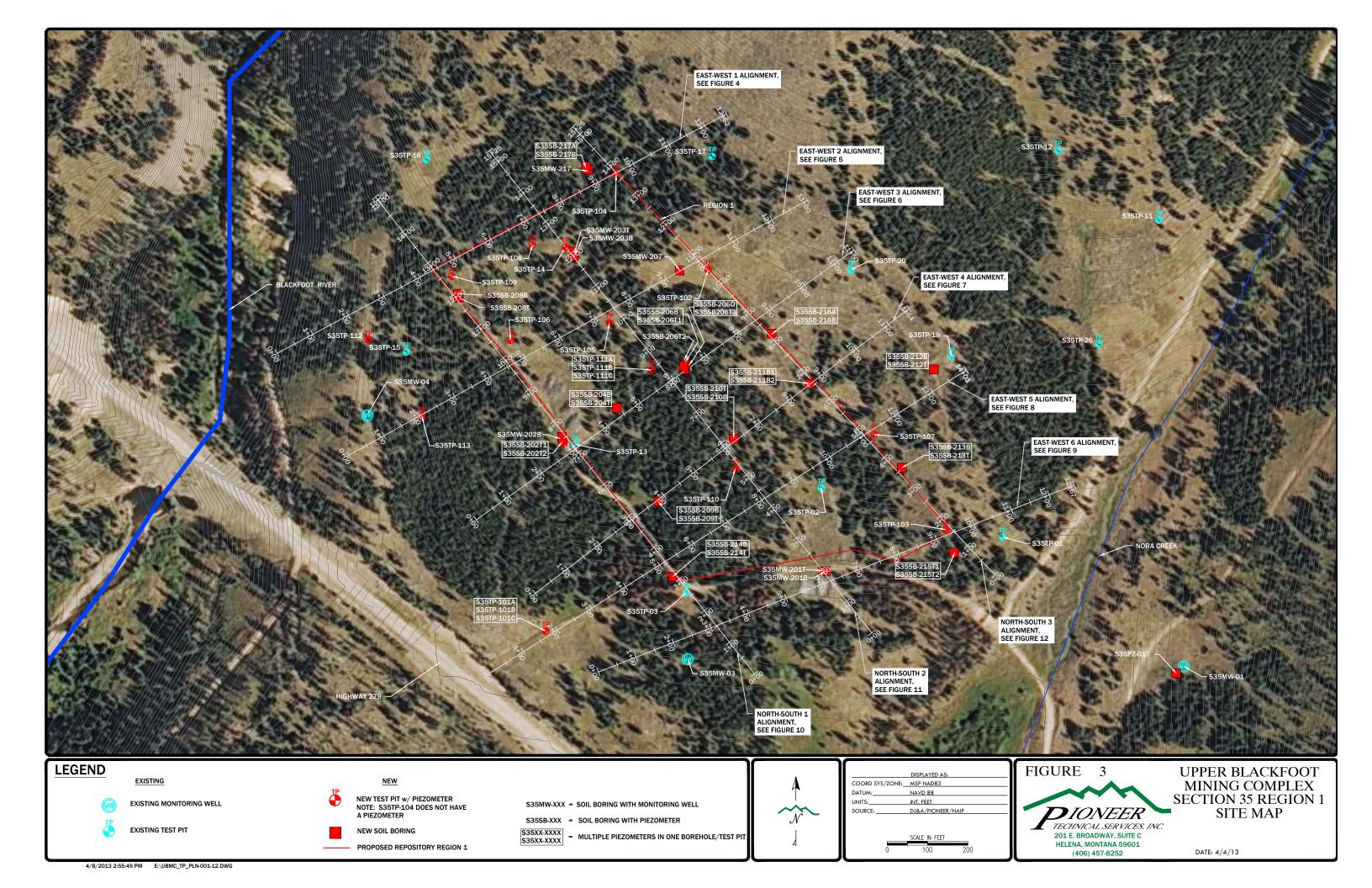
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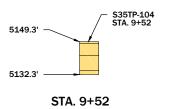


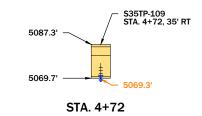


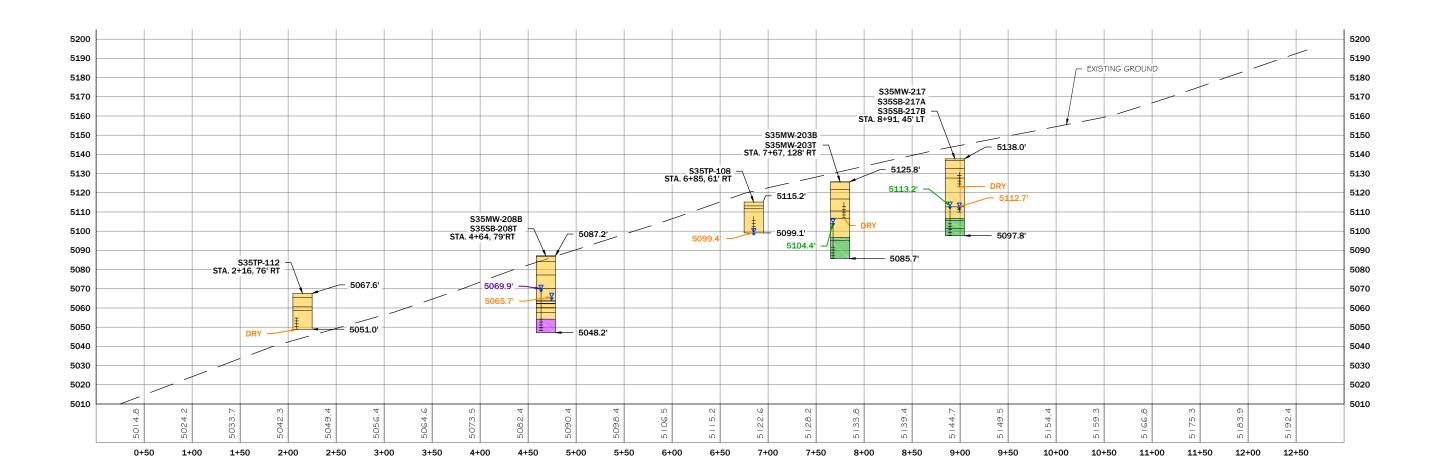


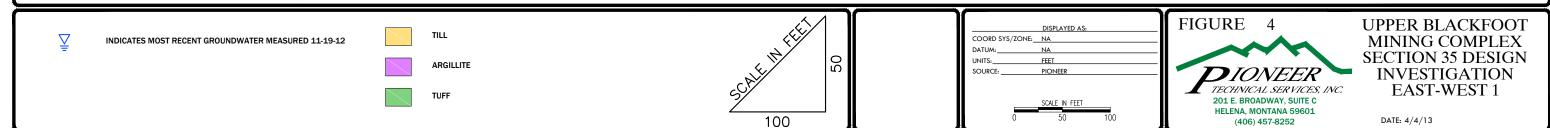
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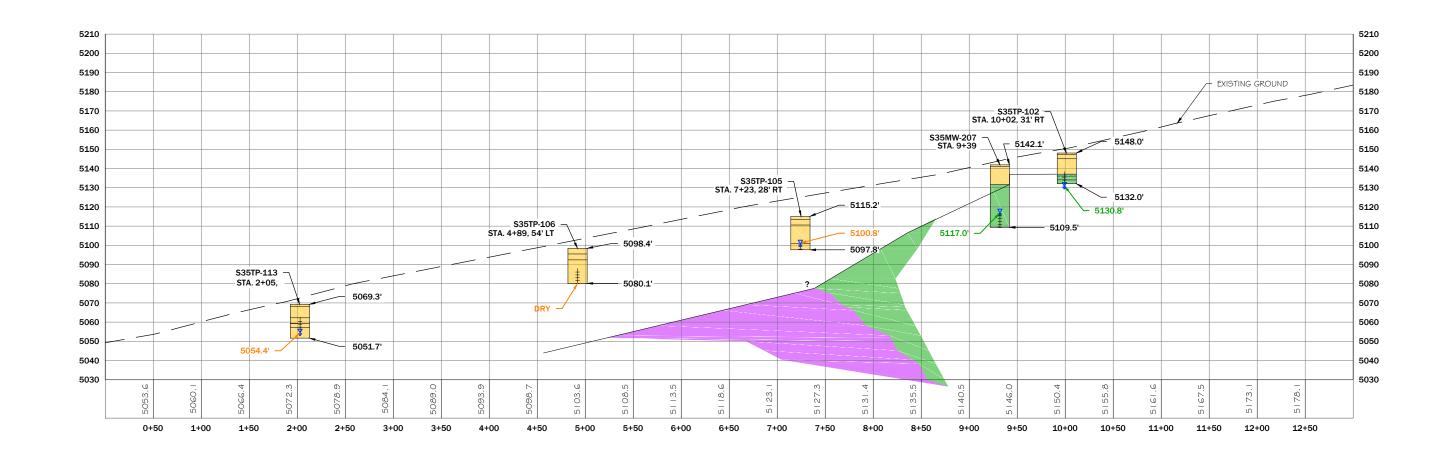


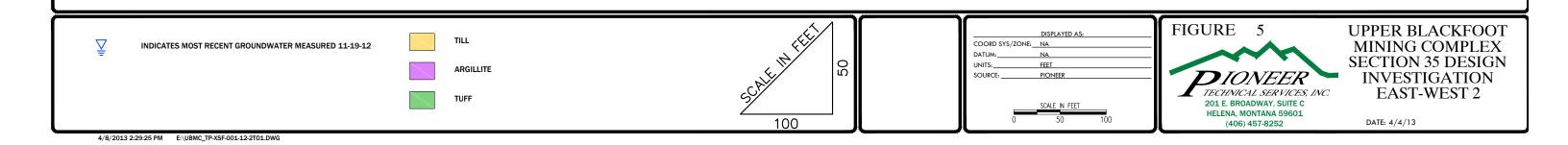


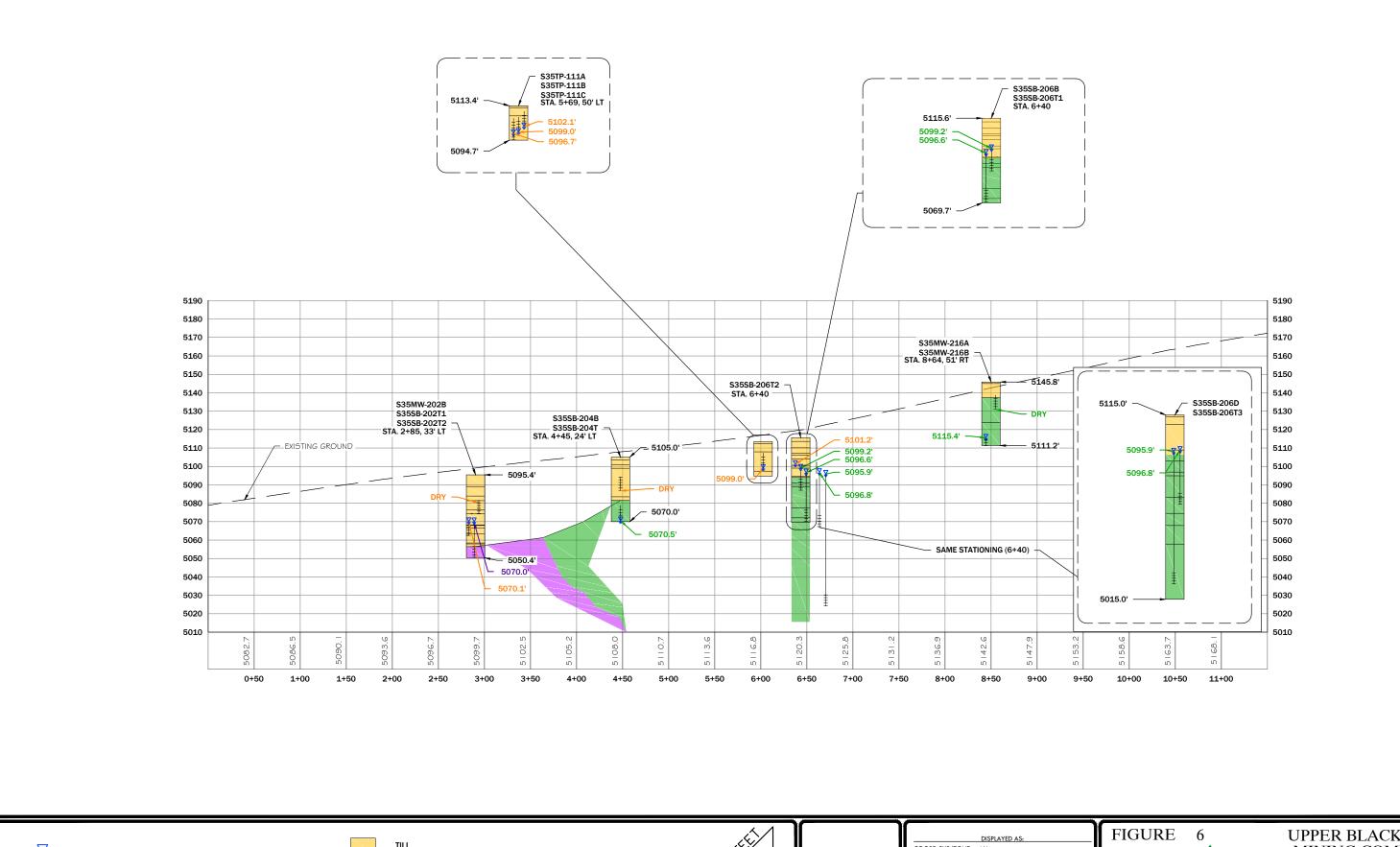


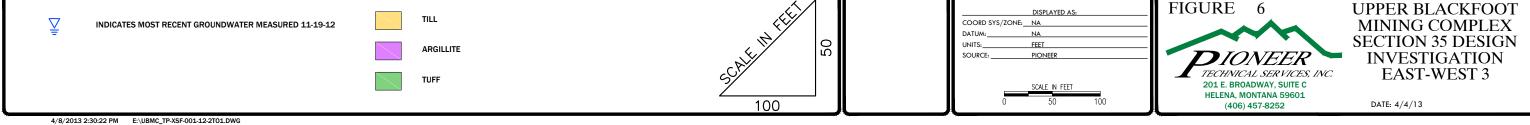




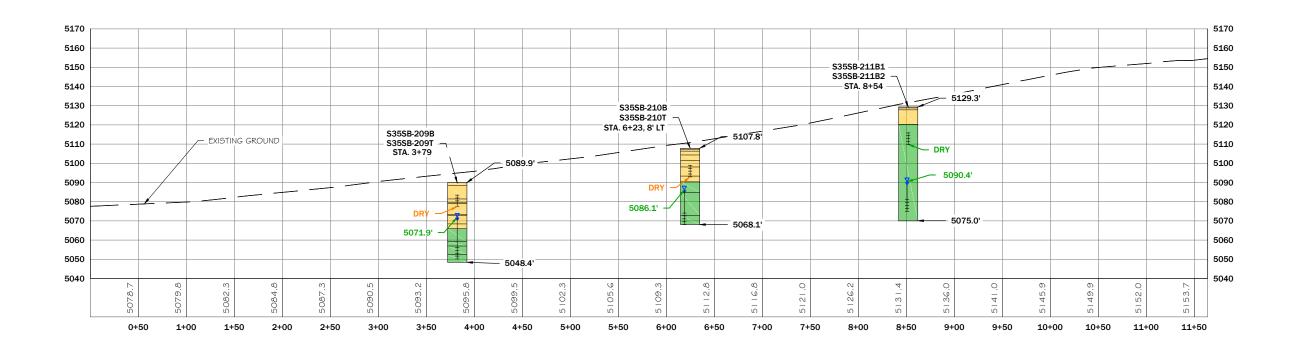


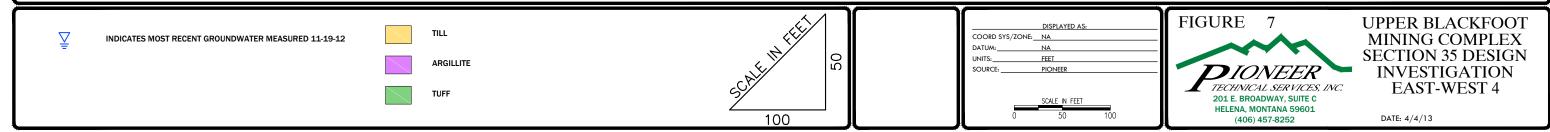


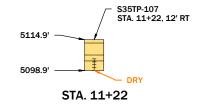


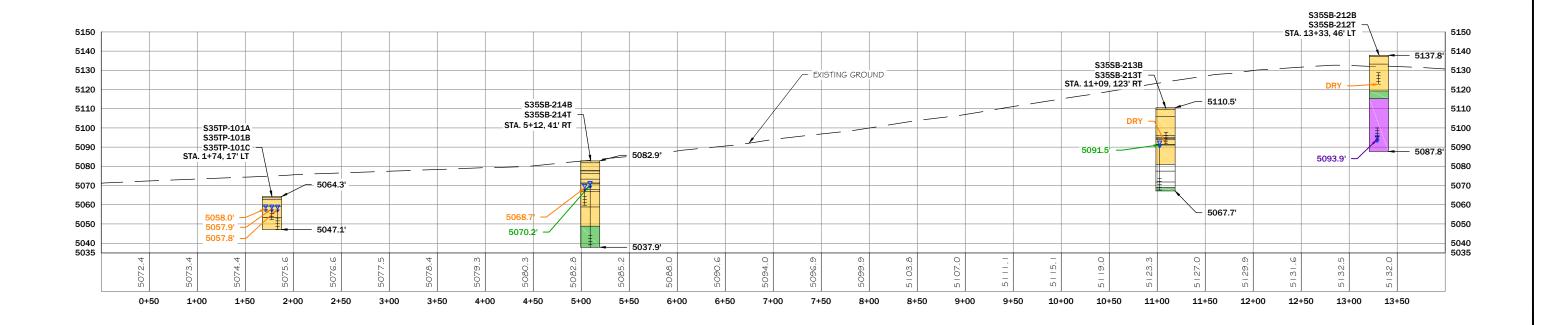


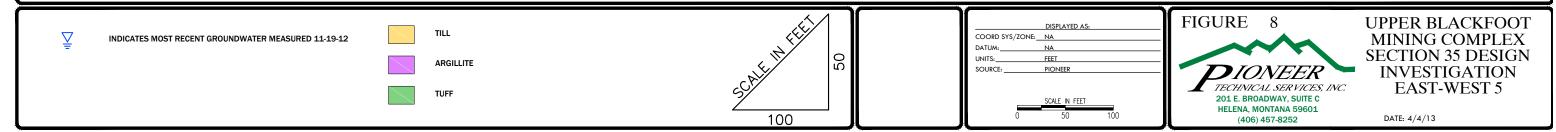


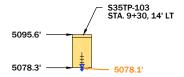




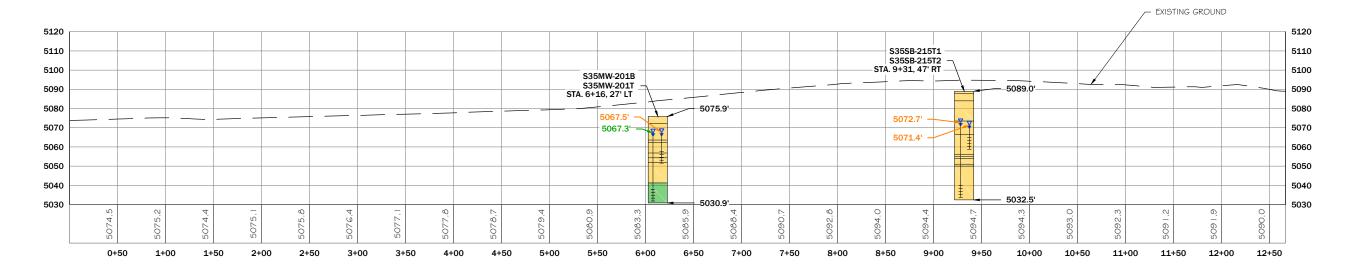


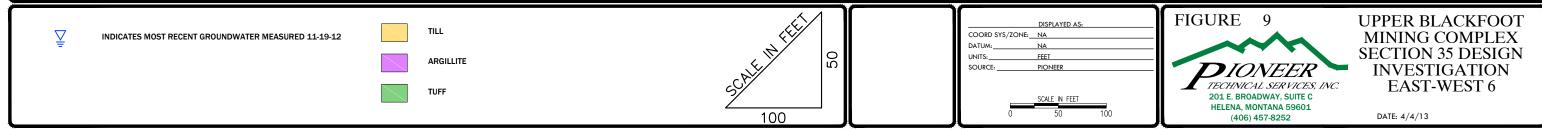


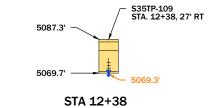


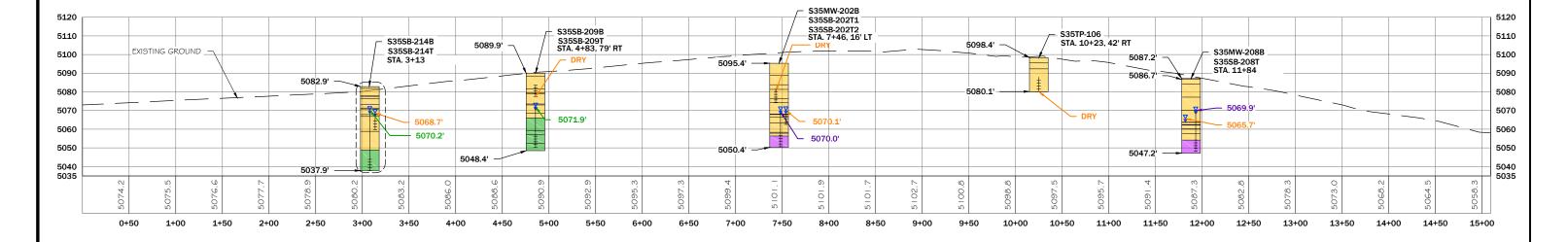


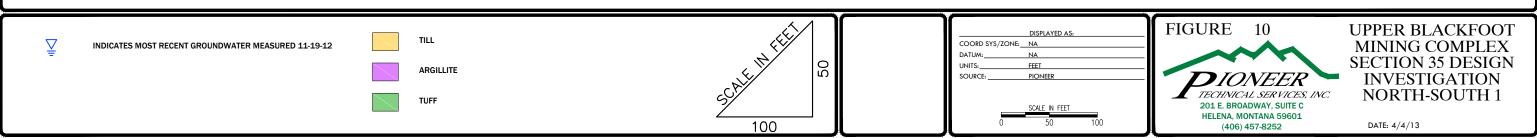
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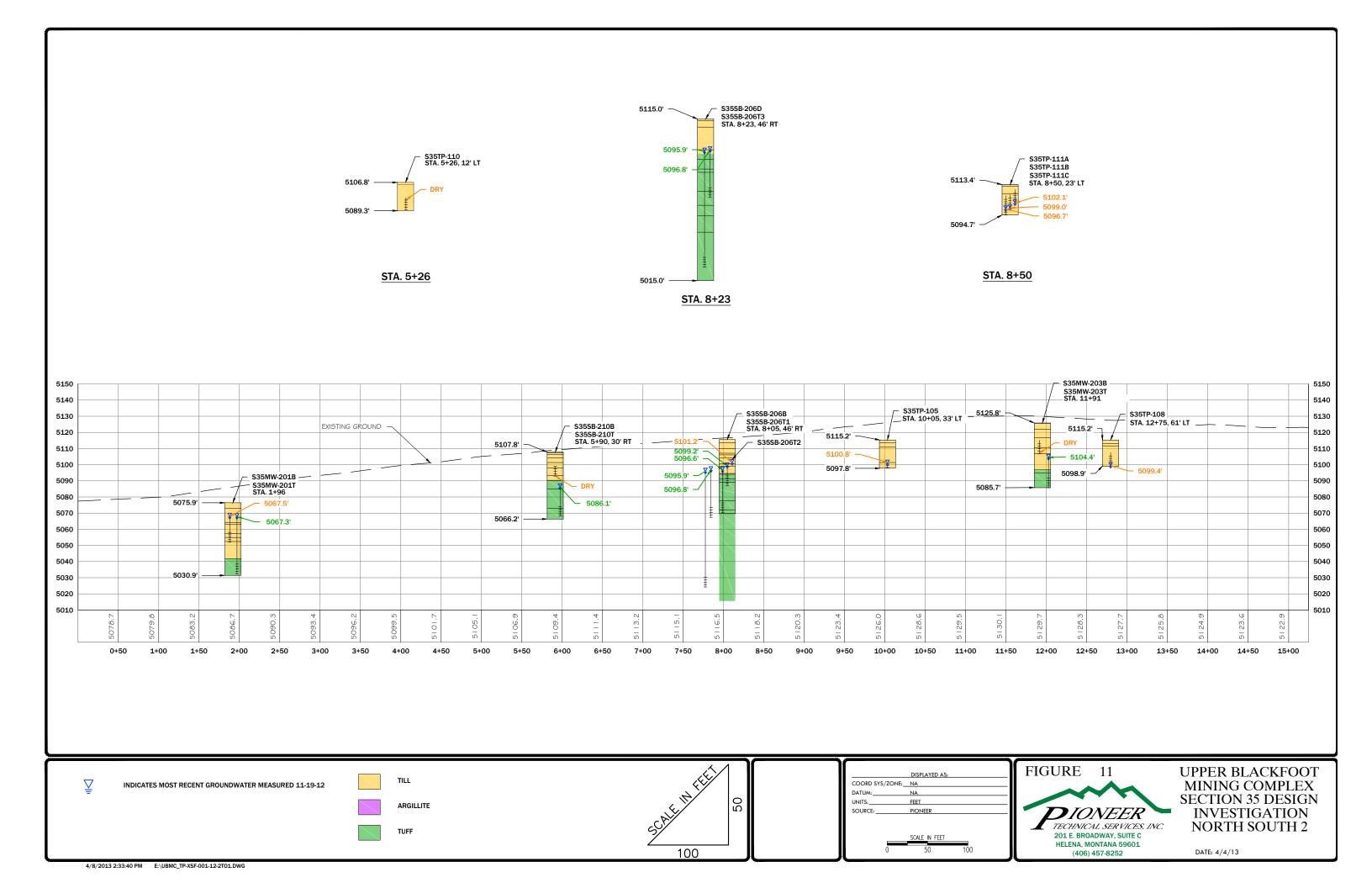












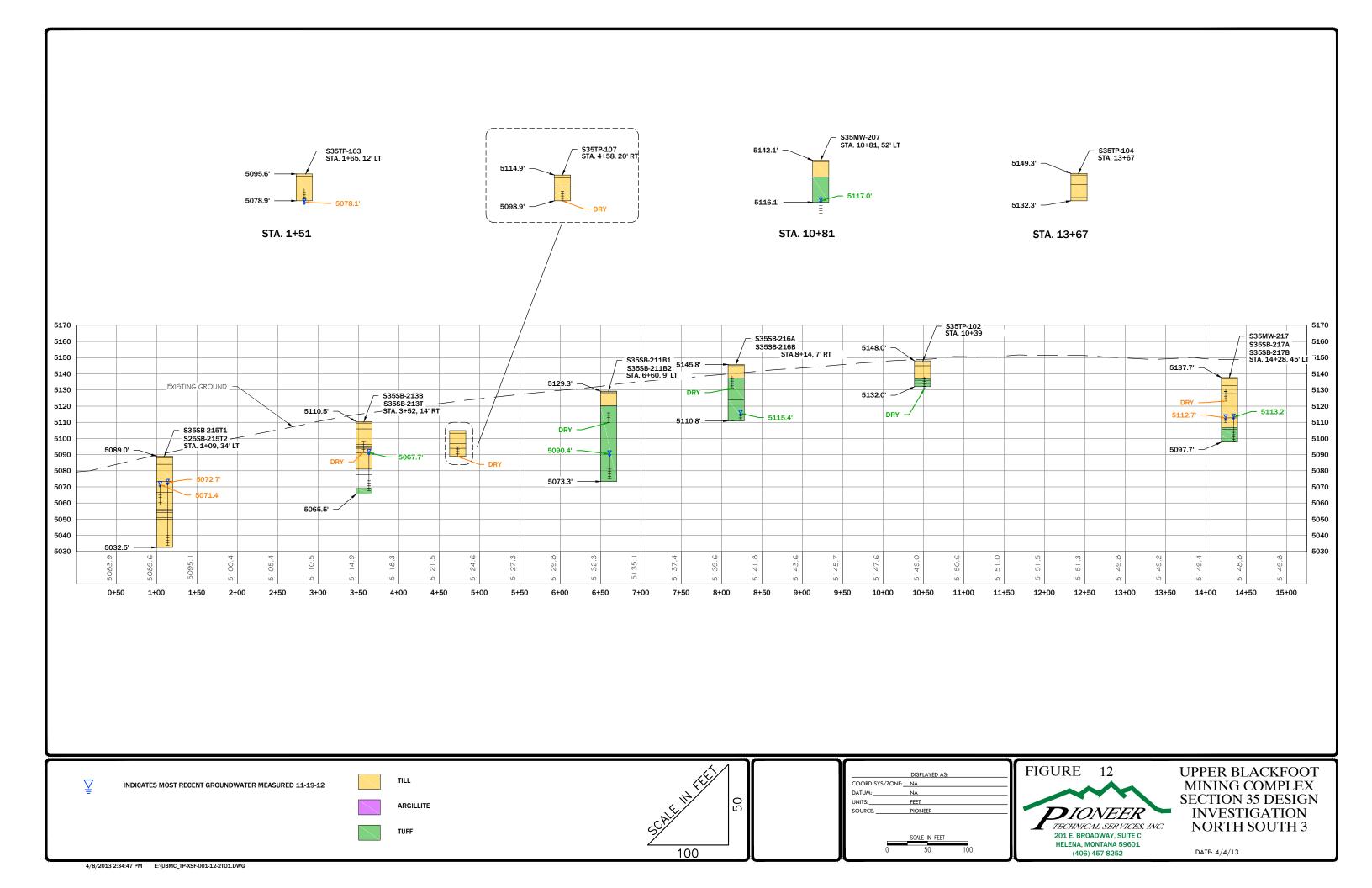


Table 1 UMBC Section 35 Design Investigation Test Pit Composite Sample Summary

	T
Combined Sample Sample ID	Samples to Combine (1,2)
	TP-101 (2.5-3.5)
	TP-101 (8.2-9.2)
G25 DCT 01	TP-113 (1.3-3.5)
S35-BGT-01	TP-113 (16-17)
	TP-112 (2-4.5)
	TP-112 (15-16)
	TP-110 (4-5)
	TP-110 (9-10)
S35-BGT-02	TP-111 (1-4.7)
333-DG1-02	TP-111 (10.5-11.5)
	TP-105 (3-9)
	TP-108 (8.5-9.5)
	TP-104 (1-4.5)
	TP-104 (7-10)
S35-BGT-03	TP-107 (1.7-5.2)
	TP-107 (9-10)
	TP-102 (0.7-3.7)
	TP-101 (0-0.7)
S35-CS-01;	TP-101 (0.7-1.7)
S35-CS-01 (Dup)	TP-113 (0-1.2)
	TP-112 (0-2)
	TP-110 (0-1.3)
S35-CS-02	TP-111 (0-1.0)
555 65 02	TP-105 (0-1.7)
	TP-108 (0-2.1)
S35-CS-03	TP-107 (0-1.7)
555 C5 05	TP-102 (0-0.7)

NOTES:

- 1) Samples that originate from a larger bulk sample container reduced to the required size with a sample splitter.
- 2) Unused sample splits stored for future testing needs.

									Geotechnical	Properties	
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Mechanical Sieve with Hydrometer Analysis (ASTM D422) (3)	(AS	rberg L TM D4	318)	Moisture Content (ASTM D2216) ⁽⁸⁾	Specific Gravity -#10 Fraction (ASTM D854 or D6473)	Standard Proctor Max. Dry Unit Weight (ASTM D698)
025FP 104	***************************************	(7.0.10.0)	66		% Passing #200	PL	LL	PI	(wt %)	• 10	(pcf)
S35TP-104	H12120317-007	(7.0-10.0)	GC	В	38	15	26	11	10	2.68	
S35TP-106	H12120317-008	(8.4-9.4)	GC	В	20	14	23	9	8	2.67	
S35TP-107	H12120317-009	(9.0-10.0)	SM	В	14	NP	NV	NP	6	2.68	
S35TP-111	H12120317-010	(10.5-11.5)	GC	В	27	15	23	8	10	2.69	
S35TP-113	H12120317-011	(1.5-3.5)	GW	В	4.1	NP	NV	NP	3	2.66	NA ⁽⁷⁾
S35-BGT-01	H12120317-001		Composite (2)		11				7	2.68	
S35-BGT-02	H12120317-002		Composite (2)		28				10	2.68	
S35-BGT-03	H12120317-003		Composite (2)		25				7	2.69	
			•								
S35-CS-01	H12120317-004		Composite (2)		39				8	2.65	
S35-CS-01 (Dup)	H13010211-001		Composite (2)								
S35-CS-02	H12120317-005		Composite (2)		47				15	2.53	
S35-CS-03	H12120317-006		Composite (2)		41				11	2.57	

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ). April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

				Sample Type (1)				Agronomic Pr	operties		
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Organic Matter Content (ASA #9, ASA 29-3)	pH, Saturated Paste (ASAM10-3.2)	Conductivity, Saturated Paste (ASAM10-3)	Sodium Adsorption Ratio (USDA20b)	Saturation Percentage (USDA27a)	Cation Exchange Capacity (USDA 60, 19 (EPA 6010B))	Fertilizer Recommendation Analysis (N/K/P) ⁽⁶⁾ (N-ASA#9 (33-8); K-ASA #9 (13-3); P-ASA#9 (24-5))
S35TP-104	H12120217 007	(7.0.10.0)	CC	D.	(%)	(s.u.)	(mmhos/cm)	(unitless)	(%)	(meq/100g)	(lbs / acre)
S35TP-104 S35TP-106	H12120317-007	(7.0-10.0)	GC GC	<u>В</u> В	<0.2	7.6 7.3	0.3	0.2	33.2	11.6	
S35TP-100 S35TP-107	H12120317-008 H12120317-009	(8.4-9.4) (9.0-10.0)	1		<0.2 <0.2	7.9	0.3	0.2	27.8 19.5	10.3 4.89	
S35TP-107 S35TP-111	H12120317-009	(10.5-11.5)	1	D D	<0.2	7.8	0.2	0.1	29.0	9.52	
S35TP-111	H12120317-010	` '	SM B				0.4		24.6		
		(1.5-3.5)		D	<0.2	6.8		0.1		3.33	(6)
S35-BGT-01	H12120317-001		Composite (2)		< 0.2	7.2	0.4	0.3	24.0	9.75	(35/50/30) ⁽⁶⁾
S35-BGT-02	H12120317-002		Composite (2)		< 0.2	7.1	0.3	0.2	29.8	11.3	$(35/50/50)^{(6)}$
S35-BGT-03	H12120317-003		Composite (2)		0.3	6.8	0.5	0.2	32.4	14.2	(35/30/30) ⁽⁶⁾
S35-CS-01	H12120317-004		Composite (2)		1.5	5.7	0.5	0.2	32.3	16.9	(35/30/0) ⁽⁶⁾
S35-CS-01 (Dup)	H13010211-001		Composite (2)								
S35-CS-02	H12120317-005		Composite (2)		2.8	5.7	0.3	0.2	38.8	23.0	$(35/0/0)^{(6)}$
S35-CS-03	H12120317-006		Composite (2)		4.1	5.7	0.2	0.1	45.5	27.0	$(35/0/0)^{(6)}$

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ).
- April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

						Physical Proj	perties	
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Hydrometer (%Sand, Silt, Clay) (ASA #9 Part 1, Method 15-5)	USDA Texture (ASA #9, Part 1, Method 15-5)	Point (SSSA pt. 4)	Field Capacity (SSSA pt. 4)
S35TP-104	H12120317-007	(7.0-10.0)	GC	В	(%)	Classification	(-15 bar wt%)	(-1/3 bar wt%)
S35TP-104 S35TP-106	H12120317-007 H12120317-008	(8.4-9.4)	GC	В В	(43,34,23) (59,23,18)	Loam Sandy Loam	9.6 7.5	19 17
S35TF-100 S35TP-107	H12120317-008	(9.0-10.0)	SM	В	(76,19,5)	Loamy Sand	2.9	10
S35TP-111	H12120317-009	(10.5-11.5)	GC	В	(52,30,18)	Sandy Loam	7.3	17
S35TP-113	H12120317-011	(1.5-3.5)	GW	В	(80,10,10)	Sandy Loam	4.7	8.6
S35-BGT-01	H12120317-001	(110 010)	Composite (2)		(61,22,16)	Sandy loam	6.2	15
S35-BGT-02	H12120317-002		Composite (2)		(51,30,19)	Loam	7.9	18
S35-BGT-03	H12120317-003		Composite (2)		(54,31,14)	Sandy Loam	9.0	19
			•			•		
S35-CS-01	H12120317-004		Composite (2)		(39,43,18)	Loam	9.4	21
S35-CS-01 (Dup)	H13010211-001		Composite (2)					
S35-CS-02	H12120317-005		Composite (2)		(42,43,14)	Loam	11.0	26
S35-CS-03	H12120317-006		Composite (2)		(42,42,17)	Loam	12.0	29

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ). April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

								ABA/SMP			
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Sulfur, Total (Modified Sobek, USDA 60, Method 23c)	Neutralization Potential (Modified Sobek, USDA 60, Method 23c)	Acid Potential (Modified Sobek, USDA 60, Method 23c)	Acid/Base Potential (Modified Sobek, USDA 60, Method 23c)	Total Exchangeable Acidity (TEA) (ASA#9 (9-4))	SMP Buffering Capacity (ASA#9 (12-3))	Lime Requirement, SMP Buffer (ASA#9 (12-3))
					(%)	(tons/1000)	(tons/1000)	(tons/1000)	(meq/100g)	(pH s.u.)	tons/1000
S35TP-104	H12120317-007	(7.0-10.0)	GC	В	< 0.01	23	< 0.3	23	0.95	7.6	<1
S35TP-106	H12120317-008	(8.4-9.4)	GC	В	< 0.01	7	< 0.3	7	1.5	7.6	<1
S35TP-107	H12120317-009	(9.0-10.0)	SM	В	< 0.01	26	< 0.3	26	1.1	7.6	<1
S35TP-111	H12120317-010	(10.5-11.5)	GC	В	< 0.01	22	< 0.3	22	0	7.6	<1
S35TP-113	H12120317-011	(1.5-3.5)	GW	В	< 0.01	6	< 0.3	7	2.9	7.5	<1
S35-BGT-01	H12120317-001		Composite (2)		< 0.01	13	<0.3	13	0.95	7.6	<1
S35-BGT-02	H12120317-002		Composite (2)		< 0.01	10	<0.3	10	1.4	7.6	<1
S35-BGT-03	H12120317-003		Composite (2)		< 0.01	14	<0.3	14	2.8	7.4	<1
S35-CS-01	H12120317-004		Composite (2)		< 0.01	9	<0.3	9	6.2	6.8	<1
S35-CS-01 (Dup)	H13010211-001		Composite (2)								
S35-CS-02	H12120317-005		Composite (2)		< 0.01	8	<0.3	9	9.8	6.4	4.0
S35-CS-03	H12120317-006		Composite (2)		< 0.01	10	<0.3	10	12	6.2	5.0

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ). April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

								TAL Metals			
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Total Aluminum (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 77,000 mg/kg	Total Antimony (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 31 mg/kg	Total Arsenic (EPA 6010/6020 prep 3050B) AL ⁽⁵⁾ = 40 mg/kg	Total Barium (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 15,000 mg/kg	Total Cadmium (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 70 mg/kg	Total Chromium (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 280 mg/kg	Total Copper (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 3,100 mg/kg
G25TP 101	************	(F. 0. 4.0.0)			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
S35TP-104	H12120317-007	(7.0-10.0)	GC	В	9,530	<1	7	216	<1	20	17
S35TP-106	H12120317-008	(8.4-9.4)	GC	В	9,620	< 1	5	146	<1	12	22
S35TP-107	H12120317-009	(9.0-10.0)	SM	В	4,970	<1	5	232	<1	/	13
S35TP-111	H12120317-010	(10.5-11.5)	GC	Б	8,540	< 1	3	192	<1	12	14
S35TP-113	H12120317-011	(1.5-3.5)	GW	В	7,900	< 1	6	132	<1	12	15
S35-BGT-01	H12120317-001		Composite (2)		8,380	< 1	7	166	<1	14	17
S35-BGT-02	H12120317-002		Composite (2)		10,100	< 1	6	195	<1	13	18
S35-BGT-03	H12120317-003		Composite (2)		11,800	< 1	7	191	<1	16	15
S35-CS-01	H12120317-004		Composite (2)		16,300	< 1	21	254	1	19	113
S35-CS-01 (Dup)	H13010211-001		Composite (2)		16,300	<1	21	269	<1	21	106
S35-CS-02	H12120317-005		Composite (2)		16,400	< 1	6	315	<1	16	18
S35-CS-03	H12120317-006		Composite (2)		18,100	< 1	6	326	<1	17	18

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ). April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

								TAL Metals			
Sample ID	Lab ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type (1)	Total Iron (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 55,000 mg/kg	Total Lead (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 400 mg/kg	Total Manganese (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 1,800 mg/kg	Total Mercury (EPA SW7471A) RSL ⁽⁴⁾ = 10 mg/kg	Total Nickel (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 1,500 mg/kg	Total Silver (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 390 mg/kg	Total Zinc (EPA 6010/6020 prep 3050B) RSL ⁽⁴⁾ = 23,000 mg/kg
C25TD 104	1112120217 007	(7.0.10.0)	CC.		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
S35TP-104 S35TP-106	H12120317-007	(7.0-10.0)	GC GC	В	13,400	10 20	341 328	< 0.50 < 0.50	17	< 1	39
S35TP-106 S35TP-107	H12120317-008 H12120317-009	(8.4-9.4) (9.0-10.0)	SM	B B	13,200 9,420	20	293	< 0.50	8	<1	42 26
S35TF-107 S35TP-111	H12120317-009	(10.5-11.5)	GC	B B	11,600	10	308	< 0.50	11	<1	35
S35TP-113	H12120317-010	(1.5-3.5)	GW	B	15,100	10	283	< 0.50	13	<1	42
		(1.3-3.3)		ь	,						
S35-BGT-01	H12120317-001		Composite (2)		13,600	12	350	< 0.50	14	< 1	43
S35-BGT-02	H12120317-002		Composite (2)		13,500	11	400	< 0.50	15	< 1	41
S35-BGT-03	H12120317-003		Composite (2)		14,500	11	335	< 0.50	15	< 1	39
S35-CS-01	H12120317-004		Composite (2)		16,000	548	603	< 0.50	14	1	273
S35-CS-01 (Dup)	H13010211-001		Composite (2)		16,300	630	718	< 0.50	14	2	267
S35-CS-02	H12120317-005		Composite (2)		14,600	12	531	< 0.50	14	< 1	62
S35-CS-03	H12120317-006		Composite (2)		14,600	11	399	< 0.50	13	< 1	61

NOTES:

- 1) B = Bulk/Grab Sample.
- 2) Refer to Table 1 for composite sample components.
- 3) See Table 3 and Appendix C.1 of DSR for complete gradation results.
- 4) RSL = Nov 2012 Regional Screening Levels for chemical contaminants at Superfund Sites (DEQ).
- April 2009 Regional Screening Levels referenced for Total Chromium.
- 5) AL = DEQ Action level for Arsenic in surface soil (DEQ Remediatoin Division 2005).
- 6) Complete fertilizer recommendations provided in Appendix D of DSR.
- 7) Material too coarse to run proctor. No value obtained.
- 8) See Appendix C.1 of DSR for a complete list of Moisture Content results.
 - = Soil concentration exceeds the Regional Screening Level.

Table 3
UBMC Section 35 Design Investigation
Test Pit Laboratory Gradation Test Data Summary

				ASTM D2488 USCS		Particle S	ize Distributio	n ASTM D422	
Sample I.D.	Sample Depth (ft)	Sample Type ⁽¹⁾	ASTM D2488 General Material Description	Classification Based on Lab Testing	Passing 3" (%) Passing	Passing #4 (%) Passing	Passing #10 (%) Passing	Passing #20 (%) Passing	Passing 0.005 mm (%) Finer
S35TP-104	(7.0-10.0)	В	clayey gravel with sand	GC	100	68	61	38	18.0
S35TP-106	(8.4-9.4)	В	clayey gravel with sand	GC	100	58	44	20	9.0
S35TP-107	(9.0-10.0)	В	silty sand with gravel	SM	100	61	46	14	3.0
S35TP-111	(10.5-11.5)	В	clayey gravel with sand	GC	100	59	50	27	12.0
S35TP-113	(1.5-3.5)	В	well-graded gravel with sand	GW	100	46	20	4.1	2.0
S35-BGT-01		C	Composite (2)		100	43	25	11	5.0
S35-BGT-02		C	Composite (2)		100	66	51	28	13.0
S35-BGT-03		C	Composite (2)		100	61	46	25	9.0
S35-CS-01		C	Composite (2)		100	66	61	39	15.0
S35-CS-02		C	Composite (2)		100	86	76	47	18.0
S35-CS-03			Composite (2)		100	73	65	41	16.0

NOTES:

2) Refer to Table 1 for composite sample components.

¹⁾ B = Bulk/Grab Sample

Sample ID	Sample Intervals (ft)	USCS Group Symbol	Sample Type ⁽¹⁾	Mechanical Sieve with Hydrometer Analysis ⁽²⁾ (ASTM D422)	Atter	rberg L TM D4.		Moisture Content (ASTM D2216) (3)	Specific Gravity (ASTM D854 or D6473)	Consolidation Testing (ASTM D2435) (4)	Permeability - Back Pressure TX/Pbp by constant head (ASTM D5084) (4)	CU Triaxial - Saturated with Pore Water Pressure (ASTM D4767) (4)	CU Triaxial - Saturated with Porewater Pressure - Staged (ASTM D4767) (4)
					PL	LL	PI	(%)			cm/sec	(ASTM D4707)	(ASTMID4707)
S35MW-203B	(20.0-20.8)		ST	X	14	30	16		2.65		5.1E-08		X
S35SB-206B	(15.0-15.5)		BL								1.6E-08	X	
S35SB-206B	(15.5-16.0)	SC	BL	X	16	36	20					X	
S35SB-206B	(16.0-16.5)		BL						2.60			X	
S35SB-206B	(35.0-36.5)		SS	X	21	48	27	15					
S35MW-208B	(20.0-20.7)		ST	X	14	29	15	10					
S35SB-211B	(9.0-9.5)	CL	ST	X	12	41	29		2.70		2.6E-06		X
S35SB-213B	(40.0-40.8)		ST	X	15	39	24		2.67	X	3.2E-08		X
S35MW-217	(25.0-25.9)	GC	ST	X	13	26	13		2.62	X			

NOTES:

- 1) B: Bulk/Grab Sample, BL: 2.5" California Brass Liners, SS: 2" or 3" Dia. Split Spoon, ST: 3" Dia. Shelby Tube.
- 2) See Table 5 and Appendix C.2 of DSR for complete gradation results.
- 3) See Appendix C.2 of DSR for a complete list of Moisture Content results.
- 4) See Appendix C.2 of DSR for complete test results.

Table 5
UBMC Section 35 Design Investigation
Soil Boring Laboratory Gradation Data Summary

			ACTIVE DAMAGE CO. LANCE AND ALLE	ASTM D2488 USCS		Particle	Size Distributi	on ASTM D422	
Sample I.D.	Sample Depth (ft)	Sample Type ⁽¹⁾	ASTM D2488 General Material Description	Classification Based on Lab Testing	Passing 3"	Passing #4 (%) Passing	Passing #10 (%) Passing	Passing #200 (%) Passing	Passing 0.005 mm (%) Finer
S35SB-203B	(20.0-20.8)	ST	clayey gravel with sand	GC	100	61	48	31	17
S35SB-206B	(15.0-16.5)	BL	clayey sand with gravel	SC	100	80	65	41	23
S35SB-206B	(35.0-36.5)	SS	sandy lean clay	CL	100	94	84	51	29
S35SB-208B	(20.0-20.7)	ST	clayey sand with gravel	SC	100	58	51	31	16
S35SB-211B	(9.0-9.5)	ST	sandy lean clay	CL	100	99	92	62	28
S35SB-213B	(40.0-40.8)	ST	clayey sand with gravel	SC	100	71	60	40	25
S35MW-217	(25.0-25.9)	ST	clayey gravel with sand	GC	100	63	50	28	13

NOTES:

1) B: Bulk/Grab Sample, BL: 2.5" California Brass Liner, SS: 2" or 3" Dia. Split Spoon, ST: 3" Dia Shelby Tube.

Table 6
UBMC Section 35 Design Investigation
Monitoring Well and Piezometer Installation Summary

									Top of PVC	Ground	Bottom of Screen	Screen	Filter Pack	Depth of	Transducer	PVC Casing	
Monitoring Well or		Completion	Total Depth	Total PVC	Depth to	Water	Northing	Easting	Casing Elevation	Elevation	Interval Elevation	Interval	Interval	Transducer	Elevation	Diameter	Stickup
Piezometer ID	Logged By	Date	(ft bgs) ⁽¹⁾	Depth (ft) ⁽¹⁾	Water (ft)(2)	Level Date	SP-N83 (IF)	SP-N83 (IF)	NAVD88 (ft)	NAVD88 (ft)	NAVD88 (ft)	(ft bgs) ⁽¹⁾	(ft bgs) ⁽¹⁾	$(\mathbf{ft})^{(2)}$	NAVD88 (ft)	(in)	(ft ags) ⁽³⁾
S35MW-201T	M. Browne	11/1/2012	44.00	24.15	11.65	11/19/2012	1020346.98	1233668.82	5079.19	5075.78	5051.63	19.2-24.2	19.2-24.2	25.14	5054.05	2	3.41
S35MW-201B	M. Browne	11/1/2012	44.00	44.00	12.18	11/19/2012	1020347.09	1233675.78	5079.51	5075.91	5031.91	39-44	37-44	45.20	5034.31	2	3.60
S35SB-202T1	J. Riedel	10/12/2012	33.89	22.18	Dry	11/19/2012	1020667.81	1233022.44	5097.85	5096.39	5074.22	17.2-22.2	17.2-22.2	N/A	N/A	1	1.45
S35SB-202T2	J. Riedel	10/12/2012	33.89	33.89	27.67	11/19/2012	1020667.87	1233022.24	5097.75	5096.46	5062.58	28.9-33.9	28.9-33.9	32.75	5065.00	1	1.28
S35MW-202B	J. Riedel	10/11/2012	45.00	44.77	29.47	11/19/2012	1020673.87	1233018.56	5099.51	5095.36	5050.59	39.8-44.8	39.8-44.8	46.50	5053.01	2	4.15
S35MW-203T	M. Browne	10/30/2012	20.00	19.04	Dry	11/19/2012	1021133.63	1233052.98	5127.68	5125.92	5106.88	14-19	13-19	N/A	N/A	2	1.76
S35MW-203B	M. Browne	10/29/2012	40.11	40.11	23.26	11/19/2012	1021128.63	1233054.20	5127.63	5125.77	5085.66	35.1-40.1	34.1-40.1	N/A	N/A	2	1.86
S35SB-204T	J. Riedel	10/14/2012	35.00	18.20	Dry	11/19/2012	1020752.06	1233159.21	5106.89	5104.99	5086.79	13.2-18.2	13.2-18.2	N/A	N/A	1	1.90
S35SB-204B	J. Riedel	10/14/2012	35.00	34.24	38.20	11/19/2012	1020751.97	1233159.49	5108.68	5104.95	5070.71	29.2-34.2	29.2-34.2	N/A	N/A	1	3.73
S35SB-206T2	J. Riedel	10/13/2012	15.00	14.42	18.29	11/19/2012	1020850.12	1233325.83	5119.51	5115.64	5101.22	9.4-14.4	9.4-14.4	18.00	5101.51	1	3.87
S35SB-206T1	J. Riedel	10/12/2012	46.50	28.70	19.15	11/19/2012	1020855.89	1233324.07	5118.32	5115.81	5087.12	23.7-28.7	23.7-28.7	28.78	5089.54	1	2.50
S35SB-206T3	J. Riedel	10/26/2012	100.00	47.88	20.63	11/19/2012	1020846.06	1233327.18	5117.45	5115.33	5067.45	42.9-47.9	42.9-47.9	48.60	5068.85	1	2.12
S35SB-206B	J. Riedel	10/12/2012	45.93	45.93	21.30	11/19/2012	1020856.05	1233324.21	5117.90	5116.23	5070.30	40.9-45.9	40.9-45.9	45.19	5072.71	1	1.67
S35SB-206D	J. Riedel	10/26/2012	100.00	90.70	23.05	11/19/2012	1020845.93	1233326.88	5118.93	5115.03	5024.33	85.7-90.7	85.7-90.7	92.60	5026.33	1	3.90
S35MW-207	M. Browne	10/30/2012	35.25	32.59	29.08	11/19/2012	1021091.32	1233314.60	5146.03	5142.09	5109.50	27.6-32.6	25.6-32.6	N/A	N/A	2	3.94
S35SB-208T	J. Riedel	10/29/2012	23.68	23.68	23.01	11/19/2012	1021024.30	1232767.37	5088.73	5087.41	5063.73	18.7-23.7	18.7-23.7	23.20	5065.53	1	1.32
S35SB-208B	J. Riedel	10/26/2012	40.00	39.00	18.99	11/19/2012	1021028.79	1232765.25	5088.84	5087.19	5048.19	34-39	34-39	38.24	5050.60	2	1.65
S35SB-209T	J. Riedel	10/14/2012	41.50	12.39	Dry	11/19/2012	1020519.00	1233262.02	5092.62	5089.83	5077.45	8.4-12.4	8.4-12.4	14.70	5077.92	1	2.78
S35SB-209B	J. Riedel	10/14/2012	41.50	39.71	20.10	11/19/2012	1020518.87	1233261.81	5091.98	5089.89	5050.18	34.7-39.7	34.7-39.7	39.38	5052.60	1	2.09
S35SB-210T	J. Riedel	10/16/2012	40.00	14.83	Dry	11/19/2012	1020675.30	1233448.27	5111.62	5107.75	5092.92	9.8-14.8	7.8-14.8	N/A	N/A	1	3.87
S35SB-210B	J. Riedel	10/16/2012	44.50	39.64	23.52	11/19/2012	1020675.56	1233448.29	5109.61	5107.75	5068.11	34.6-39.6	34.6-39.6	N/A	N/A	1	1.86
S35SB-211B1	J. Riedel	10/17/2012	55.00	54.28	43.00	11/19/2012	1020810.84	1233635.64	5133.44	5129.26	5074.99	49.3-54.3	44.3-54.3	N/A	N/A	1	4.17
S35SB-211B2	J. Riedel	10/17/2012	55.00	19.53	Dry	11/19/2012	1020811.15	1233635.25	5131.05	5129.33	5109.80	14.5-19.5	14.5-19.5	N/A	N/A	1	1.72
S35SB-212T	J. Riedel	11/7/2012	50.00	15.07	Dry	11/19/2012	1020846.28	1233943.54	5139.81	5137.91	5122.84	10.1-15.1	5.1-15.1	N/A	N/A	1	1.90
S35SB-212B	J. Riedel	11/7/2012	50.00	48.13	45.73	11/19/2012	1020846.10	1233943.38	5139.64	5137.78	5089.64	43.1-48.1	20.1-48.1	N/A	N/A	1	1.87
S35SB-213T	J. Riedel	11/5/2012	49.25	18.88	Dry	11/19/2012	1020602.32	1233865.24	5112.28	5110.53	5091.66	13.9-18.9	13.9-18.9	N/A	N/A	1	1.74
S35SB-213B	J. Riedel	11/5/2012	49.25	42.84	20.61	11/19/2012	1020602.44	1233865.37	5112.14	5110.54	5067.70	37.8-42.8	33.8-42.8	N/A	N/A	1	1.60
S35SB-214T	J. Riedel	10/16/2012	45.50	23.42	16.34	11/19/2012	1020332.96	1233297.30	5085.00	5083.26	5059.85	18.4-23.4	18.4-23.4	22.73	5062.27	1	1.73
S35SB-214B	J. Riedel	10/16/2012	45.50	45.00	16.12	11/19/2012	1020332.86	1233296.90	5086.31	5082.86	5037.86	40-45	40-45	46.03	5040.28	1	3.45
S35SB-215T1	J. Riedel	11/6/2012	56.50	55.17	18.11	11/19/2012	1020393.32	1233994.32	5090.82	5088.99	5033.82	50.2-55.2	50.2-55.2	54.60	5036.22	1	1.83
S35SB-215T2	J. Riedel	11/6/2012	56.50	30.22	19.85	11/19/2012	1020393.46	1233994.48	5091.24	5089.01	5058.79	25.2-30.2	25.2-30.2	30.03	5061.21	1	2.23
S35SB-216A	M. Browne	11/2/2012	35.00	34.71	32.19	11/19/2012	1020935.19	1233542.51	5147.57	5145.88	5111.17	24.7-34.7	22.7-34.7	36.13	5111.44	1	1.69
S35SB-216B	M. Browne	11/2/2012	35.00	14.87	Dry	11/19/2012	1020935.23	1233542.73	5149.30	5145.84	5130.97	9.9-14.9	7.9-14.9	18.04	5131.26	1	3.46
S35SB-217B	M. Browne	10/31/2012	30.00	14.63	Dry	11/19/2012	1021345.75	1233083.35	5141.50	5137.70	5123.07	9.6-14.6	7.6-14.6	18.18	5123.32	1	3.80
S35SB-217A	M. Browne	10/31/2012	30.00	27.86	26.70	11/19/2012	1021345.90	1233083.25	5139.43	5137.73	5109.87	22.9-27.9	21.9-27.9	29.29	5110.14	1	1.70
S35MW-217	M. Browne	10/31/2012	40.13	40.13	28.74	11/19/2012	1021341.61	1233088.22	5141.90	5137.95	5097.82	35.1-40.1	35.1-40.1	39.66	5102.24	2	3.95
S35PZ-01T	J. Riedel	11/8/2012	15.53	15.53	17.18	11/19/2012	1020093.22	1234545.24	5097.17	5095.31	5079.78	10.5-15.5	5.5-15.5	N/A	N/A	1	1.86

Table 6
UBMC Section 35 Design Investigation
Monitoring Well and Piezometer Installation Summary

									Top of PVC	Ground	Bottom of Screen	Screen	Filter Pack	Depth of	Transducer	PVC Casing	;
Monitoring Well or		Completion	Total Depth	Total PVC	Depth to	Water	Northing	Easting	Casing Elevation	Elevation	Interval Elevation	Interval	Interval	Transducer	Elevation	Diameter	Stickup
Piezometer ID	Logged By	Date	(ft bgs) ⁽¹⁾	Depth (ft) ⁽¹⁾	Water (ft) ⁽²⁾	Level Date	SP-N83 (IF)	SP-N83 (IF)	NAVD88 (ft)	NAVD88 (ft)	NAVD88 (ft)	(ft bgs) ⁽¹⁾	(ft bgs) ⁽¹⁾	$(\mathbf{ft})^{(2)}$	NAVD88 (ft)	(in)	(ft ags) ⁽³⁾
S35TP-101A	M. Browne/N. Jaynes	10/5/2012	17.70	17.66	9.96	11/19/2012	1020197.25	1232982.21	5067.78	5064.51	5046.85	12.7-17.7	N/A	N/A	N/A	1.5	3.27
S35TP-101B	M. Browne/N. Jaynes	10/5/2012	17.70	11.92	9.67	11/19/2012	1020197.43	1232982.18	5067.53	5064.35	5052.43	6.9-11.9	N/A	N/A	N/A	1.5	3.18
S35TP-101C	M. Browne/N. Jaynes	10/5/2012	17.70	6.43	9.05	11/19/2012	1020197.38	1232982.34	5067.00	5064.33	5057.90	1.4-6.4	N/A	N/A	N/A	1.5	2.67
S35TP-102	M. Browne/N. Jaynes	10/2/2012	17.10	17.10	Dry	11/19/2012	1021092.77	1233385.12	5150.50	5147.96	5130.85	12.1-17.1	N/A	N/A	N/A	1.5	2.55
S35TP-103	M. Browne/N. Jaynes	10/5/2012	17.70	17.32	Dry	11/20/2012	1020449.00	1233972.74	5099.61	5095.58	5078.25	12.3-17.3	N/A	N/A	N/A	1.5	4.04
S35TP-104 ⁽⁴⁾	M. Browne/N. Jaynes	10/2/2012	17.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S35TP-105	M. Browne/N. Jaynes	10/3/2012	17.50	17.13	18.51	11/19/2012	1020960.61	1233139.08	5119.31	5115.23	5098.11	12.1-17.1	N/A	N/A	N/A	1.5	4.07
S35TP-106	M. Browne/N. Jaynes	10/4/2012	18.22	18.22	Dry	11/19/2012	1020918.15	1232895.44	5102.10	5098.36	5080.14	8.2-18.2	N/A	N/A	N/A	1.5	3.74
S35TP-107	M. Browne/N. Jaynes	10/3/2012	16.00	15.51	Dry	11/19/2012	1020683.38	1233796.13	5119.52	5114.92	5099.42	5.5-15.5	N/A	N/A	N/A	1.5	4.59
S35TP-108	M. Browne/N. Jaynes	10/2/2012	16.30	16.30	19.51	11/19/2012	1021154.66	1232949.19	5118.88	5115.16	5098.86	6.3-16.3	N/A	N/A	N/A	1.5	3.72
S35TP-109	M. Browne/N. Jaynes	10/4/2012	18.04	18.04	21.95	11/19/2012	1021077.35	1232749.80	5091.28	5087.32	5069.28	13-18	N/A	N/A	N/A	1.5	3.96
S35TP-110	M. Browne/N. Jaynes	10/5/2012	18.11	18.11	Dry	11/19/2012	1020634.95	1233451.93	5110.57	5106.81	5088.70	13.1-18.1	N/A	N/A	N/A	1.5	3.76
S35TP-111A	M. Browne/N. Jaynes	10/3/2012	19.37	19.37	20.95	11/19/2012	1020844.10	1233244.89	5117.67	5113.82	5094.46	14.4-19.4	N/A	N/A	N/A	1.5	3.84
S35TP-111B	M. Browne/N. Jaynes	10/3/2012	19.37	14.80	18.34	11/19/2012	1020844.23	1233244.67	5117.31	5113.62	5098.81	9.8-14.8	N/A	N/A	N/A	1.5	3.70
S35TP-111C	M. Browne/N. Jaynes	10/3/2012	19.37	11.52	14.96	11/19/2012	1020844.09	1233244.71	5117.07	5113.43	5101.91	6.5-11.5	N/A	N/A	N/A	1.5	3.64
S35TP-112	M. Browne/N. Jaynes	10/4/2012	16.59	16.59	Dry	11/19/2012	1020918.91	1232542.35	5071.85	5067.59	5051.00	11.6-16.6	N/A	N/A	N/A	1.5	4.26
S35TP-113	M. Browne/N. Jaynes	10/4/2012	17.00	15.18	19.87	11/19/2012	1020729.63	1232675.00	5074.25	5069.27	5054.09	5.2-15.2	N/A	N/A	N/A	1.5	4.98

Notes:

1) bgs = Below ground surface

2) Measured from top of PVC casing (marked "M.P.")

3) ags = Above ground surface

4) No survey shot taken

5) N/A = No data collected

= Water level pressure transducer installed in February 2013

APPENDIX A

LOGS AND FIELD LOG BOOKS

Note to Users:

Data and information contained in the field notes and logs may differ from the final interpretations presented on the final test pit logs, soil borings, and/or cross sections. Data, soil classifications, and other information recorded on the field notes are the best estimate of the field personnel at the time of completing the test pit or soil boring. These data may be revised based on subsequent laboratory analysis, additional survey, and/or data interpretation performed after the field logs were recorded.

APPENDIX A.1

LOGS AND FIELD LOG BOOKS - TEST PIT LOGS

PI	ROJECT N	AME: Se	ectio	on 3	5 Repos	sitory [Design Investigation	Drill Hole	No	. S	357	Γ P- 1	01	PAGE 1 of 1
-	ATE STAR		_)/5/12	DRILLER: Stream						
_	OGGED BY							DRILL TYPE: Ko		u PC	200			
_	ROUND SI							HOLE DIAMETER	₹:					
В	OREHOLE	LOCATI	ON	: N	102019	7.24, E	1232982.39 (MT St. Pl. NAD83)	HAMMER TYPE:						
WELL LOG	GRAPHIC LOG	DEPTH (FT)	UNDISTURBED		SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered	This summary applies ime of the drilling. cations and may change data presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
×	R	품 [품	3	B	SA	器	MATERIAL DESCRI		$ \exists$	곱	8	R 9	ĭ	TESTING
		- 1 - - 2 - 2 -		X	13324 13325		Moist, Dark reddish brown [5YR 2.5/2], CL/ Sand, GC, subangular, low to medium plant 1 1/2-in minus, gravels have rust surface s Moist, Dark brown, SILTY SAND, SM, no to trace dead roots and burned wood debris, layer prior to old highway road constructior Moist, Reddish brown [5YR 5/4], SANDY C subrounded, medium plasticity, at 3 ft dept 1-in minus.	ticity, BASE COARSE, taining. I low plasticity, very stiff, potentially a topsoil , TOPSOIL.					6.0	
		- 3 - - 4 -		X	13326								12.0	
*		- 5					Moist to wet, Reddish brown [5YR 5/4], CL Gravel, SC, subrounded, medium plasticity							Side caving in at 5', soil wet but no water flowing into Test Pit Water level on 11-19-12 TP-101A=6.7' TP-101B=6.5' TP-101C=6.4'
		-9 -10 		X	13327		Moist to wet, Pink [5YR 7/3], SILT, ML, low Moist to wet, Reddish brown [2.5YR 5/4], C Gravel, SC, subangular to subrounded, me	LAYEY SAND with	_				16.0	
		-11 <u>-</u> -12 <u>-</u> -13-												Water content decreases below 11.0'
		-14 15 16 												piezometers all 1.5" Diameter TP-101A installed to 17.7', screened 12.7-17.7' TP-101B installed to 11.9', screened 6.9-11.9' TP-101C installed to 6.4', screened 1.4'-6.4'
		-17— -18— -19— -20—		×	13328		BOH = 17.7 ft.		_				14.0	
			_				<u> </u>	CLIENT: Mon	tana	Dep	artm	ent of	Envir	onmental Quality
				~	7					<u> </u>	2009			•
			Z	1	2N	TH.		1				na 59	620-0	0901
		Tre			- 1 1 L	-1	CES INC	PHONE NUME	ED.					

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35TP-102
DATE STARTED / FINISHED: 10/2/12 - 10/2/12	DRILLER: Stream Works, Inc.
LOGGED BY: M. Browne / N. Jaynes	DRILL TYPE: Komatsu PC200
GROUND SURFACE ELEVATION: 5147.96 ft	HOLE DIAMETER:
BOREHOLE LOCATION: N 1021092.52, E 1233384.95 (MT St. Pl. NAD83) HAMMER TYPE:
SAMPLES BOT JULY BOT JUL	This summary applies to time of the drilling. ocations and may change he data presented is a ed. LIMIT OLIVINATION OF THE PROPERTY OF THE PRO
MATERIAL DESCRIPTION OF MATERI	RIPTION G G G G REMARKS / TESTING
13330 Dry, Dark brown, SANDY CLAY with Gre subrounded, low plasticity, organics (gra Gravel, maximum particle size is -in, T Dry, Brown [7.5YR 4/2], CLAYEY GRAV subangular to subrounded, low plasticity pockets of higher gravel content. Moist, Brown [7.5YR 4/2], CLAYEY SAN subangular to subrounded, low to mediu 15% Gravel, 5% Cobble, and 5% Boulde is 32-in.	vel, CL, subangular to is roots), estimated 30% DPSOIL. Li with Sand, GC, estimated 40% Gravel, D with Gravel, SC, in plasticity, estimated r, maximum particle size Water Level on 11-19-12=
Moist, Dark gray with purple, LEAN CLA WEATHERED ARGILLITE, Iron staining pockets of fine grained six and crumb Moist, Very dark grayish brown [10YR 3/ Gravel, SC, low to medium plasticity, WE PYROCLASTIC/ARGROMERLATE, fine crumble with finger pressure, visible pyri light gray, dark gray, purple). Moist, Dark grayish brown [10Y 4/2], PO with SILT AND SAND, GP, subangular, ISANDSTONE, breaks with finger pressure with finger pressure and substance of the pressure of the pres	In fissures, trace pyrite, ess with finger pressure. I], CLAYEY SAND with ATHERED grain particles that e, multiple colors (red, DRLY GRADED GRAVEL on-plastic, WEATHERED
	CLIENT: Montana Department of Environmental Quality
	ADDRESS: P.O. Box 200901
PIONEER -	Helena, Montana 59620-0901
TECTINICAL CEDITICES INC	PHONE NUMBER:

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 3/4/13

Ы	ROJECTIV	IAME: Se	ectic	n 3	5 Renos	itory I	Design Investigation	Drill Hole	No	S	357	P-1	03	PAGE 1 of 1
_	ATE STAR							DRILLER: Stream						
	OGGED BY							DRILL TYPE: Koi		u PC	200			
	ROUND S						58 ft E 1233973.53 (MT St. Pl. NAD83)	HOLE DIAMETER	₹:					
	I		MPL		1020110	J. 7 O, L	1230070.00 (WT Ot. 11. 1471200)	TO WINIER THE						
WELL LOG	GRAPHIC LOG	DEPTH (FT) DRIVE	rurbed	BULK 5	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other locat this location with the passage of time. The simplication of actual conditions encountered MATERIAL DESCRI	This summary applies me of the drilling, autions and may change e data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
>	<u>z_I y^N · z_I y^N · z_I</u>		₽	Δ,	Ø	~	Dry, Dark brown, SANDY SILT with Gravel			Д	O	08	2	TESTING
	11 11 11 11	- 1 <u>-</u>		\bigvee	13335		low plasticity, organics (roots), soil color is moisture is added, TOPSOIL.	very dark brown when					6.0	
		- 2 -					Dry to moist, Light brown, CLAYEY SAND subrounded, medium plasticity, trace cobbl size is 5-in, particles are mixed.	with Gravel, SC, es, maximum particle						
		- 3 <u>-</u> - 4 -					Moist, Dark reddish brown [5YR 3/2] Dark \(\) [10YR 3/6], CLAYEY SAND with Gravel, Si subrounded, medium plasticity, trace cobbl At 5 ft depth estimated 5% Cobbles, 30% (C, subangular to es, particles are mixed.						
		- 5 <u>-</u>		X	13336								8.0	
		- 6 <u>-</u> - 7 -												Moisture content increases with depth.
		- 8 <u>-</u>												Water level on 11-19-12= DRY
		- 9 - 		X	13337								10.0	Installed 1.5" diameter PVC to 17.3'
		-11 												017.3
		-12- 												Screened 12.3-17.3'
		-14- 												
		—15 <u>—</u> — <u>—</u> —16 <u>—</u>		X	13338								11.0	
		-17 <u>-</u>		γ_\ 			BOH = 17.7 ft.							
		-18- 19-												
-		20						CLIENT: Mont	tana	Dep	Lartme	ent of	Envir	onmental Quality
				~	7 7	<u> </u>	7.0	ADDRESS: F	P.O.	Вох	2009	01		-
					2 <i>N</i> Z					a, N	lonta	na 596	520-0	0901
		A TEC	VIC	CAL SE	RVI	CES, INC.	PHONE NUME	BER:						

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35TP-104 PAGE 1 of 1
DATE STARTED / FINISHED: 10/2/12 - 10/2/12	DRILLER: Stream Works, Inc.
LOGGED BY: M. Browne / N. Jaynes	DRILL TYPE: Komatsu PC200
GROUND SURFACE ELEVATION: BOREHOLE LOCATION: Not surveyed	HOLE DIAMETER: HAMMER TYPE:
	TICHVIIVILIX I I I L.
SAMPLES SAMPLES OD 1 O	This summary applies time of the drilling. coations and may change he data presented is a ed. LIMITORIAL STATES AND
Dry, Dark brown, SANDY CLAY, CL, orga	anics (roots), TOPSOIL. Piezometer not installed in
	Anics (roots), TOPSOIL. EY SAND with Gravel, n plasticity, trace num particle size is Groundwater not encountered while excavating 7EL with Sand, GC, imated 5% Cobbles and 26 15 10.0
-19	
	CLIENT: Montana Department of Environmental Quality
	ADDRESS: P.O. Box 200901
P IONEER —	Helena, Montana 59620-0901
TECHNICAL SERVICES, INC.	PHONE NUMBER:

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

Р	ROJECT N	AME: Se	ection	35 Repo	sitory	Design Investigation	Drill Hole	No	S	357	Γ P- 1	05	PAGE 1 of 1
	ATE STAR						DRILLER: Stream	n Wo	rks,	Inc.			
_	OGGED BY						DRILL TYPE: Koi		u PC	200			
_	ROUND SI						HOLE DIAMETER	₹:					
ГВ	OREHULE			_	0.51, 1	E 1233140.29 (MT St. Pl. NAD83)	HAMMER TYPE:						
WELL LOG	GRAPHICLOG	DEPTH (FT)	UNDISTURBED IN SECOND	LE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. To only at the location of the boring and at the tas Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encounteres. MATERIAL DESCRI	This summary applies ime of the drilling actions and may change e data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
	12 11/2 11/2		T	1		Dry, Dark brown, SANDY CLAY with Grave organics (roots), estimated 30% Gravel, To							Hard digging from 0 to 4.5 ft.
		- 1 -		13343								6.0	
		- 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 10		13344		Dry, Dark red [10R 3/6] Light brown, CLAY GC, subangular to subrounded, low to med Cobbles and Boulders, at 3 ft depth estima Cobbles and 30% Gravel, poorly graded. Moist, Dark red [10R 3/6], CLAYEY SAND subangular to subrounded, medium plastic estimated 10% Cobble and 30% Gravel. No brown, Gravelly SAND with Silt observed to between 14 and 14.5' and between 16.5' a	with Gravel, SC, ity, At 8 ft depth ultiple seams of wet, ansversing the test pit					9.0	Moisture content increases with depth. Easier digging with depth.
		-11121314151617181920		13347 13346		BOH = 17.5 ft.	CLIENT: Mont	tana	Dep	artmo	ent of	12.0 19.0	Corpored 12 1' 17 1'
			~		Y					2009		LIIVII	onnental Quality
				ON	FA	$\mathbb{Z}R$					na 59	620-0	0901
TECHNICAL SERVICES INC.													

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 3/4/13

									D 11 II 1	N T	C	2.57	TD 1	0.6	
PROJECT MAINE. Section 33 Repository Design investigation								Drill Hole				P-1	06	PAGE 1 of 1	
_								0/4/12	DRILLER: Stream						
_	DGGED B'							36 ft	DRILL TYPE: Kor HOLE DIAMETER		u PC	,200			
-			_					E 1232895.37 (MT St. Pl. NAD83)		٠.					
WELL LOG	GRAPHIC LOG	DEPTH (FT)		UNDISTURBED IN	BULK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the ti Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered	This summary applies me of the drilling, ations and may change a data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
≶	<u>717</u> 777 77	3 2	5 :	5	ਜੂ ਜ	S	<u>R</u>	MATERIAL DESCRII Dry, Brown, SILTY SAND with Gravel, SM,		ĭ	Д	8	무형	ž	TESTING
		- 1 - - 2 -		\	$\left\langle \right $	13348		plasticity, organics (roots), color changes to moisture, TOPSOIL.	dark brown with					7.0	No groundwater observed while excavating
		- 3 - 		7 2	X	13349		Dry, Dark reddish brown [5YR 3/2], SILTY 0 GM, subangular, low plasticity, with Boulde estimated 10% Boulder, 10% Cobble, and	GRAVEL with Sand, 's and Cobbles, 30% Gravel.						
		- 6						Moist, Dark red [10R 3/6], CLAYEY GRAVI subangular, medium to high plasticity, with estimated 5% Boulder, 10% Cobble, 20% (particle size is 24-in.	Boulders and Cobbles,	_					Groundwater level on 11-19-12= Dry
		- 9		2	X	13350				23	14			10.0	
		-13- -13- -14- -15- -16-													Installed 1.5" PVC to 18.2' Screened 7.75'-17.75'
		—17— —18— —19— —20—		\ \ \		13351		BOH = 18.2 ft.		-				10.0	
-		20							CLIENT: Mont	tana	L Den	lartm	ent of	Envir	onmental Quality
				~		Y	7					2009			
				1		2NI	F.F.	ZR					na 590	320-0	0901
	PIONEER PIECHNICAL SERVICES, INC.									BER:					

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

								Drill Hole	Nο	S	357	ΓP-1	07	DAGE 4 4 4
-	ATE STAR						Design Investigation	DRILLER: Stream						PAGE 1 of 1
-	OGGED BY						0/0/12	DRILL TYPE: Kor						
-	ROUND S						92 ft	HOLE DIAMETER	? :					
В	OREHOLE	LOCATI	ON	l: N	102068	4.26, I	E 1233795.92 (MT St. Pl. NAD83)	HAMMER TYPE:						
WELL LOG	GRAPHIC LOG	DEPTH (FT)	TIRRED	BULK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered	This summary applies ime of the drilling, actions and may change e data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
>	<u>7η γ. 7η γ. 7η</u> Ω				Ŋ	~	MATERIAL DESCRI Dry, Dark brown, SANDY CLAY with Grave		=	룝	ŏ	_5 €	≥	TESTING
	1/ 2/1/ 2/1/ 2/1/ 2/1/	 1			13352		plasticity, organics (roots), TOPSOIL.	a, GE, angular, low					8.0	
		- 2 - 3 - 4 - 5			13353		Moist, Dark yellowish brown [10YR 3/4], CL Gravel, SC, angular to subangular, low to r Boulders and Cobbles, estimated 5% Boul Gravel, maximum particle size is 10-in.	nedium plasticity, with					11.0	
		- 6			13354		Moist, Brown, SILTY SAND with Gravel, Sh subrounded, non-plastic, with Cobbles, est and 30% Gravel. Moist, Dark red [2.5YR 3/6], CLAYEY SAN angular to subangular, low to medium plas Cobbles, estimated 5% Boulder, 5% Cobb	D with Gravel, SC, ticity, with Boulders and le, 20% Gravel,					6.0	Water level on 11-19-12= DRY
		-13- -14- -15- -16- -17- -18- -19- -20-			13355		BOH = 16.0 ft.		-				11.0	Installed 1.5" PVC to 15.5' Screened 5.5-15.5'
_		20	_					CLIENT: Mont	tana	L Den	l artm	ent of	L Envir	│ronmental Qualitv
							CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901							
		D IONEER —						Helena, Montana 59620-0901						
		TECHNICAL SERVICES, INC.						PHONE NUME	BER:					

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 3/4/13

PF	ROJECT N	IAME: S	ec	tior	า 35	i Repos	itory I	Design Investigation	Drill Hole	No	. S	35]	Γ P- 1	08	PAGE 1 of 1
	ATE STAR		_	_				0/2/12	DRILLER: Stream						
-	GGED B		_	_				40.6	DRILL TYPE: Koi		u PC	200			
_	ROUND S DREHOLE							ιο π Ε 1232949.66 (MT St. Pl. NAD83)	HOLE DIAMETER HAMMER TYPE:	ζ.					
	711022			1PLE		02110		1202010:00 (1111 01:11:11/1200)	TO WHITE COLOR	1					
WELL LOG	GRAPHIC LOG	DEPTH (FT)	1	TURBED		SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. To only at the location of the boring and at the it Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered	This summary applies me of the drilling. eations and may change edata presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	DEMARKO /
WE		DEF	ב	5 2	BULK	SAI	RE	MATERIAL DESCRI		ΔH	PL/	000	Pc pc	ΘW	REMARKS / TESTING
		-1 -1		\		13356		Dry, Dark brown, CLAY with Sand, CL, low (roots), color changes to black when wetter						14.0	Groundwater table not observed while excavating
		- 2 - - - 3 -			\bigvee	13357		Dry, Light brown, SILTY SAND with Gravel, subangular.							
		- 4 <u>-</u>			\setminus	.000.		Dry to moist, Dark reddish brown [5YR 3/2] CLAYEY SAND with Gravel, SC, subangulal plasticity, occasional Argillite rock particles Iron surface staining notes on Argillite at 15 particle size is 18-in., estimate 5% Boulders 20% Gravel.	ar modium to high						
		- 6													
				\ Z	X	13358									
		-10 													Soil is almost wet at 10 ft depth.
,		-14- -15- -16- 		7	X	13359		BOH = 16.3 ft.		_				18.0	Groundwater level on 11-19-12= 15.8' Installed 1.5" diameter PVC to 16.3' Screened 6.3-16.3'
		-17 18 													
			_	_	_				CLIENT: Mont	tana	Dep	artm	ent of	Envir	ronmental Quality
					< 	7 2						2009			-
						2NZ	9E	$R \sim$	Helena, Montana 59620-0901						
							CES. INC.	PHONE NUME	BER:						

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Se	ction :	35 Repos	sitory	Design Investigation	Drill Hole	No.	. S	 35]	P-1	09	PAGE 1 of
DATE STARTED / FIN	ISHE	D: 10/4/	12 - 1		DRILL TYPE: Kee						
LOGGED BY: M. Brow GROUND SURFACE I				32 ft	DRILL TYPE: Ko		u PC	200			
				E 1232750.18 (MT St. Pl. NAD83)	HAMMER TYPE:						
IIC LOG (FT)	UNDISTURBED SELLK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pion project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other loc at this location with the passage of time. Th simplication of actual conditions encountere	This summary applies ime of the drilling. cations and may change e data presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
	UNDIS	SAM	REC	MATERIAL DESCRI		릴	PLA	COR	DRY (pcf)	MO	REMARKS / TESTING
1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2		13361		Dry, Brown [7.5YR 4/2], SILTY SAND with subangular, low plasticity, organics (roots),						5.0	Groundwater table not observed while excavating
2				Dry, Light brown, SILTY SAND with Gravel low plasticity, at 3 ft depth estimated 10% 0 40% Sand, and 20% fines.	, SM, subangular, no to Cobble, 30% Gravel,						
3		7									Hard digging entire test pit depth
5 5	X	13362		Moist, Dark red [10R 3/6] Dusky red [10R 3/6] with Sand, GC, subangular to subrounded, plasticity, estimated 10% Cobble, 30% Gra	medium to high	_				9.0	
6 -				size is 8-in.	vei, maximum particle						
7	X	13363								12.0	
9		,									
10											
-11											
12											
14											
15											Installed 1.5" PVC to 18.0' Screened 13-18'
16-		13364								11.0	Groundwater level on 11-19-12= 18.0'
18		13304		BOH = 18.0 ft.		_				11.0	
-19 <u>-</u>											
-20-	$\overset{\sqcup}{\sim}$	~/	\	<u> </u>						Envir	ronmental Quality
D		2N2			ŀ				01 na 59	620-0	0901
	HNI	CAL SI	ERVI.	CES, INC.	PHONE NUME	BER:					

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole	No	. S	357	Γ P- 1	10	PAGE 1 of 1
DATE STARTED / FINISHED: 10/5/12 - 10/5/12	DRILLER: Strea	am Wo	orks,	Inc.			
LOGGED BY: M. Browne / N. Jaynes	DRILL TYPE: K		u PC	200			
GROUND SURFACE ELEVATION: 5106.81 ft	HOLE DIAMETE						
BOREHOLE LOCATION: N 1020634.70, E 1233452.38 (MT St.	PI. NAD83) HAMMER TYPE	:					
BOO DE LANGE BETWEEN THE PROJECT AND SHOULD BE SIMPLIFIED TO BE SIMPLIFIED	epared by Pioneer Technical, Inc. for this with the report. This summary applies ring and at the time of the drilling. Iffer at other locations and may change age of time. The data presented is a ons encountered.		PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
BULK BULL LOG GRAPHIC LOG GRAPHIC LOG GRAPHIC LOG GRAPHIC LOG MATERI MAT	AL DESCRIPTION	LIQUID LIMIT	PLAST	CORRI	DRY D (pcf)	MOIST	REMARKS / TESTING
Dry, Dark brown, SILTY S/plasticity, organics (roots),	ND with Gravel, SM, subangular, low TOPSOIL.					8.0	
subangular to subrounded	8 3/6], CLAYEY SAND with Gravel, SC, medium plasticity, homogeneous, at 5 bble, 20% Gravel, and 5% Boulder. At Clay.						No groundwater encountered while excavating
- 5 -						7.0	
13367						8.0	
-13 -14 -15 							Installed 1.5" PVC to 18.1' Screened 13.1-18.1'
13368 BOH =18.1 ft.						13.0	Groundwater level on 11-19-12=DRY
	CLIENT: Mo	ntana	Dep	artme	ent of	Envir	ronmental Quality
	ADDRESS:	P.O.					
PIONEER -			na, N	1onta	na 59	620-0	0901
TECHNICAL SERVICES INC	DHONE NUM	IDED.					

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole	No.	. S	357	P-1	11	PAGE 1 of 1
DATE STARTED / FINISHED: 10/3/12 - 10/3/12	DRILLER: Strea						
LOGGED BY: M. Browne / N. Jaynes	DRILL TYPE: Ko		u PC	200			
GROUND SURFACE ELEVATION: 5113.82 ft BOREHOLE LOCATION: N 1020844.58, E 1233244.80 (MT St. F	HOLE DIAMETE 1. NAD83) HAMMER TYPE:						
CAMPLES							
BEALTH CONTRIBUTION OF THE PROPERTY OF THE PRO	pared by Pioneer Technical, Inc. for this th the report. This summary applies ng and at the time of the drilling. ffer at other locations and may change ge of time. The data presented is a ns encountered.		PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
Dry, Dark brown, CLAYEY S	AND with Gravel, SC, subangular to		_	O	08		TESTING Three nested piezometers
subrounded, medium plastic 30% gravel, maximum partic 30% gravel, maximum partic 30% gravel, maximum partic Moist, Dusky red [10R 3/4], subangular, low plasticity, wi 5% Boulder, 10% Cobble, a 18-in. Moist, Reddish brown, CLAY subangular to subrounded, subrou	ity, organics (grass roots), estimated the size is 5-in., TOPSOIL. SILTY GRAVEL with Sand, GP-GM, th Boulders and Cobbles, estimated and 30% Gravel, maximum particle is solved to the state of the sta					7.0	
13371 13371 13371 134 15 16		23	15			10.0	TP-111C=11.3'
13372						14.0 12.0	Groundwater slowly flowing into test pit from 16 and 17 ft depth through sand and gravel
13374						15.0	
BOH = 19.4 ft.							
	CLIENT: Moi	ntana	Dep	ı artme	ent of	∟ Envir	ronmental Quality
	ADDRESS:	P.O.					•
P IONEER —		Heler	na, M	lonta	na 596	620-0	0901
TECHNICAL SERVICES. INC.	PHONE NUM	IBER:					

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

Р	ROJECT N	Drill Hole No. S35TP-112 PAGE 1 of 1 TE STARTED / FINISHED: 10/4/12 DRILLER: Stream Works, Inc.												
D	ATE STAR	TED / FII	NIS	HED): 10/4/	12 - 1								
-	OGGED B'						50 ff	DRILL TYPE: Kor HOLE DIAMETER		u PC	200			
							E 1232542.59 (MT St. Pl. NAD83)	HAMMER TYPE:	٠.					
FOG	GRAPHIC LOG		UNDISTURBED		ÜE D	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered	This summary applies me of the drilling. eations and may change e data presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
WELL LOG	GRAP	DEPT	NDIS	BULK	SAMPLE	RECO	MATERIAL DESCRI	PTION	LIQUII	PLAS	CORR	DRY [MOIS	REMARKS / TESTING
		- 1 2					Dry, Light brown, SILTY SAND with Gravel, plasticity, organics (grass roots), TOPSOIL Dry to moist, Dark brown [10YR 3/3], WELI with Silt and Sand, GW-GM, subrounded, r laying flat, at 4 ft depth estimated 15% Cob 35% Sand, maximum particle size is 8-in. Moist, Reddish brown, SANDY SILT, ML, Ic with Silt and Sand, GW-GM, subrounded, 6 30% Cobble, 40% Gravel and 20% Sand wize of 30-in. Wet, reddish brown, Sandy C 16.0°.	GRADED GRAVEL ock particles generally ble, 50% Gravel, and ble, 50% Gravel, and w plasticity. GRADED GRAVEL istimated 10% Boulder, ith maximum particle					9.0	Easy digging from 7 to 9 ft.
		-11- -12- -13- -14- -15- -16- -17- -18- -19- -20-			> /	FI	BOH = 16.6 ft.	ADDRESS: I	P.O.	Box	2009			Could not visually observe the Sandy Clay on the test pit walls or bottom.
			7	1/	2N	FA	$\mathbb{Z}R$	I					620-0	0901
TECHNICAL SERVICES, INC. PHONE NUMB														

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole	No.	S	357	P-1	13	PAGE 1 of 1
DATE STARTED / FINISHED: 10/4/12 - 10/4/12	DRILLER: Stream	n Wo	rks,	Inc.			
LOGGED BY: M. Browne / N. Jaynes	DRILL TYPE: Ko		u PC	200			
GROUND SURFACE ELEVATION: 5069.27 ft	HOLE DIAMETER	₹:					
BOREHOLE LOCATION: N 1020730.25, E 1232675.16 (MT St. Pl. NAD83) HAMMER TYPE:						
SAMPLES BOT JULE BOT JUL	This summary applies time of the drilling. ocations and may change he data presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
MATERIAL DESCR	IPTION	1	7	8	PS (pc)	×	TESTING
Dry, Light brown, SILTY SAND with Grav plasticity, organic (roots), estimated 20% Dry to moist, Brown, WELL GRADED GR	Gravels.					6.0	
subrounded, with Cobbles, particles are horizontal position. At 4 ft depth estimate particle size 6-in	generally flat and laying in					3.0	
Moist, Brown, WELL GRADED SAND, S are generally fine to medium grained, oc graded, fine grain sand.						16.0	
Moist to wet, Reddish brown, SANDY SI	T, ML, low plasticity,						
occasional seams of varied Lean CLAY.						26.0	Observed groundwater dripping into test pit near 11 ft depth, sidewall of test pit caved in and water drip could
Wet, Brown, WELL GRADED GRAVEL of GW-GC, subrounded, at 14 ft depth estin Cobbles and a maximum particle size of	nated 10% Boulder, 30%						no longer be noted
13384 BOH = 15.2 ft.						12.0	Installed 1.5" PVC to 15.2' Screened 5.2-15.2' Groundwater level on 11-19-12= 14.9'
-16- 							
	OUTS 1	4	D -			Fee	
						⊏nvir	ronmental Quality
DIONEED		P.O. Heler			101 na 596	820 r	0001
TECHNICAL SERVICES INC	PHONE NUME		ıa, ıv	iorita	110 090	020-0	JUU 1

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

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Test Pit No. TP-104		Page 2 of 2
Weather:		
Temperature: 60'5	Snow depth: Wind WINDY	Cloud P. CLOUSY Cover: 1+161+ OVERSAN
Piezo Stickup @ M.P. (ft/tenths):	Diameter: Mate	rial
Screen Interval:	M.P to Water:	Depth to Water:
Depth to Bottom of Test Pit:	77.6	
Initial pH	Depth at Reading	Time at Reading
Stabilized water pH	Depth at Reading	Time at Reading

From	To	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
0	1,0	535TP-104	BA6(2)	11:35	CL	D. BROWN		7 1
	4.5	10	BUK(2)		SC	BALE BOL	5Um	
7	10		1.4	12:15	sm.	R. BROWN		
.15	17	()	BOCK (1)	La ve	SC	4.1	CONTRACTOR OF THE PARTY OF THE	79 Kg.
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J. W. W.	1,91	111				1		

Notes:

IN POCKET OF SMALL, LIVE HEALTHY GRASSIS

DENSITY OR COARSE CONSISTENCY GRAINED DEPOSITS 11-29 M-VALUE 0-4 > VERY LOOSE 11-29 MEDIUM DENSE 30-49 DENSE >50 ▶ VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	q _U (lsf) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0	► VERY SO ► SOFT ► MEDIUM ► STIFF ► VERY STI ► HARD
--	-----------------------------	--	--	---

Criteria	for	Describing	Consistency	(Fine grain)
Cifteria	101	Describing	Consistency	(Fine grain)

Yery Soft

Thumb will penetrate soil about 1" (25mm)

Thumb will indent soil about 1" (5mm)

Very Hard Thumbnail will not indent soil

E STARTED/FINISHED: GGED BY: MB ASSISTED BY: ND RIDINATES:(State Plane) Northing: Easting: SAMPLES SAMPLE NO. DEPTH OF THE STAND NO. DE	PERATOR: SW EXCAVATOR TYPE: PC 200L(report prepared by Ploneer Technical just and should be read with many opinies only at the location of so time of the drilling. Subsurface at other locations and may change at passage of films. The data presented actual conditions encountered. LI DESCRIPTION BLK WHEN WETEN DPSOIL BROWN; DRY; GRASS ROOTS ILTY CLAY W/ SAND; LOW PL; SILTY CLAY W/ SAND; LOW PL; SILTY SAND W/ GRAVEL; DRY; SMALL GRAVELS (F) ARE AWG, TO GOB AWG. CLAYEY SAND W/ GRAVELS & ROBBELS DRY; MED PL; BROWN; W/ RED
ASSISTED BY: ASSISTED BY: ASSISTED BY: SAMPLES SAMPLE	report prepared by Ploneer Technical plect and should be read with many applies only at the location of the of the drilling. Subsurface at other locations and may change at possage of time. The data presented actual conditions encountered. LI DESCRIPTION BLK WHEN WETCH OPSOIL BROWN; DRY; GRASS ROOTS ILTY CLAY W/ SAND; LOW PL; SILTY CLAY W/ SAND; LOW PL; SILTY SAND W/ GRAVEL; DRY; LIGHT BROWN; (BONY) SMALL GRAVELS (FF) ARE ANG, TO GUB AING. CLAYEY SAND W/ GRAVELS & ROBBELS CLAYEY SAND W/ RED BROWN; MED PL: BROWN; W/ RED
SAMPLES SAMPLE	INTERPOLITY SAND LY GRAVELS & COBBELS CLAYEY SAND W/DEGRAVELS & COBBELS CLAYER SAND W/DEGRAVELS CL
SAMPLES SAMPLE NO. DEPTH OF THE STATE OF TH	INTERPOLITY SAND LY GRAVELS & COBBELS CLAYEY SAND W/DEGRAVELS & COBBELS CLAYER SAND W/DEGRAVELS CL
SAMPLE NO. DEPTH. IN TO DEPTH.	INTERPOLITY SAND LY GRAVELS & COBBELS CLAYEY SAND W/DEGRAVELS & COBBELS CLAYER SAND W/DEGRAVELS CL
A 2.1 SI	BROWN; DRY; GRASS ROSTS ILTY CLAY W/ SAND; LOW PL; SILTY SAND W/ GRAVEL; DRY; LIGHT BROWN; (BONY) SMALL GRAVELS (E) ARE ANG, TO SOB ANG. (S) CLAYEY SAND W/ORGRAVELS & COBBELS CLAYEY SAND W/ORGRAVELS & COBBELS THEY MED PL; BROWN; W/ RED
BOH @ 16.1	BROWN; DRY; GRASS ROOTS ILTY CLAY W/ SAND; LOW PL; SILTY SAND W/ GRAVEL; DRY; LIGHT BROWN; (BONY) SMALL GRAVELS (FE) ARE ANG, TO SOB ANG. CLAYEY SAND W/ GRAVELS & ROBBELS CLAYEY SAND W/ GRAVELS & ROBBELS THEY MED PL; BROWN; W/ RED
3,5 B) S ARGALIA	SILTY SAND LY GRAUEL; DRY; LIGHT BROWN; (BONY) SMALL GRAVELS (ES) ARE ANG, TO SOB ANG. (S) CLAYEY SAND W/ORGANIELS & COBBELS THEY MED PL; BROWN; W/ RED
B) S C) C ARGAZIAN	LIGHT BROWN; (BONY) SMALL GRAVELS (ES) ARE ANG. TO SOB ANG. (S) CLAYEY SAND W/OF GRAVELS & COBBELS THEY MED PL: BROWN; W/ RED
ARGALITA	SMALL GRAVELS (50) ARE ANG. TO SOB ANG. (50) CLAVEY SAND W/DEGRAVERS & COBBELS THEY MED PL: BROWN; - W/ RED
BOH @ 16.1	CLAVEY SAND W/DEGRAVERS & COBBELLY THEY MED PL BROWN; W/ RED
BOH @ 16.1	CLAVEY SAND W/ GRAVELS & COSSELS
BOH @ 16.1	DITY MED PL BROWN WIRES
BOH @ 16.1	DITY : MED PL; BROWN, - 01 1000
BOH @ 16.1	
BOH@16.1'	GRAVELS ARE SUB ANG TO ANG
BOH@16.1'	ROCKS ARE PURPUSH IN COZUM;
BOH@16.1'	DRY TO MOIST, ALMOST WET @ 10'.
BOH@16.1'	OCCASIONAL AMOURAR BOLDERS (18")
BOH@16.1'	~10% (09882)
	TRUM STAINING NOTED IN ARGILYTE
	2000 & 0
SAMPLED W. FACE	
	Classification
	USCS USCS USCS USCS GW Well graded gravet, fine to course gravel SC Clayey sand
	GP Poorty graded gravel SC-SM Silty, clayey sand GW-GM Well graded gravel with slit CL Clay GW-GC Well graded gravel with clay or silty clay GW-GC Well graded gravel with clay or silty clay
	GW-GC Well graded gravel with clay or sitty clay CL-ML Silty Clay GP-GM Poorly graded gravel with sitt ML Silt GP-GC Poorly graded gravel with clay or silty clay OL Organic silt, organic clay
	GM Silty gravel CH Clay of high plasticity, fat clay GC Clayey gravel MH Silt of high plasticity, fat clay
	GC-GM Sitty, clayer gravel OH Organic clay, organic sitt SW Well graded sand, fine to course sand OTHER OTHER
	SW Well graded sand, line to course sand Office Office Office SP Poorly graded sand CT Concentrated tailings - SW-SM Well graded sand with silt BLK Black Mn/Fe coated
	SW-SC Poorly graded sand with clay or silty clay MT Mixed tailings/ alluvium SP-SM Poorly graded sand with silt NA Native, undisturbed above water table
	SP-SC Poorly graded sand with clay or silty clay NB Native, undisturbed below water table
	SP-SC Poorly graded sand with clay or silty clay NB Native, undisturbed below water table

Page Z of Z

	× .	Charles and the Manager of the Control of the Contr	MA
Test Pit	No.	535 FA-	08

Weather:	-	
Temperature: 60'S	Snow depth: Wind_	WINDY Cover: CLEPAN
Piezo Stickup @ M.P.	1 7 70 00 00 00 00 00 00 00 00 00 00 00 0	
(ft/tenths):	Diameter: 1/2	_ Material SCH 80 AV C
	M.P to	Booth to
Screen Interval: 10'@ BOTTOW	Water:	Depth to Water: N67 08 Swells
Depth to Bottom of Test Pit:	6.(
Initial pH	Depth at Reading	Time at Reading
Stabilized water pH	Depth at Reading	Time at Reading

Soil Samples

From	То	Sample ID	Туре	Time (Military)	USC	Color	Comment	Photo ID
0	2.1	\$35-70-108	BAG (2)	13:35	75	BROWN		
2.1	4,7	11	BBOCKET(2)	13:45	54	R. BROWN		
8.5	9,5	11	1,1	14:00	(1)	714		1100
16	17.	11	//	14120	n			10.0
						* I		100
					15			
	100		× = 1			Wall Same		11.40
						HEW.		1
			1.1.					
	100	1.19						
	6	1				1000		100
						17.		19.22

Notes:

HEACTHY

SURROUNDING

DENSITY OR CONSISTENCY	COARSE GRAINED DEPOSITS	N-VALUE 0-4 5-10 11-29 30-49 >50	► VERY LOOSE ► LOOSE ► MEDIUM DENSE ► DENSE ► VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	Q _U (tsf) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0		VERY SO SOFT MEDIUM STIFF VERY STI HARD
---------------------------	-------------------------------	---	--	-----------------------------	--	--	--	--

Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)

Thumb will penetrate soil about 1" (25mm)

Thumb will indent soil about 1" (5mm)

Thumb will indent soil, but readily indented with thumbnail very Hard

Thumbnail will not indent soil

		SAMPLI	ES	This log is part of Services for this p	a report prepared by Pioneer Technical reject and should be read with mmary applies only at the location of the lime of the drilling. Subsurface
ОЕРТН (FT)	SAMPLE NO. DEPTH	IVE DISTURE	RECOVERY	the boring and at it conditions may diffe this location with th is a simplification o	he time of the drilling. Subsurface or at other locations and may change at se passage of time. The data presented of actual conditions encountered.
DEF	DEPTH	88	B	MATERI	AL DESCRIPTION
_ 2_ 				B SA GRAVER	DREATE SUBBOLIAN SOME COBBELS; LOW PC: ANIC GRASS ROOTS (~30% GROWS) HES ARE SUBBOLING SUBANG. (8" MAY CARE
- T - -6-				6),51	LIY SAND J. DRY, LIGHT BROWN; LOW AV.
_				The state of the s	KETS OF HIGHER ROCK %;
-8-	1	Ш		A DECEMBER OF THE PERSON OF TH	IN A STATE OF THE
		, W			CLAYEY SAND(SO W) GRAVEL, DAMPE
10-		V.			n. PLASTIC; GRAVELS SUBROWNS & SUB
	16			11.0	TRACE (15 30) SUBROUNDED COBBETS;
12-				0.51	5% COOREC
			3111	E 14.0	5% BOULDER
-14- -					WEATHERED ARBOLLYTO; MOIST; DARK GRAY W/ PUR
	- 191		4		TING: IRON STAINING OBSERVED IN FISH
16				C) CANASTONIS GRAY	BICATAS DOWN W/ FINGER PRESCUPIT
-18-			Wil	CLOBING BRANKS W/	MEDIUM PLASTIC CLAY; TRACE PYRITE
_			, 1	FLUGGER PRESSURE; NP; A FE STAINING E)	PYRO CLYSTIC? AGROMERIATE: MOIST: A. BROWN ?
-20-		3		(2)	PYRO CLYSTIC? AGROMERIATE; MOIST; D. BROWN P RED-LT GRAY-DARK GRAY-PURALS: FINE GRAIN P (RUMBLE W) FINGER PRESSURE; PYRITE FLAKES;
			Ш		THESTORY PYRITE FLAKES
	ПП	ш	ПП	SAMPLE AL, FACE	Classification
					USCS USCS USCS GW Well graded gravel, fine to course gravel SC Clayery sand
1					GP Poorly graded gravel Sc-SM Silty, clayery sand GW-GM Well graded gravel with silt CL Clay GW-GC Well graded gravel with clay or silty clay CL-ML Silty Clay
× 1		\blacksquare			GP-GM Poorly graded gravel with slit ML Silt GP-GC Poorly graded gravel with clay or silty clay OL Organic silt, organic clay GM Silty gravel CH Clay of high plosticity, fat clay
					GC Clayey gravel MH Silt of high plasticity, elastic silt GC-GM Silty, clayey gravel OH Organic clay, organic silt
Α.		#	1/2		SP Poorly graded sand CT Concentrated tailings - SW-SM Well graded sand with silt BLK Black Mn/Fe coated
		\blacksquare			SP-SC Poorly graded sand with clay or silty clay MT Mixed tailings/ alluvium SP-SM Poorly graded sand with silt NA Native, undisturbed below water table SP-SC Poorly graded sand with clay or silty clay NB Native, undisturbed below water table
		##	ш		SM Silty sand Pt Peat W Water starts flowing into pit

	-	-
Page _	_ < of	<

Test	Pit	No.	535.TP-	102

Weather:			
Temperature: #O Notes:	Snow depth: Win	Cloud CLOPR Cover:	
Piezo Stickup @ M.P. (ft/tenths): 2.35	Diameter:	Material PVC	
	M.P to Water:	Depth to Water:	<u>.</u>
Depth to Bottom of Test P	it: 16		
Initial pH	Depth at Reading	Time at Reading	
Stabilized water pH	Depth at Reading	Time at Reading	-

Soil Samples

From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
0.	0.7	535TP-102	BAG (11)	151.30	73	D. Brown		1 7 1
0.7	3.7	in the contract of	BK(11)	15:45	SC	R. BRun		
9.0	10.0	lı .	1)	16:00	11	/ 1		-
13.0	13.5	11 .	BOC(1.)	16:15				
15,	16.0	100 mg 110 mg	- 11	16:45	100			-
THE SECTION			V =		1000	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	199-19-19	1 3 3
100		/h			1133	V v J	1	
	7 7							
	- Land 1							
	- 201							+
wife .		W 14 24 1		1				-
								-

Notes:

IN MEADOW WY GRASS & SAGE BRUSIT.
SURROUNDED BY SMALL (-30') TREES

DENSITY OR CONSISTENCY	COARSE GRAINED DEPOSITS	N-VALUE 0-4 5-10 11-29 30-49 >50	► VERY LOOSE ► LOOSE ► MEDIUM DENSE ► DENSE ► VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	q _U (lsl) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0	► VERY SO ► SOFT ► MEDIUM ► STIFF ► VERY STI ► HARD
---------------------------	-------------------------------	---	--	-----------------------------	--	--	---

Criteria for Des	cribing Consistency	(Fine grain)
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Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)
Thumb will penetrate soil about 1" (25mm)
Firm
Thumb will indent soil about X" (5mm)
Hard
Thumb will not indent soil, but readily indented with thumbnail
Very Hard
Thumbnail will not indent soil

ATE STA	NAME: UP	HED	: 10/3/12	Test Pit No. 105 PAGE OF
ME STA	RTED/FINIS	HED	11/100	EXCAVATOR TYPE:
	BY: N		ASSISTED BY: NY	* C
OORIDINATI	ES:(State Plan	9) No		
MAS (FT)	DRIVE STATES STA	RECOVERY (%)	the roport. This set the boring and at conditions may diff this location with the conditions of the conditions of the condition of the conditi	a report prepared by Pioneer Technical project and should be read with ummary applies only at the location of the time of the drilling. Subsurface er at other locations and may change at the passage of time. The data presented of actual conditions encountered. IAL DESCRIPTION
2- 4- 6- 8- 10- 12- 14- 16- 18- 20-			B (175 B) PC (175 B) P	CLAY WY GRAVILL; DRY; HARD DIGO. BROWN; ORGANIK GRISS POOTS BROWN; ORGANIK GRISS POOTS BROWN; CORBERS, + BOWDERS; LT BROWN RYCE 39 CAPTH; SUB ANG TO SUB ROWNED; HARD DIGGING; LUM 10% BOWDERS; E COBBELS MINUS 40 LAYEY SAND (S) LY GRAVEL & COBBELS LAYEY SAND (S) LY GRAVEL & COBBELS LAYEY SAND (S) LY GRAVEL & COBBEL LAYEY SAND (S) LY GRAVEL LAYER SAND (S) LY GRAVEL LAMS OF GRAVELLY SAND LY SILT, BROWN PLOST WATER DRAWN, TO SURFACE LIHER APPRILO LY FIRMER, WATER VISIALLY DRIFT FIRST NOTED (S) 14' OCCASIONALLY ADTER STRIVETS ARE 18" MINUS, SUBANG.
	ППП	П		Classification
				USCS GW Well graded gravel, fine to course gravel GP Poorly graded gravel GP Poorly graded gravel GW-GM Well graded gravel with silt GW-GC Well graded gravel with silt GW-GC Well graded gravel with silt GP-GC Poorly graded gravel with silt GP-GC Poorly graded gravel with silt GP-GC Poorly graded gravel with silt GR GP-GM Silty gravel GM Silty gravel GC Clayey gravel GC Clayey gravel GC-GM Silty, dayey gravel MH Silt of high plasticity, fat clay SW Well graded sand, fine to course sand GC-GM Silty, dayey gravel OH Organic silv, organic silt SW Well graded sand with silt SW-SC Poorly graded sand with silt SW-SC Poorly graded sand with clay or silty clay SP-SM Poorly graded sand with clay or silty clay SP-SM Poorly graded sand with clay or silty clay SP-SM Poorly graded sand with clay or silty clay SP-SM Poorly graded sand with clay or silty clay SP-SM Poorly graded sand with clay or silty clay SP-SM Silty sand Pt Peat W Water starts flowing into pit

EASIER DIGGING W/ LEPT!
MONSTURE 1 LY DEFTH

Test Pit No.	
Weather:	
Temperature: 30 3 Snow depth: Wind CACM Cover: CLOUDY	
Notes:	
Piezo Stickup @ M.P. X07 70 (ft/tenths): 3 95 Diameter: Material OV C (2x/0' ELANAS, 15'50 REN, 4 CAD)	
Screen Interval: 27 04 5 Water: Depth to Water: Water:	
Depth to Bottom of Test Pit: Initial pH Depth at Reading Time at Reading	All a
Stabilized water pH Depth at Reading Time at Reading Soil Samples	

From	То	Sample ID	Type	Time (Military)	USC	Color	Comment	Photo ID
0	1.7:	S35 70-105	816(3)	1) 35	75	O. Break		X7 2 1 1 1
2	4	11	BUC(2)	11:50	SP	17.BROWN		
8	9	11 11 11	E 3411	13:00	50	P Brown		
17	17.5		BAG(2).	12:30	50	BROWN		
16.5	17.0		BAG(1)	12:45	SC	R. BROWN		A CANADA
	13,00	S	1 180	in my	1000			W-1.7
15				255.16			September 1	
	N	ALEVY DI	1			and the		
100	12.			A CHEST	100	The Arthur	32 1/13/2017	
0		4					200	
	1			av. 1 4	-71			11. A . N
					14.	144		

Notes:

TRICKLE

N-VALUE N-VALUE Q _U (ISI) 0.2	1.1.
DEPOSITS 11-29 MEDIUM DENSE DEPOSITS 9-15 1.0-2.0	district of the same of

		4 7	of the same of the same of the same of
			small or a basis of
Cuitoria	for Describing	Concietones	(Line orain

Very Soft Thumb will penetrate the soil more than 1" (25mm)

Thumb will penetrate soil about 1" (25mm)

Thumb will indent soil about 1" (5mm)

Thumb will not indent soil, but readily indented with thum

Very Hard Thumbnail will not indent soil

S35 TP-107

	ED BY: Y	M:	_	ASSISTED BY: Northing: Easting:	
J.	DRIVE DRIVE	ES	RECOVERY (%)	This log is part of a report prepared by Ploneer Technical Services for tills project and should be read with the report. This summary applies only at the location of	6.3
	DEPTH E	8	REC	MATERIAL DESCRIPTION	
) — ; — ; — ; — ; — ; — ; — ; — ; — ; —				A TOPSOIL BOT, DARK BROWN SANDY CLAY WITGRADEL & TRACE LOW PL, ORGANIC GRASS POOTS; GRAVEL & COORE & ANDULAN B) CLAYEY SAND (SC); DAMP; IT BROWN WY RED TING; T ANGUAR TO SUB ROUNDED; BY CORDEL; ZOX CRAVEL LOW TO MED PL, & CREEK SOME SILTY MOST; BROWN NON. FIRETTI; SUB-ANG VIO "6 CORREST" SOME GRAVEL VIO "6 CORREST"	AND GE
/			* '		CO74
0-				B) MOISTURE INCREMSES W/ DAY LE	3"0
		П		LOCATIVE NWGIDE OF THE Classification	
- 1				USCS USCS USCS GW Well graded gravel, fine to course gravel SC Clayey or GP Poorly graded gravel SC-SM Silty, claye GP Poorly graded gravel with silt CL Clay GW-GC Well graded gravel with silt CL Clay GW-GC Well graded gravel with silt ML Silty GP-GM Poorly graded gravel with silt ML Silty GP-GM Poorly graded gravel with clay or silty clay OL Organic silt, or GP-GC Poorly graded gravel with clay or silty clay OL Clayer GW-GW-GW-GW-GW-GW-GW-GW-GW-GW-GW-GW-GW-G	and y sand / lay rganic ctay icity, fat clay city, elastic silt organic silt

		4.6	53	PT	D-	07
Test	Pit	No.	20			-

Weather: CNOW	4	•
Temperature: 303	Snow depth: 4 Wind CAL	Cloud COUE (SNOW I W
Piezo Stickup @ M.P. (ft/tenths):	Diameter: N	naterial PVC
Screen Interval:		Depth to Nith
Depth to Bottom of Test Pit:	Depth at Reading	Time at Reading
Stabilized water pH	Depth at Reading	Time at Reading

Soil Samples

From	То	Sample ID	Туре	Time (Military)	USC	Color	Comment	Photo ID
1111111	. 9	F01-97382	BAG(T	9:15	45	D. BROWN	A819 18	0.1
0	1,7	585 TP - 107		9:15	100	R. BROWN		1000
tit.	5.2	11 .	12001	01:25	SP.	LT BROWN	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
of	10.	1.1	11.	10:00	-5C	R. Brown		
15	16	11	- 11	10.00	-			
			*		-			1
	1000		1		-			
			1 5 8 10			-	A CORP THE SAME	
		100	0.	1 - 1 - 1 - 1		-		1
						-		V-1
	-			100		1		-
	-	2 2 2 3	1	14-14		1		
		- V					7 *	

Notes:

HARDNES D166176 WEDINW

DENSITY OR COARSE 0.4 VERY LOOSE CONSISTENCY GRANED 5.10 LOOSE DEPOSITS 11-29 MEDIUM DENSE DENSE 550 VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	q _U (tsl) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0	► VERY SO ► SOFT ► MEDIUM ► STIFF ► VERY STI ► HARD
---	-----------------------------	--	--	---

Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the Soil more than 1" (250mm)

Thumb will penetrate soil about 1" (25mm)

Thumb will indent soil about 1" (5mm)

Thumb will not indent soil, but readily indented with thumbnail.

Very Hard
Thumbnail will not Indent soil

EXCAVATOR TYPE: 200
irt of a report prepared by Ploneer Technical this project and should be read with. his summary applies only at the location of d at the time of the drilling. Subsurface y differ at other locations and may change at with the passage of time. The data presented tilon of actual conditions encountered.
TERIAL DESCRIPTION
PSON PRINCIP SAME (S) DAY B. BROWN ONE GRAVEL SUR MINE & SUB POWN MAN PRINCIE DEBANG GRAVE ROSS ED PL: POODLY GRADED GRAVELY SAME WY SILT & COBRECT & BOUNDERS: DAM @3'; IT BROWN SUB AND & FROM I TO 4 LANGEST PART IS BY LOW FL. @ 4' MAY 18" PROTICLE: S& BOUNDER CLAYEY SAND WY GRAVEL & COBBES; MOIST, M. PL. WOX CORDER & BOUNDER CLAYEY SAND WY GRAVEL & COBBES; MOIST, M. PL. WOX CORDER & BOUNDER BOOKH WY RED HOE; POORLY GRADED GRAVEL WY SAND & TRAG CLAY: SUB POUNDED PRIMARIY XX WHET; BROWN /GRAY MATRIX; WATER PLOWING THE OBLY MYER MICH PARTICLE IS S".
Classification
Classification USCS USCS USCS USCS GW Well graded gravel, fine to course gravel SC Clayery sand GP Poorly graded gravel with silt CL Clay GW-GM Well graded gravel with silt CL Clay GW-GM Well graded gravel with silt CL Clay GW-GC Well graded gravel with silt CL Silty Clay GP-GM Poorly graded gravel with silt ML Silt Silt CP-GC Poorly graded gravel with clay or silty clay GM Silty gravel CH Clay of high plasticity, fat clay GC Cayer gravel MH Silt of high plasticity, fat clay GC-GM Silty, clayer gravel OH Organic clay, organic silt SW Well graded sand, fine to course sand OTHER OTHER SW-SM Well graded sand CT Concentrated tailings- SW-SM Well graded sand with silt BLK Black Mn/Fe coated SW-SC Poorly graded sand with silt BLK Black Mn/Fe coated SP-SM Poorly graded sand with silt NA Native, undisturbed below water table SP-SC Poorly graded sand with clay or silty clay SM Silty sand Pt Peat W Water starts flowing into pit
N CONTRACTOR OF THE PARTY OF TH

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7011175
0,
-
Texto
TOKUP
TOKUP 95

DENSITY OR CONSISTENCY	COARSE GRAINED DEPOSITS		➤ VERY LOOSE ► LOOSE ► MEDIUM DENSE ► DENSE		FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15	q _U (lsf) <0.25 0.25-0.50 0.50-1.0 1.0-2.0	4444	VERY SO SOFT MEDIUM STIFF
	DEPOSITS	30-49 >50	➤ DENSE ➤ VERY DENSE	es f	DEPOSITS	9-15 16-30 >30	1.0-2.0 2.0-4.0 >4.0	4 4 4	VERY STI HARD

Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)

Firm
Thumb will penetrate soil about 1" (25mm)

Firm
Thumb will indent soil about %" (5mm)

Thumb will not indent soil, but readily indented with thumbnail

Very Hard
Thumbnail will not Indent soil

COOR	DINATES:(_	_	_	ASSISTED BY: orthing: MB Easting: MJ
ОЕРТН (FT)	SAMPLE NO. DEPTH	NVE ANDISTURBED ANDISTURBED	1	_	This log is part of a report prepared by Pioneer Technical Services for this project and should be read with the report. This summary applies only at the location of the borting and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.
- B	DEPTH	5	B	A.	MATERIAL DESCRIPTION SUBANG
-2- -4- -6- -8- -12- -14- -16- -20-					A) POPSOIL SILTY SAND MY SOME GRAVEL DRY BROWN (TURNS DARK BROWN MY MOISTURE) ORGANIC GRASS ROOTS; LOW PL B) SILTY SAND (COBSEL & BOULDSRS); DRY; MY" GRAVELY LIT BROWN; SUBANGLIAR; SLIGHTLY PLASTIC; MARED BLOGING C 4' -30% GRAVEL 10% COBBEL 10% BOULD C) CLAYEY SAND MY GRAVEL COBBELS; F BOUNDARY PARTICLES; LARGEST PARTICLE "24"; "5% BOULDER, "10% COBASE, "20% GRA MED PL EAS MEDIUM DISCINS HARDNESS
27			1		
					Classification USCS USCS GW Well graded gravel, fine to course gravel SC Clayey sand GP Poorly graded gravel SC SM Silty, clayey sand GW-GM Well graded gravel with silt CL Clay GP-GM Poorly graded gravel with silt CL Clay GP-GM Poorly graded gravel with silt ML Silt GP-GC Clayey gravel OH Clay of high plasticity, fast GC GC Clayey gravel MH Silt of high plasticity, fast GC GC-GM Silty gravel OH Organic clay, organic silt GF-GC Clayey gravel OH Organic clay, organic silt GC-GM Silty gravel OH Organic clay, organic silt GC-GM Silty gravel OH Organic clay, organic silt SW Well graded sand, fine to course sand OTHER OTHER SW-SM Well graded sand with silt BLK Black Mn/Fe coated SW-SM-SM Well graded sand with silt SW-SM Well graded sand with silt SW-SM Well graded sand with silt SW-SM Notweet sallows above wat babove wat babo

Test Pit No. 106		Page of
Weather: 1697 SNO	w	
Temperature: 30 Notes:	Snow depth: 3 Wind CA	Cloud Cover: OVERS CAS 7
Piezo Stickup @ M.P. (ft/tenths): 2./5	Diameter: 1/2	Material_PV
Screen Interval: 10' (0:	M.P to Water:	Depth to Water:
Depth to Bottom of Test Pit:	18.2	
Initial pH	Depth at Reading	Time at Reading
Stabilized water pH	Depth at Reading	Time at Reading
	Soil Samples	

From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
0	29		BA6(2)	14:30	75	D. BROWN		
3.6	4.6		Brow (5)	14:30	sm	17. BROW		
8,4	9.4		/1	15:05	SC	R. BROWN)	
17.2	18.2		11	15:55	11	2)	1	
	1			-				
	1							
				2			in v	

Notes:

POTENTIALLY TP LOCATED ON OLD SLASH PILET.
NO GW OBSERVED
TECH STUDENTS ON 917E

DENSITY OR CONSISTENCY	COARSE GRAINED DEPOSITS	N-VALUE 0-4 5-10 11-29 30-49 >50	AAAA	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	q ₁₁ (tst) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0	AAAAAA	VERY SO SOFT MEDIUM STIFF VERY STI HARD
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Criteria	for Describing Consistency (Fine grain	1
Many Cafe	Thomb will apparent the call many than # 190-	

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)
Thumb will penetrate soil about 1" (25mm)
Thumb will indent soil about X" (5mm)
Hard
Thumb will not indent soil, but readily indented with thumbnail
Very Hard
Thumbnail will not indent soil Very Soft Soft

	ED BY:		ane) A	ASSISTED BY:	
22211		SAMPL			of a report prepared by Plonear Technical
оертн (гт)	SAMPLE NO. DEPTH	RIVE	BULK RECOVERY (%)		of a report prepared by Ploneer Technical is project and should be read with s summary applies only at the location of at the lime of the drilling. Subsurface differ at other locations and may change at th the passage of time. The data presented on of actual conditions encountered.
_	DEPIH			THE RESERVE TO SERVE THE RESERVE TO SERVE THE RESERVE	ERIAL DESCRIPTION
- -2- -4- -6- -8- -10- -12- -14- -18-				B 5127 C 4.5 6" C GRA C 3' C 3' C 30	SAND W/ MINUE; LOW PL; ORGANIC GRASS RO ADLY I" MINUE; LOW PL; ORGANIC GRASS RO TY, XI GRAVELLY SANDW! SOME COBRESCO WAS ARE SUBANG; SLIGHT PL WES ARE SUBANG; SLIGHT PL WES ARE SUBANG; SCHOOL; 40% SAND; SOME ** 10% COBBEL, 30% GRAVEL; 40% SAND; SOME ** (COGNEL) RED HUE; MED PL; SUBANG E SUB O'S GRAVEL MIGHT PARTICLE BY ** (COGNEL)
- -20-	17.5				
		Ш			
	Ш	Ш	П		Classification
					USCS USCS GW Well graded gravel, fine to course gravel GP Poorty graded gravel GW-GM Well graded gravel with silt GW-GC Well graded gravel with clay or silty clay GP-GM Poorty graded gravel with silt GP-GC Poorty graded gravel with silt GF-GC Poorty graded gravel with clay or silty clay GM Silty clayer Silty clayer GP-GM Poorty graded gravel with silt ML Silty Clay GP-GC Poorty graded gravel with clay or silty clay GM Silty clayer silty clay GM Silty clayer silty clay GM Silty clayer gravel MM Silt of high plasticity, fat clay GC-GM Silty, clayer gravel MM Silt of high plasticity, elastic silt GC-GM Silty, clayer gravel SW Well graded sand, fine to course sand SP Poorty graded sand CT Concentrated tailings SW-SC Poorty graded sand with silty clay MT Mixed tailings fallowium

Test Pit No. 109		Page 2 of 2
Weather: L1647	SNOW	W
Temperature: 30 S	Snow depth: 3 Wind CALM	Cloud Cover: OVER CAST
Piezo Stickup @ M.P. (ft/tenths): 식나5	Diameter: 1½ Materi	ial pvc
Screen Interval: 5" Depth to Bottom of Test Pit:	M.P to Water:	Depth to. Water:
Initial pH	Depth at Reading	Time at Reading
Stabilized water pH	Depth at Reading	Time at Reading

From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
0.	1,3	5857A-109	346(2)	12145	73	D. BROLL		
3.6	4.6		BK 2	12155		UBRUL		187 2
7.3	8.3		11	13:10	SC	R. Brown	والمراج المالون	
16.6	17.6		11	13:30	11	14 4		
					1		The second	
9					(b			16
						1	E STORES	1.0
						1		1.00
				11-11-11-11			***************************************	
×.			11 X 1			1		
			The same	1 - 4				5
	115		THE TY,	1 5	1	1 1	P	1

Notes:

NO

DENSITY OR COARSE CONSISTENCY GRAINE DEPOSI	N-VALUE 04	N-VALUE 0-2 FINE 3-4 GRAINED 5-8 DEPOSITS 9-15 16-30 >30	Q _U (Isf) <0.25
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Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)

Firm
Thumb will penetrate soil about 1" (25mm)

Thumb will indent soil about %" (5mm)

Thumb will not indent soil, but readily indented with thumbnail

Very Hard
Thumbnail will not indent soil

ME	STARTED/ STARTED/ GED BY:	FINIS	HED	ASSISTED BY: NO	OPERATOR: 5 W EXCAVATOR TYPE: 0C 200 LC
	DINATES:(State			rthing: Easting:	
	DEPTH DEST	UK UKBED 3		This log is part of Services for this p the report. This su the boring and at i conditions may diffi this location with the la a simplification of	a report prepared by Pioneer Technical project and should be read with immany applies only at the location of the firme of the drilling. Subsurface er at other locations and may change at the passage of time. The data presented of actual conditions encountered.
	DEPTH 6	5 8	RE	MATERI	AL DESCRIPTION
				B) SA GE 3 7.0 Q.0 Q.0 SA LO BOH @ 16.5	SAME AS B BUT BONY EN SOLD WAS INTO MOST ON SCHOOL SOLD WAS WELL OF BOUNDS INTO MOST ON SCHOOL SOLD WAS WATER OF BOTTOM SCHOOL WAS WELL ON THE THORY OF BOTTOM SCHOOL WAS WELL ON THE THORY OF BOTTOM, LIKELY FROM BOTTOM. DID NOT USUALLY SEE ANY CLAY IN BOTTOM. DID NOT USUALLY SEE ANY CLAY IN BOTTOM TA
					USCS USCS USCS USCS GW Well graded gravel, fine to course gravel SC Clayey sand
					GP Poorly graded gravel SC-SM Sitty, clayey sand SW-SC Well graded gravel with sit CL Clay SW-GP-GM Well graded gravel with sit CL Clay GP-GM Poorly graded gravel with sit ML Sitty Clay Sit GP-GM Poorly graded gravel with sit ML Sitty Clay Sit GP-GC Poorly graded gravel with sit ML Sitty Clay GM Sitty gravel CH Clay of high plasticity, fat clay GC-GM Sitty gravel MH Sitt of high plasticity, fat clay GC-GM Sitty, clayey gravel MH Sitt of high plasticity, fat clay Sity GC-GM Sity, clayey gravel OH Organic clay, organic sit GC-GM Sity, clayed gravel Sitty GM-GM-GM-GM-GM-GM-GM-GM-GM-GM-GM-GM-GM-G

Test Pit No.		Page <u>2</u> of <u>2</u>
Weather:		
Temperature: 30 5 Notes:	Snow depth: 3 Wind_	Cloud CLOUDY / CMCP GA
Piezo Stickup @ M.P. (ft/tenths): 1.15 Screen Interval: 5 0.3 11 Depth to Bottom of Test Pit:	Diameter: 1 // M.P to Water:	
Initial pH Stabilized water pH	Depth at Reading Depth at Reading Soil Samples	Time at Reading Time at Reading
	_ Time	

From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
0	2.0	\$85 70.112	BA6 (2)	10:15	15.	Brown		(36,
21.0	4.5		BUC (3)	-10125	GRAV	BROWN.		
6.8	8.8		BAG(2)	10:35	me	0.57250		100
16	16,5		BAS (1)	11:15	CL	1 ₁		
15	16	1	BUCK(2)	. 11:00 .	GRAV	ELV CON		- 1 1
Teal III						0.07		
.; '-				Maria 200			rei i	
	1			- 1)		, , , , ,		
	-			4				VI_VP-
				1				A Hage
				1.00	0	V - 1		
			ila V	- '\				1 . T

Notes:

DENSITY OR COAR GRANDEPO	IED 5-10 ► LOOSE	M-VALUE 0-2 FINE 3-4 GRAINED 5-8 DEPOSITS 9-15 16-30 >30	Q _U (Isf) <0.25
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Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)

Firm
Thumb will penetrate soil about 1" (25mm)

Firm
Thumb will indent soil about 1" (5mm)

Thumb will not indent soil, but readily indented with thumbnail

Very Hard
Thumbnail will not indent soil

KOJ	ECT NA	ME:	į	18	MC	1	11.	/ 10											_	_			0.		100	-	PAGE	=	_ OF	(fair)
DATE	START	ED/E	INIS	HEL	. 0	10	14	116	-	_	M	60		-		+	OP.	ERAT CAVA	OR:	TV			3/9	_	200	pr	7	_		
DCC	STARTE ED BY:	D/F	NIS AB	HEU		A .	SSI	STF	D E	Ý.		1:					EA	CAVA	IO	ш	CE.				S. March	0			-	
	DINATES:				orthin		221	-11-			sting														*				-	
JUNE	THE PARTY	SAME	_	_		-						V	ale d	ng 1		4 00	11	no-4		ad he	Plan	oor T	achala	al						
оертн (гт)	SAMPLE NO. DEPTH	DRIVE	BULK	RECOVERY (%)							-	- 11	ne re ne be	port oring ions ocation	may on w	diffe	nmo r at p pa f ac	port protect and any applime of other assage atual co	the locar of the	drilling flons me.	g. Sond n	ubsur nay c	non or face change	at	9					
		-	+				Α		1,	2			3					_				8				-				
-2 -4 -6 -8 -10 -12			, , , , , , , , , , , , , , , , , , ,				B	2		20.1)	<u> </u>	B		STLOS SPECTO ST	RIM HOPE	E PI YAY IN THE TO	STAN GRANT GERMAN POR	STATE OF STA	THE SOMETH ROOM TO COME	MIN PILLER	E SOUND THE SOUN	PM SHOWS IN (III)	SAY PIONE	BENEVILLE STATE OF THE STATE OF	3 3 3 m	FU SUST	677 E 77 E 886 E 516 AT A	DAIZT DAIZT DAIZT DAIZT	MCLE P
		Ш				1)	-	N.	-	~ ^ N	MA.	, 51	T	CW	12	1	WE	Ti	B	race.	W;	50/	20	WPL
16-	1					1	8					1		2))	24	na.	, -1		-)	4		1	EEDO	SH	/	1		(C2)
4					1	E	MA	0	17	1.0		1				Oc	CA	BION	194		SE	um	S	OF	· V	AK.	USA	CI	YFL	((2)
18-					1	85	COST I	-			. 1				0		,	· A	in.		Par	-73 V	/AS	W.	11 11	-	00	ob tuel	00	
20-			6.2					11.		1	1			R	0	14		3	0%	BU Co.	enic BBB BBB	50 VBT	L t	SI	16 NJ	8	W	67	05	
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	##	#			\parallel	\sharp		H	4		H	H	#	\parallel	+	#	#	USCS	W	II grade		JSCS I, fine t	to course	gravel	USC		_		ISCS ey sand	
		#	#		\parallel	H	7	1	#	#		#	#	Ħ	#	#	#	GP GW-GM	-	P	oorly g	raded g		-	SC-SI	M		Silty, c	layey sand Clay	74.1
				H	H	H	-		Ħ	H	1	Ħ	#	\forall	+	\Box	#	GW-GC GP-GM		Poorl	y grade	d grave	clay or si el with si	ilt	ML		17.	56.00	ty Clay Silt	
			H	H	5 5		1	H	H	H	H	H	H	H	-	H	7	GP-GC GM	Poo	rly grad	Silt	y grave		silty cla	CH		Clay	of high p	t, organic plasticity, f	at clay
			H	-		1		H	H	H	H	H	H	F		\blacksquare	-	GC-GM			Silty, cl		ravel	- daniel	OH			Organic ct	asticity, ela ay, organio THER	
1		H	H	H		A	H	H	H	H	H	H	H	\mathbb{H}		H	\exists	SP SW.CM	- W	-	Poorly p	graded	sand with silt		CT BLK			Concentr	THER ated tailin	
		\mathbf{H}	H	H	1	Ŧ	H	H	H	H	H	H	\mathbf{H}	\blacksquare	F		1	SW-SM SW-SC SP-SM	Poi	orly grad	ied san	d with	clay or s d with si	lity clay				Mixed tail	lings/alluv	
			H	H	1	Ŧ	H	H	H	H	H	H	H	F	F	H	-	SP-SC SM	Po		ded san		clay or s			1		undisturb		water table
Tan 1 19 11	(A) (A)				4	_																								

Test Pit No. 113		Page 2 of 2
Weather:		
Temperature: 30 Notes:	Snow 3" Wind CNM	Cloud Cover: 19 18 12 1857
Piezo Stickup @ M.P. (ft/tenths): 5.2	Diameter: 1 1/2 Materia 10 BUANN M.P to	Depth to
Depth to Bottom of Test Pit:	Water:	Water:
Initial pH Stabilized water pH	Depth at Reading Depth at Reading	Time at Reading

Soil Samples

From	From To Samp		Туре	Time (Military)	USC	Color	Comment	Photo ID
0	1.2	525 TP-113	BAG(IA	825	75	LT BROWN	A PROPERTY	or Condition
1.5	3.5		Buc (11)	8:35	GP	BROWN	in the second	
6.0	7.0	100	BOCKS	8145	SW		i =0	1 1 1 1 1
8.0	9.0		BAGCI	8150	SW	BROW	T 2; 1:	0.4-10
1010	15:0		BAGCIN	91/5	m	R BAG	and	1-17-
16	17	186	BUCCO	9:20	GAMA	7 Branch		
			T					17.00
				the second	1 3,			24.
MA .								
1 1						,		August 1
		1.00					2 2 2 3 Av. a	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	- 57	\	1721.5	17 - 2	1	1		

Notes:

DENSITY OR COARSE 04 PVERY LOOSE CONSISTENCY GRAINED 5-10 PLOOSE DEPOSITS 11-29 PMEDIUM DENSE 30-49 PDENSE >50 PVERY DENSE	0-2 FINE 3-4 GRAINED 5-8 DEPOSITS 9-15 16-30 >30	Q _U (ISI) <0.25
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Criteria for Describing Consistency (Fine grain)

Very Soft Thumb will penetrate the soil more than 1" (25mm)

Soft Thumb will penetrate soil about 1" (25mm)

Firm Thumb will indent soil about %" (5mm)

Hard Thumb will not indent soil, but readily indented with thumbnail

Very Hard Thumbnail will not indent soil

-	START	D/F	INIS	HED	:	911	5 .	No.	11:00	5				E	PERA (CAV	ATO	R TY	PE:	PC PC	20	X	V		
GI	D BY:		F	MB		ASSI	STED																	
RID	INATES:(SAM	-	-	orthing	_	_		asting		_		_	_	_	_			-		_			=
	SAMPLE NO. DEPTH	1	2	8						th th co	e repondition	ort. ring ons ri cation mplif	This and a nay di with leaffor	the for o	report process and nary aptime of other or other	f the r loca of t	drillin flons ime. ions e	at the g. Su and m The d ncount	location ibsurforay ch ata pr	on of	t t			
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1		П	Ш				1	Yii C	115						FACE									
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1		П		1) 3	1		b				100).	511	016	7 10	D'an	ero a	Pand 1's	Por	JYK.	4 10 V	es a b	D) TIRACLE	- 80
							1		i	120	die.		172	ACO!	D	50	RIC	-	SU	618-	r F	SI.		100
-								16	-11	WE	1		La	KE	1	(2)	773	3 Kage	tre.	1 10	WAD	12	Plant To	ROM
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-	34	П					-	1			,	-1	8	ACHA	SX	y mi	X	r ila	of c	SIRP	U.S	2)	moist;	MERO
		Til	1							1	@ 3	31	B	RA	VAT	1	i on the	en e		, of	ele via e	4	ZONES OF	SUM
-	X						1			П			18	ron	UN	W7	R	20	HUS		51/18/2	5	BONES OF SUBROUNDER	5,
		Н		1		C	1																GRAUES)	
-		П					1	AM /	5157												1.0		GRAVEZ A E	
1		П			/ 81		1	.IM	3131				W	67	10	Con Contract	1	ore.	IDE	1-10	214	7 "	AUNIO IN,	
-		П					1						VI	SIB	LE	58		Pull .	67	5	SUR	FRE	5 9U7	NO
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E		+	H	\mathbf{H}	#	\boxplus	+	Ш	+	+	H	\blacksquare	+	Ħ	GW GP	1	P	gravel, oorly gra	fine to d			SC-SM	Clayey sand Silty, clayey sand	
E		\blacksquare	H	H	\blacksquare	Ш	\blacksquare	Ш	\blacksquare	H	H			\blacksquare	GW-GM GW-GC	We	ll grade	graded (d gravel graded	with clay	y or silty o	clay	CL CL-ML ML	Clay Silty Clay Silt	
F	###	#	#	H	\pm	Ш	#	Ш	#	Ħ	H	Ħ	#	\sharp	GP-GC GM			d grave		y or silty	clay	OL	Organic silt, organic c Clay of high plasticity, fa	
E		\blacksquare	Ħ	H	#	\boxplus	\parallel	\parallel	\parallel	H			#	\pm	GC GC-GM			Clayey Silty, clay	y gravel yey grav			OH OTHER	Sift of high plasticity, elas Organic clay, organic	
E	\prod	H	H	H	\blacksquare	\blacksquare	H		H		H		\blacksquare	\blacksquare	SP SW-SM		1	ed sand, corly gr graded	aded sa		rio	CT BLK	OTHER Concentrated tailing Black Mn/Fe coated	
t	###	#	#	#	#		#		#	#	#	#		\sharp	SW-SC SP-SM	Poo	orly grad Poor	ed sand ly grade	with cla d sand w	y or silty with silt		MT	Mixed tailings/ alluvi Native, undisturbed above w	am rater table
100	+++	++	H	11	++	+++	++	Ш	++	+	1		\Box	+	SP-SC SM	Por	orly grad		with cla	y or silty	clay	NB Pt	Native, undisturbed below w Peat	ater table

Temperati	ure: <u>30</u>	S	now lepth: 2	w	ind_CA	CM 6	Cloud Cover: CLISAN	
Piezo Stick (ft/tenths)				Diameter:	1/2	Matarial	PV	н
3 N Screen Int	657 [6] erval: _5	PIEZO	3'enp	M.P to Water:		14 4	Depth to Water:	
Depth to E	ottom o	Test Pit: 17	Donth a	t Reading	7715	T:	me at Reading	-×
	water pH			Reading			me at Reading	
From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo I
				-				
						10.		
Notes:						CKUP		

DENSITY OR CONSISTENCY	COARSE GRAINED	N-VALUE 0-4 5-10	► VERY LOOSE ► LOOSE	FINE GRAINED	N-VALUE 0-2 3-4 5-8	<0.25 0.25-0.50 0.50-1.0	4 4 4	VERY SO SOFT MEDIUM	× 1
	DEPOSITS	11-29 30-49 >50	► MEDIUM DENSE ► DENSE ► VERY DENSE	DEPOSITS	9-15 16-30 >30	1.0-2.0 2.0-4.0 >4.0	A A A	STIFF VERY STI HARD	

Criteria for Describing Consistency (Fine grain)

Very Soft
Soft
Thumb will penetrate the soil more than 1" (25mm)

Firm
Thumb will indent soil about 1" (25mm)

Hard
Thumb will indent soil about 1" (5mm)

Thumb will not indent soil, but readily indented with thumbnail

Very Hard
Thumbnail will not indent soil

TE STAR	AME:		(0/5/12	Test Pit No. 103 PAGE 1 OF 2
ME START	ED/FINE	SHED	11115	EXCAVATOR TYPE: PC 200 L.C.
GGED BY ORIDINATES:	Contract of the second	ELDI HA	ASSISTED BY: NO	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
JAIDHAILS.	SAMPLE			a report prepared by Planear Technical
SAMPL NO. DEPTH	DRIVE UNDISTURBED BILLY	RECOVERY (%)	Services for this the report. This is the boring and at conditions may diff this location with the a simplification	a report prepared by Pioneer Technical project and should be read with ummary applies only at the location of the time of the drilling. Subsurface for at other locations and may change at the passage of time. The data presented of actual conditions encountered.
DEPTH		2		IAL DESCRIPTION V. CMPET CAP
2- 4- 6- 2- 4- 6- 8- 50-			B CLAYI B) CLAYI MINÜS LARGES COGNER PROM BROW PROM TING LARE SIM	L SAND SILT SAND BY SUB AND GOLDAR GRAVELS: DARK BRD TRACE OF GAME DOOR) SLIGHT PLO EY SAND BY GRAVEL F TRACE COBBECS 40 PARTICLES ARE MED PL; T PRETICLE FROM 0-5' IS 5"; PARTICLES ALLY SUB ROUNDED & JUMBLED; B. I.H. TO 3.1 LT BROWN, BELOW 3.1 IS IN WY RED HOE, WE'S COBBEC, "20% GRAVEL DEE 96 WILLEASED TO DAMP @ 3' (DAMP) CREASES TO MOST @ EOTTOWN. WIZ 513' WIS 55 PARTICLE "16" MULHIR GRAVEL & COORLE % ENTIRE DEPTH ETCY CONSISTENT THROUGHOUT GASTAN THE CONSISTENT THROUGHOUT GASTAN THROUGH THROUGHOUT GASTAN THROUGH THROUGH THROUGHOUT GASTAN THROUGH THR
ш	шп	ш		Classification
				USCS USCS USCS GW Well graded gravel, fine to course gravel SC Clayey sand GP Poorly graded gravel with slit CL Clay GW-GM Well graded gravel with slit CL Clay GW-GC Well graded gravel with slit ML Slit Clay GP-GM Poorly graded gravel with slit ML Slit Clay GP-GM Poorly graded gravel with slit ML Slit Clay GP-GM Slity gravel CH Clay of high plasticity, fat clay GG C Clayey gravel NH Slit of high plasticity, least sight GC-GM Slity, clayer gravel OH Organic clay, organic slit GC-GM Slity, clayer gravel OH Organic clay, organic slit SW Well graded sand, fine to course sand THER OTHER SP Poorly graded sand with slit BUK Black Mn/Fc coated SW-SC Poorly graded sand with slit BUK Black Mn/Fc coated MT Mibred tailings - SW-SC Poorly graded sand with slit NA Native, undisturbed above water table

-232

Test Pit No Weather: Snow Cloud Temperature: depth: Wind_ Cover: Notes: Piezo Stickup @ M.P. PUC (ft/tenths): 3.85 Diameter: Material M.P to Depth to Screen Interval:_ Water: Water: Depth to Bottom of Test Pit: Initial pH_ Depth at Reading Time at Reading Stabilized water pH_ Depth at Reading Time at Reading

Soil Samples

From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
	100				Mr. KOLL	1.7	*	
							4	
-					1			
		F - 104	1					
	71							
						16	1	
	THE V		(= .3.)	4				V
	-							
	4 4							111
								10

Notes:

DENSITY OR COARSE 04 → VERY LOOSE CONSISTENCY GRANNED DEPOSITS 11-29 → DENSE 30-49 → DENSE >50 → VERY DENSE	PINE 3-4 GRAINED 5-8 DEPOSITS 9-15 16-30 >30	Q _L (lsf) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 > STIFF 2.0-4.0 > HARD WERY SO VERY SO VERY SO VERY SO HARD
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Criteria for Describing Consistency (Fine grain)

Very Soft Thumb will penetrate the soil more than 1" (25mm)

Thumb will penetrate soil about 1" (25mm) Thumb will indent soil about 1/4" (5mm)

Hard Thumb will not indent soil, but readily indented with thumbnail Very Hard Thumbnail will not Indent soil.

STARTED/FINISHED:		OPERATOR: EXCAVATOR TYPE: PQ 1 C 700 PC
ED BY: MB	ASSISTED BY: NO	The state of the s
NATES:(State Plane) No	rthing: Easting:	
HITAGO STANKE DRIVE DRIVE BULK RECOVERY (%)	Services for the the report. The the boring and conditions may this location with the boring and the continual to the continual	of a report prepared by Ploneer Technical lis project and should be read with is summary applies only at the location of at the lime of the drilling. Subsurface differ at other locations and may change at th the passage of time. The data presented on of actual conditions encountered.
DEPIH (A) DIE &	7. mm . 7.	ERIAL DESCRIPTION
	B) CLAVE GRAVE REGION MANO LOW HAVE E TRE BOUR	SAND W/ SUB ANGULAR GRAVEL & COBORIS, DRY ORGANIC GRASS ROOTS, D. BROWN, DRY
	80H 17,5	
		Classification
		USCS USCS USCS USCS

		415					11.0	
Test Pit N	vo. 111)		•			Page of	
Weather:	-		+14,					
			C. L.				22/0 (01	
Temperat Notes:	ure:		Snow depth:	w	ind		Cloud Cover:	<u> </u>
Piezo Stick (ft/tenths)	1.			Diameter:		Material_		
Screen Int	erval:_	5 5000m		M.P to Water:	+ 8 :		Depth to Water:	
		of Test Pit:	1	2 19 19	v			
Initial pH			Depth a	t Reading	-	T	ime at Reading	
Stabilized	water p	н	Depth a	t Reading			ime at Reading	
1 1		1.		Soil Samp	les	True -		
From	То	Sample ID	Туре	Time (Military)	usc	Color	Comment	Photo ID
					-			
			14-11					
							s	
v			1		14.8			
(T		25						
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Notes:

DENSITY OR COARSE CONSISTENCY GRANED DEPOSIT	N-VALUE 0-4 5-10 11-29 30-49 >50	► VERY LOOSE ► LOOSE ► MEDIUM DENSE ► DENSE ► VERY DENSE	FINE GRAINED DEPOSITS	N-VALUE 0-2 3-4 5-8 9-15 16-30 >30	q _U (tsf) <0.25 0.25-0.50 0.50-1.0 1.0-2.0 2.0-4.0 >4.0	44444	VERY SO SOFT MEDIUM STIFF VERY STI HARD
--	---	--	-----------------------------	--	--	-------	--

Criteria for Describing Consistency (Fine grain)

Very Soft
Soft. Thumb will penetrate the soil more than 1" (25mm)

Firm Thumb will penetrate soil about 1" (25mm)

Firm Thumb will Indent soil about X" (5mm)

Hard Thumb will not indent soil, but readily indented with thumbnail very Hard

Thumbnail will not indent soil

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LOGS AND FIELD LOG BOOKS - SOIL BORING LOGS

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-201B/T PAGE 1 of 3
DATE STARTED / FINISHED: 11/1/12 - 11/1/12	DRILLER: Axis Drilling
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5075.91 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020346.93, E1233675.89 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

	BUREHULE	LUCA	TION	I. IN I	020346	.93, ⊑	1233075.89 (MT St. Pl. NAD83) HAMMER TYPE:	140	ib au	ιτο			
	WELL LOG	ОЕРТН (FT)	DRIVE INDISTIRBED	BULK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
	M		<u> </u>		SA	器	MATERIAL DESCRIPTION	\vdash	귑	\sim	변형	ž	TESTING
		 1 				94	Moist, Black [10YR 2/1] Dark yellowish brown [10YR 3/6], ORGANIC SANDY SILT WITH GRAVEL, OL, low plasticity, no reaction to HCl, some roots. Moist, Very dark brown [7.5YR 2.5/2], ORGANIC CLAY, OL, low to					11.0	
		— 2 — —————————————————————————————————				39	medium plasticity. Moist to wet, Reddish brown [5YR 4/4], CLAY with Gravel, CL,					11.6	
		4 = - - - - 5 =					medium plasticity, gravel content decreasing with depth, becoming wet t 11.0'.						
		- 6 - 				83				19		11.1	
		- 7 - - - - 8 -				67				6		17.3	
1	<u> </u>	— 9 <u>—</u> — 9 <u>—</u>											Water level on 11-19-12 MW-201B=8.6' SB-201T=8.2'
		—10— ——————————————————————————————————				80							Bottom 1" crumbled on liner
		12 13				61	Moist, Reddish brown [5YR 4/4], SAND, SP, non-plastic. Wet, Reddish brown [5YR 4/4], CLAYEY SAND with Gravel, SC, medium plasticity, contains layers of poorly graded sand.			23		14.4	
		—14 <u>—</u> ——15—											Attempted 24" Shelby prior to SPTs. End crumpled (pushed
2/21/13		-16- 16-				78				26		11.3	2") no recovery
, 5		—17— —— —18—				72	Wet, GRAVEL, GP, gravels and cobbles noted from cuttings.			19		7.8	
יייי יייי		-19 20					Wet, Reddish brown [2.5YR 4/4], CLAYEY SAND with Gravel, SC, low plasticity.						Driller reports water sealed off at 19.0'
)							CLIENT: Mon	+	Dan	- rt c	nt of		conmontal Quality

PIONEER TECHNICAL SERVICES, INC.

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

CLIENT: Montana Department of Environmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJECT N			_	sitory I	Design Investigation Drill Hole	No	. S	35N	ΛW-	-20	IB/T PAGE 2 of 3
WELL LOG		UNDISTURBED STAM	LEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS/
≥ 0			S S	2	MATERIAL DESCRIPTION West Peddish brown 12 5VP 4/41 CLAVEV SAND with Gravel SC			Ö	ㅁ용	2	TESTING
	_21			72	Wet, Reddish brown [2.5YR 4/4], CLAYEY SAND with Gravel, SC, low plasticity. (Continued)			100+		6.9	
	-22 -23			17	Wet, Reddish brown [5YR 4/4], SILTY SAND with Gravel, SM, low plasticity.			29		23.5	
Y Y Y Y Y X A A A A A A A A A A A A A A	24	,		100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, low to medium plasticity, very stiff, Weathered Tuff, Secondary Gravelly Clay with Sand (CL), Argillite gravels within Tuff are subangular, purple in color.			33		11.8	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	26			72				23		11.4	
X X X X X X X X Y Y Y Y Y Y Y Y Y Y Y Y	-29 -29 -30 -31 -32 -33 -34			100				15		15.7	
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-35- -36- -37- -38-				Wet, Reddish brown [5YR 4/4], CLAYEY GRAVEL, GC, low plasticity, Weathered Tuff.						on a rock no SPT
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	39										too hard for SPT
											Piezometer: 2" Sch 40 PVC 0-37' Bentonite 0-39' Riser 37-44' 10-20 Sand
1 1					CLIENT: Mor	⊥ ıtana	Den:	l artm <i>e</i>	ent of	 Envir	onmental Quality
'				~							
			•	•	ADDRESS:	P.O.	Box	2009	01		
)//	OV	FA					01 na 59	620-0	0901

PROJECT NAME: Section 35 Repository	Design Investigation	Drill Hole No. S35MW-201B/T PAGE 3 of 3					
SAMPLES 90 (%)	This log is part of a report prepared by Pioneer Tec project and should be read with the report. This sur only at the location of the boring and at the time of Subsurface conditions may differ at other locations at this location with the passage of time. The data p simplication of actual conditions encountered.	nnical, Inc. for this nmary applies he drilling. and may change presented is a	LIMIT	TED SPT	YII.Y	RE (%)	
GRAPHIC LOG GRAPHIC LOG DEPTH (FT) DRIVE UNDISTURBED BULK SAMPLE ID RECOVERY (%)	MATERIAL DESCRIPTIO		PLASTIC LIMIT	CORRECTED	(pcf)	MOISTURE (%)	REMARKS / TESTING
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Wet, Reddish brown [5YR 4/4], CLAYEY GRAVEL plasticity, Weathered Tuff. (Continued)	, CO, IOW					39-44' 0.010 Screen Total Depth= 44.0'
-45 -46 -46							
——————————————————————————————————————							
-48- -49- 							
-50							
-52- -53- 							
—54— ——55— ————————————————————————————							
—56— ——————————————————————————————————							
-58- 59- 							
-60 							
PIONE I							
		CLIENT: Montana Department of Environmental Quality					
	A	DDRESS: P.O	O. Box 2	20090	1		
PIONE E TECHNICAL SERVI		HONE NUMBE	elena, M R:	ontani	a 590	J∠U-U)30 I

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-202B PAGE 1	of 3
DATE STARTED / FINISHED: 10/11/12 - 10/11/12	DRILLER: Axis Drilling	
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent	
GROUND SURFACE ELEVATION: 5095.36 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX	
BOREHOLE LOCATION: N1233018 43 E1020673 72 (MT St. PL NAD83)	HAMMER TYPE: 140 lb auto	

ت	OTTELL			, · · ·		200010	то, ш	1020073.72 (WT St. 11. NADOS) HAWWERT THE.		10 a	110			
			SA	MPL	ES			This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies			SPT			
	90			350			(%)	only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change	⊨	I	SO	<u></u>	(%)	
90	GRAPHIC LOG	ОЕРТН (FT)		UNDISTURBED		SAMPLE ID	RECOVERY (%)	at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED	DRY DENSITY (pcf)	MOISTURE	
WELL LOG	HA	Ŧ	Ą	JIST	×	/IPLI	δ			ST	3RE		IST	
WEI	GR/	当	DRIVE	N	BULK	SAN	REC	MATERIAL DESCRIPTION	P	PLA	COF	(pcf.	MO	REMARKS / TESTING
		_	17					Dry, Very dark brown [7.5YR 2.5/2], ORGANIC SILT, OL, low plasticity, very stiff.						
		 _ 1 _	₹X.			SS#1	78	,			100+		9.4	
		· <u> </u>						Dry, Dark brown [7.5YR 3/3], CLAYEY GRAVEL with Sand, GC,						
		- 2 -	W			SS#2	39	medium plasticity, very stiff.			61		5.5	
		_	/			33#2	39				01		5.5	
		- 3 <u>-</u>						Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, very stiff, Argillite gravels.						
								mediani plasticity, very cuit, ruginite graveta.						
		- 5 <u> </u>	1											
		=	Ŋ			SS#3	89				53		8.9	
		- 6 <u>-</u>	$ / \rangle$			000							0.0	
			1/					Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, very stiff to hard, gravels rounded.						
			ĮX.			SS#4	39				26		10.5	
		- 8 -												
			Ŋ			SS#5	67	Moist to wet, Reddish brown [5YR 4/3], GRAVELLY CLAY with			46		11.4	
		- 9 <u>-</u>	1/			000	0.	Sand, CL, medium plasticity, very stiff to hard, Argillite cobble/gravel in spoon at 9.0', very thin lense of sand at 11', interbedded with gravel at 15.5', shattered argillite in spoon from						
								19-19.5'.						
			1/											
		_ _11_	‡X			SS#6	100				24		14.6	
		=												
		-12 <u>-</u>	ŧV.			SS#7	78				18		10.4	
			<u> </u>											
		 _14	1											
		_												
		-15 <u>-</u>	1											
		16	ĮX.			SS#8	100				19		10.7	Visible water at 15.5'
		-16- 	V											
		 17	\mathbb{N}											dust and chips from
			1			SS#9					41		10.6	17.5-17.75'
		-18 -	\vdash											
			1											
		-19 <u>-</u>												
			-					Wet, Reddish brown [5YR 4/4], SILTY GRAVEL with Sand, GM, low plasticity.						
			_	ш			$\overline{}$	OLIENT, Mari		_	<u> </u>			



CLIENT: Montana Department of Environmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

WELL LOG	DEPTH (FT)	UNDISTURBED	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION		PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
				SS#10	83	Wet, Reddish brown [5YR 4/4], SILTY GRAVEL with Sand, GM, low plasticity. (Continued)			12		9.6	spoon moist on outside
	21				92	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			21		14.0	
	-22			SS#11							12.4	
	-23 -24 -24											
	25			SS#12	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, firm.			15		12.1	Water level on 11-19-12 MW-202B=25.3'
	26			SS#13	67				16		10.7	outside of spoon is wet
	27			55#13	67 67				16		12.7 9.0	
	-28											cuttings are chips and dust with clay at 29'
	29_					Boulder.						
	30	<		SS#14	0				100+			Split spoon on boulder
	31											
	32		\ /			Moist to wet, Reddish brown [5YR 4/4], CLAYEY GRAVEL with Sand, GC, medium plasticity, medium dense.						
	33 - 34 - 35 - 35 - 35 - 35 - 35 - 35 -			B#1		cana, co, medium piasiwiy, medium dense.						
	36	\bigvee		SS#15	100				15			
	37					Cobble. Moist to wet, Dark reddish brown [5YR 3/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, medium dense.						rock chips at 37'
	39					Saturated, Dark reddish brown [5YR 3/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, medium dense.						blowing dust at 39-40', some 1/2" chips, argillite, grayish purple
	41			SS#16	83				24		21.1	
		\sim				CLIENT: Mo	ntana	Dep	artme	ent of	Envir	onmental Quality
) /	7	2N	. F.J.	ADDRESS:		Box na, M		01 na 596	520-0	0901
	TE	- I CH	レル	~	SIST.	CES, IVC. PHONE NUM						

	PROJECT N	NAME: Section	on 35 Rep	ository	Design Investigation Drill Hole	No.	. S.	S35MW-202B PAGE 3 of					
	WELL LOG	DEPTH (FT) DRIVE UNDISTURBED	BULK SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /		
	M R		BU SA	- R	MATERIAL DESCRIPTION	=	Ъ	8	DR Og	ĭ	TESTING		
3 COMBINED REPOSITORY GPJ 2/27/13		-43- -44- -45- -46- -47- -48- -49- -50- -51- -52- -53- -54- -55- -56- -57- -58- -59- -60- -61- -62- -63- -63-			Saturated, Dark reddish brown [5YR 3/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, medium dense. (Continued) CLIENT: Mor	ntana	Dena	artme	ent of	Envir	Total Depth= 45.0' Piezometer MW-202B 2" Sch 40 PVC Stick-up 3.9' 0-40' Riser 40-45' 0.010 Screen Annulus 0-40' Bentonite Chips 3/8" 40-45' 10-20 Sand		
DRILL HOLE LOG			У [//]Л	וישו	ADDRESS:	P.O.	Box 2	2009					
HH		TECH	IVICAL S	EL	CES, INC. PHONE NUM		ıa, IVI	ontal	ia 596	J∠U-L	J30 I		

	D 1111 1 N C25CD 202T
PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-202T PAGE 1 of 2
DATE STARTED / FINISHED: 10/12/12 - 10/12/12	DRILLER: Axis Drilling DRILL TYPE: Davey-Kent
LOGGED BY: J. Riedel GROUND SURFACE ELEVATION: 5096.39 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020667.66, E1233022.45 (MT St. Pl. NAD	
SAMPLES This log is part of a report prepared b project and should be read with the re only at the location of the boring and subsurface conditions may differ at o	Pioneer Technical, Inc. for this ort. This summary applies
BOT DIH HE DOES CONGISTION of the boring and a styling condition of the boring and at this location of the boring and at this location with the passage of the simplication of actual conditions enco	the time of the drilling. In detail the time of the drilling. In detail the time of the drilling. In
	CRIPTION ☐ ☐ Ö ☐ S E TESTING
- 1 - 1 2	
PIONEER TECHNICAL SERVICES, INC.	ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

17-22' 10-20 Sand 22-27' Bentonite Chips 3// 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand 27-33' 10-20 Sand	PROJECT NAME:				Repos	sitory I	Design Investigation	Orill Hole	No.	S	35S	B-2	027	PAGE 2 of 2
Most, Residish brown [5YR 4/3], CLAYEY GRAVEL with Sand. 22 23 44 25 26 46 27 B84 B84 B84 B84 B85 B85 B85 B85	APHIC LOG				MPLE ID	COVERY (%)	only at the location of the boring and at the time of Subsurface conditions may differ at other location at this location with the passage of time. The data	chnical, Inc. for this ummary applies the drilling. s and may change presented is a	UID LIMIT	ASTIC LIMIT	RRECTED SPT	Y DENSITY f)	ISTURE (%)	DEMARKS /
Most, Residish brown [5YR 4/3], CLAYEY GRAVEL with Sand. 22 23 44 25 26 46 27 B84 B84 B84 B84 B85 B85 B85 B85	WE GR	DR	S	B	SAI	RE	MATERIAL DESCRIPTION	N	ΓIO	PL	00	DR (pc)	Σ	
30 Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, 17-22' 0.010" Screen Piezometer SB-202T2 1" Sch 40 PVC Stick-up 1.3' 0.27' Riser 27-33' 0.010" Screen Annulus 0-17' Bentonite Chips 3/8' 17-22' 10-20 Sand 22-27' Bentonite Chips 3/8' 27-33' 10-20 Sand 27-33' 10-20 Sand	21- -21- -22- -23- -24- -25- -26- -27- -28-	DF.	j j	BI BI	B#3	122	Moist, Reddish brown [5YR 5/3], CLAYEY GRAV GC, medium plasticity. Moist, Reddish brown [5YR 4/3], CLAYEY GRAV	EL with Sand,	רוע	PL	20	DF (pc	M	Water level on 11-19-12 SB-202T1=DRY SB-202T2=26.4' Total Depth= 33' Piezometer SB-202T1 1" Sch 40 PVC Stick-up 1.4'
CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901	-35- -36- -37- -38- -39-				B#5		Installed 1" diameter piezometer to 33'.							17-22' 0.010" Screen Piezometer SB-202T2 1" Sch 40 PVC Stick-up 1.3' 0-27' Riser 27-33' 0.010" Screen Annulus 0-17' Bentonite Chips 3/8" 17-22' 10-20 Sand 22-27' Bentonite Chips 3/8" 27-33' 10-20 Sand
ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901			~	<u></u>	\checkmark	/	F						Envir	onmental Quality
TECHNICAL GERMACE TAKE DUONE NI IMPED.					21/2	FA	TR						320-C	0901
		TEC						 PHONE NUMB		, 171				

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-203B PAGE 1 of 2
DATE STARTED / FINISHED: 10/29/12 - 10/29/12	DRILLER: Axis Drilling
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5125.77 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1233054.10, E1021128.57 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

						, , ,						
WELL LOG		ОЕРТН (FT)	DRIVE SAMED INDICATI IRRED	SAMPLE ID	RECOVERY (%)		LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
	<u> </u>	_	M	SS#1	83	Moist, Black [10YR 2/1], ORGANIC SILT, OL, no reaction to HCI, grass roots in upper 3".					25.7	
		- 1 -			92	Moist, Dark brown [7.5YR 3/3], SANDY CLAY with Gravel, CL, medium plasticity, no reaction to HCI.					4.0	
		- 2 - - 2 - - 3 -		SS#2	72	Moist, Dark reddish brown [5YR 3/4], CLAYEY GRAVEL with Sand, GC, medium plasticity, no reaction to HCl, gravels are subangular.					5.0	Gravel content higher from 1.5-3.0'
			1									
		- 4 <u>-</u> - 5 <u>-</u>				Moist, Dark brown [7.5YR 3/3], SILTY GRAVEL with Sand, GM, non-plastic, gravels and cobbles are subangular.						
		- 6 -	X	SS#3					55		2.4	
		=	$\left\langle \cdot \right\rangle$									
	2003	- 7 <u>-</u>	<u> </u>	SS#4	53				37		4.9	
		- 8 -										
		=										
		- 9 _				Moist, Dark reddish brown [5YR 3/4], CLAYEY GRAVEL with Sand, GC, medium plasticity.						
		 				Sand, GC, medium plasticity.						
			M									
		-11 <u>-</u>		SS#5					36		10.5	
			$\langle \cdot \rangle$									
		-12— —	X	SS#6					28			
		 -13	\square									
		=										
		-14 <u></u>										
		 -15—				Moist, Reddish brown [5YR 4/3], CLAYEY SAND with Gravel, SC,						
		=	M	SS#7	100	low plasticity.			40		6.1	
		-16 <u>-</u>		30#1	100				40		0.1	
		 _17	M									
			X	SS#8	61				21		5.6	
		-18 <u>-</u>	H									
		 _19										
						Moist, Brown [7.5YR 4/3], SANDY CLAY with Gravel, CL, medium plasticity, no reaction to HCl, 25.25'-25.5' higher gravel content, gravels are subangular.						Driller reports that bottom 1" of run is clay layer
		-20-										
- 1				_ /	\ _	CLIENT: Monta	na	Dena	artme	nt of	Fnvir	ronmental Quality



CLIENT: Montana Department of Environmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJECT N	IAME:				5 Repos	itory [Drill Design Investigation	Hole	No.	S	35N	ЛW-	203	BB PAGE 2 of 2
WELL LOG GRAPHIC LOG	DEPTH (FT)		UNDISTURBED		SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Ir project and should be read with the report. This summary a only at the location of the boring and at the time of the drillin Subsurface conditions may differ at other locations and may at this location with the passage of time. The data presente simplication of actual conditions encountered.	pplies g. change	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	Y DENSITY	MOISTURE (%)	DEMARKS.
WE GR	DEF	DRI		BULK	SAI	REC	MATERIAL DESCRIPTION		ΔÏ	PL⊿	S	DRY (pcf)	Θ	REMARKS / TESTING
		_ \	X		ST#1	100	Moist, Brown [7.5YR 4/3], SANDY CLAY with Gravel, CL, r plasticity, no reaction to HCl, 25.25'-25.5' higher gravel corgravels are subangular. (Continued)	nedium ntent,	30	16			11.3	Bottom 1" of Shelby tube is crumpled, pp=1.25 tsf in top Water level on 11-19-12
	-22 22 	<u> </u>			SS#9	100					12		11.8	MW-203B=21.4'
		\ /					Wet, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, me	edium						
		$\left\langle \right\rangle$			SS#10	72	plasticity, gravel subangular.				19		13.0	
	-27 	\bigwedge			SS#11	22					16		16.1	
Y Y Y Y Y Y X X X X X Y Y Y Y Y Y Y	-29 						Wet, Very dark gray [5YR 3/1], GRAVELLY CLAY, CL, we Tuff, greenish in color only apparent in seams.	athered						
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-30 	X			SS#12		Saturated, Dark brown [7.5YR 3/2], SILTY GRAVEL with S	and,			100+		12.1	Hard drilling stopped due to high blow counts
4							GM, Weather Tuff.							3/8" rock fragments in cuttings
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-33 <u>-</u> -34- 													
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-35 36 													
	-37 													Total Depth= 40.0' Piezometer MW-203B 1" Sch 40 PVC Stick-up 1.5'
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	39 40													0-35' Riser 35-40' 0.010" Screen Annulus
	-41 <u>-</u>													0-34' Bentonite Chips 3/8" 34-40' 10-20 Sand
			_	_		abla	CLIEN	Γ: Mon	tana	Depa	artme	ent of	Envir	onmental Quality
			, .	`	, 117	, , , ,	ADDRE		P.O.					
					1/VL		K <u> </u>			a, M	onta	na 596	620-0)901
		FI	HA	110	CAL SE	RVI	TES. INC. PHONE	- NII IN/IE	JED.					

PROJECT NAME: Section 35 Repository Des	sign Investigation	Drill Hole No. S35MW-203T PAGE 1 of 1						
DATE STARTED / FINISHED: 10/30/12 - 10/3		DRILLER: Axis Drilling						
LOGGED BY: M. Browne		DRILL TYPE: Davey-Kent						
GROUND SURFACE ELEVATION: 5125.92	(U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX						
BOREHOLE LOCATION: N1021133.42, E123	33052.94 (MT St. Pl. NAD83)							
HIC LOG HIC LOG THE LOG STURBED LE ID LE ID VERY (%)	nis log is part of a report prepared by Pione oject and should be read with the report. I nly at the location of the boring and at the tiubsurface conditions may differ at other loc this location with the passage of time. The mplication of actual conditions encountered	This summary applies me of the drilling.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
GRAP GRAP DEPTI DRIVE BULK SAMP SAMP	MATERIAL DESCRI	PTION	<u> </u>	P	00	P. C. P. C.	M	TESTING
- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Moist, Reddish brown [5YR 4/3], SANDY C	CLIENT: Mont ADDRESS: F	ana I	Dера Зох 2	artme 2009	ent of 01	Envir	Water level on 11-19-12 Piezometer MW-203T MW-203T=Dry 1" Sch 40 PVC Stick-up 1.4' 0-15' Riser 15-20' 0.010" Screen Annulus 0-14' Bentonite Chips 3/8" 14-20' 10-20 Sand
PIONEER	γ —			a, M	onta	na 59	b20-0	J9U ⁻ 1
TECHNICAL SERVICE	ES, INC.	PHONE NUMB	ER:					

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-204B PAGE 1 of 2
DATE STARTED / FINISHED: 10/14/12 - 10/14/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5104.95 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020751.92, E1233159.35 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

	OKLITOLL				1102070	1.02, L	1255159.55 (WIT St. 1 I. NADOS) HAWWERT ITTE.		ib ac	110			
				//PLES			This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies			SPT			
	98	_		ED		(%)	only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change	Ŀ	₩	ED S	<u></u>	(%)	
00	GRAPHIC LOG	ОЕРТН (FT)		UNDISTURBED BULK	SAMPLE ID	RECOVERY	at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED	DRY DENSITY (pcf)	MOISTURE	
WELL LOG	H H	Ŧ	VE	지지	IPLI	8			ST	RE		IST	
W	GR.	DEF	DRIVE	UNDIS BULK	SAN	REC	MATERIAL DESCRIPTION	g	PLA	COF	DR) (pcf	MO	REMARKS / TESTING
		Ξ	M		SS#1	83	Dry, Black [10YR 2/1], ORGANIC CLAY, OL, low to medium plasticity, contains organics, twigs, roots.					8.3	
		- 1 <u>-</u>			SS#2	83	Dry, Dark reddish brown [5YR 3/2], GRAVELLY CLAY with Sand, CL, low to medium plasticity.					7.1	
			$\langle \cdot \rangle$				Dry, Dark brown [7.5YR 3/2], CLAYEY GRAVEL with Sand, GC, low to medium plasticity.						
		- 2 - - 	X		SS#3	78	ion o modern process,					6.9	
		- 3 -	\square										
		=											
		- 4 <u>-</u>					Dry, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, low to medium plasticity.						
		_	M		SS#4	100				100+		6.7	
		- 6 <u> </u>			55# 4	100				100+		0.7	
			\mathcal{M}				Dry, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, low to medium plasticity, stiff.						
			X		SS#5	56				31		11.1	
		- 8 <u>-</u>	H				Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, medium						
							plasticity, stiff.						
		- 9 - - 											
		_ _10_											
		=			SS#6	100				33		12.1	
		-11 <u>-</u>											
		 12	M				Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, medium plasticity, stiff.						
		_			SS#7	72				26		11.8	
	6/1/S/S/	-13 <u>-</u>			1		Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, stiff.						
		 14		V	B#1		GC, medium piasticity, still.						
					D#1								
		-15 <u>-</u>		_	<u> </u>								
			M		SS#8	100				19			
		-16- - 	\mathbb{N}										
		_ -17-	M										Rock stuck in bit, no recovery
		=			SS#9	0				8			
		-18 <u>-</u>	\vdash		1								Water Level 11-19-12
		 19		V	B#2								SB-204T = Dry
				/\	J.,,								
		-20 ⁻			<u> </u>								
. [~/	\	CLIENT: Mor	tana	Dep	artme	ent of	Envir	onmental Quality

PIONEER TECHNICAL SERVICES, INC.

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJECT NAME: Section 35 Repository Design Investigation	ll Hole No. S35SB-204B PAGE 2 of 2
SAMPLES SAMPLES This log is part of a report prepared by Pioneer Technica project and should be read with the report. This summa only at the location of the boring and at the time of the distributions and only at the location of the boring and at the time of the distributions and only at the location of the boring and at the time of the distributions may differ at other locations and at this location with the passage of time. The data present in the passage of time.	ary applies trilling. TIWIT DILOS LIWIT DI
MATERIAL DESCRIPTION	REMARKS / TESTING
SS#10 SS#11 SS#11 SS#11 SS#11 B#3 Moist. Dark grayish brown [10YR 4/2], LEAN CLAY, Cliplasticity, weathered Tuff, andesile, secondary secrite, hematite on fracture faces, maybe chlorite also. Moist, Dark grayish brown [10YR 4/2], LEAN CLAY, Cliplasticity, weathered Tuff, andesile, secondary secrite, hematite on fracture faces, maybe chlorite also. Moist, Dark grayish brown [10YR 4/2], SILT with Grave plasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], CLAYEY GRAVI Sand, GC, medium plasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], LEAN CLAY, Cliplasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], LEAN CLAY, Cliplasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], SANDY CLAY, Cliplasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], SANDY CLAY, Cliplasticity, weathered Tuff. Moist, Dark grayish brown [10YR 4/2], SANDY CLAY, Cliplasticity, weathered Tuff.	th Sand, CL, 27 20 11.8 Cuttings color change to yellowish gray at 23.5' 21. medium 22. The same specified as a specific specified by the same specified as a specified by the same specified by
-38	13-18' 0.010" Screen Annulus 0-13' Bentonite Chips 3/8" 13-18' 10-20 Sand 18-30' Bentonite Chips 3/8" 30-35' 10-20 Sand
	ENT: Montana Department of Environmental Quality
	ENT: Montana Department of Environmental Quality DRESS: P.O. Box 200901
PIONEER TECHNICAL SERVICES, INC. PHO	Helena, Montana 59620-0901
TECHNICAL SERVICES, INC.	ONE NUMBER:
TILCHINICAL SERVICES, IIVC.	JAC HOMBER

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-206B PAGE 1 of 3
DATE STARTED / FINISHED: 10/12/12 - 10/12/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5116.23 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020856.02, E1233324.44 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

_						- ,	.2002 (64						
	WELL LUG GRAPHIC LOG	DEPTH (FT)		UNDISTURBED SET	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
			V		SS#1	83	Dry, Black [10YR 2/1], ORGANIC CLAY, OL, low plasticity,					8.6	
		- 1 <u>-</u> - 1 <u>-</u>			SS#2	83	contains twigs, roots, pine needles.					8.0	
		- 2 - - - -	$\left\langle \right $		SS#3	56	Dry, Dark brown [7.5YR 3/2], CLAYEY GRAVEL with Sand, GC, medium plasticity.					4.5	
		- 3 <u>-</u> - <u>-</u> - 4 <u>-</u> - <u>-</u>					Moist, Reddish brown [5YR 5/3], CLAYEY GRAVEL with Sand, GC, medium plasticity.						
		_ 5 <u>_</u>	X		SS#4	88	Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity.			100+		7.7	
		- 6 <u> </u>	X		SS#5	89	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			100+		8.3	
		- 7 <u>-</u>	X		SS#6	44				20		6.1	
		- 8 <u>-</u> - 9 <u>-</u>					Boulder.						
		-10 -11	V		SS#7	22	Moist, Reddish brown [2.5YR 5/4], CLAYEY GRAVEL with Sand, GC, medium plasticity, dense.			52		11.8	outside of spoon is damp
		 12	\bigvee		SS#8	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, medium plasticity, very stiff.			29		11.7	
		-13 -14											
		 15	Ī	\bigvee	00.110	400	Moist, CLAYEY SAND with Gravel, SC, medium plasticity, very stiff.		40	00	400.4	40.0	3 brass liners
Ţ		-16 		\bigwedge	SS#9	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, very stiff.	36	16	33	109.1	13.9	Water level on 11-19-12 SB-206T1=16.6'
		-17 <u>-</u> -18-	\bigwedge		SS#10	89	Moist, Dark reddish gray [5YR 4/2], GRAVELLY CLAY with Sand,			20		12.8	
		 19					CL, medium plasticity, stiff.						Water level on 11-19-12
▼ -							T = : := : : :						SB-206B=19.6'
					/ / **	_	\ CLIENT: Mon	tana	Dena	artme	ent of F	-nvir	onmental Quality

PIONEER TECHNICAL SERVICES, INC.

CLIENT: Montana Department of Environmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJEC	ΓNAME					5 Repos	itory [Design Investigation Drill Hole	No).	S35	5S]	B-2	06E	PAGE 2 of 3
WELL LOG GRAPHIC LOG	DEPTH (FT)	H	DRIVE	DISTURBED		SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	TIMITOTES	COBBECTED SET	NAECTED 3F1	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
WE			씸	5	BULK	SAI	RE	MATERIAL DESCRIPTION	اظ ا	=		3	DR Pool	MC	TESTING
	- -21	\exists	$\sqrt{}$			SS#11	100	Moist, Dark reddish gray [5YR 4/2], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff. (Continued)			2	2		13.8	
Y Y Y	^ —22 ′	\exists	\bigvee			SS#12	44	Wet, Very dark gray [5YR 3/1], CLAYEY GRAVEL with Sand, GC, medium to high plasticity, gravels are weathered Tuff.			1	8		19.1	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		∃						Saturated, Dark reddish brown [5YR 2.5/2], SANDY SILT with Gravel, SM, low plasticity, weathered Tuff.							
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-26	∃\	$\sqrt{}$			SS#13	100				2	2		18.8	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		,				SS#14	89	Saturated, Very dark gray [5YR 3/1], SANDY SILT, SM, low plasticity, rock is limonite, weathered feldspars, fine grained parent rock.			1	7		28.7	
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		∃			V	B#1		Saturated, Very dark gray [5YR 3/1], SANDY CLAY with Gravel, CL, low to medium plasticity, gravels are weathered feldspars.							hard drilling at 29'
	30 31 31 32 32 33	2				SS#15	39	Saturated, Dark gray [5YR 4/1], SANDY CLAY, CL, medium plasticity, weathered Tuff, small quartz feldspar, horndblend, limonite secondary.			3	1		25.3	
	-34 -35 -35 -36 -37 -37 -36	5				SS#16	100		48	2	1 4	9		15.5	water on return
Y Y Y X A A A A A A A A A A A A A A A A	-38 -38 39	∃		1	\bigvee	B#2								13.1	blowing dust, solid drilling at 38'
Y Y Y Y X X X X X X X X X X X X X X X X	40 / / / -41	∄\			<u> </u>	SS#17	100	Saturated, Dark gray [5YR 4/1], CLAYEY GRAVEL with Sand, GC, medium plasticity, very stiff, Argillite within Tuff.			10	0+		19.9	50/5" Refusal, maybe weathered volcanics with country rock argillite
	-							CUENT: Ma-	ton		no-4	ma	nt of	Envi	conmental Quality
	_				<u> </u>	✓	<u>ヾ</u>				рап х 20				ronmental Quality
		Z				2 <i>N</i> Z	SE	/ L			Mon	tan	a 596	620-0	0901
		TE	C	H/	VIC	CAL SE	RVI	CES, INC. PHONE NUM	3ER	:					

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJECT NAME: Section 35 Rep	ository Desi	ign Investigation Drill Hole	No	. S	35S	B-2	06I	PAGE 3 of 3
WELL LOG GRAPHIC LOG DEPTH (FT) DRIVE UNDISTURBED BULK SAMPLE ID	(%) projection only Subject the	s log is part of a report prepared by Pioneer Technical, Inc. for this ject and should be read with the report. This summary applies y at the location of the boring and at the time of the drilling, bsurface conditions may differ at other locations and may change his location with the passage of time. The data presented is a uplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
S S S S S S S S S S S S S S S S S S S	1 1	MATERIAL DESCRIPTION	\vdash	귑	S	변형	ĭ	TESTING
	roc	aturated, Very dark gray [5YR 3/1], CLAYEY GRAVEL with and, GC, medium plasticity, very stiff, multicolored with multiple ock types, weatheredTuff, argillite, diorite, dendrite, argillite with agnesium oxide. (Continued) CI IENT: Mor		Den	100+		11.7	Hard drilling. Cuttings red/purple argillite chips, some white feldspar? trace green olivine? 50/4.5" Refusal Piezometer SB-206B 1" Sch 40 PVC Stick-up 1.6' 0-40' Riser 40-45' 0.010" Screen Piezometer SB-206T1 1" Sch 40 PVC Stick-up 2.1' 0-25' Riser 25-30' 0.010" Screen Annulus 0-25' Bentonite Chips 3/8" 25-30' 10-20 Sand 30-40' Bentonite Chips 3/8" 40-45' 10-20 Sand
PION Prechnical s	7/				2009			omnorital Quality
	FFR					na 596	320-0	0901
TECHNICAL S	<i>LALAL</i> L ERVICES			•				
			**					

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								Design Investigation	Drill Hole			338	D-2	001	PAGE 1 of 1	
	ATE STAR				<u>-</u> υ:	10/13	/12 - 1	10/13/12	DRILL TYPE: Davey-Kent							
GROUND SURFACE ELEVATION: 5115.64 (U.S. Feet) NAV88								SA (ILIC Egot) NAV/99	DRILL TYPE: Davey-Kent HOLE DIAMETER: 4.5" ODEX							
	BOREHOLE LOCATION: N1020855.69, E1233324.12 (MT St. Pl. NAD83								HAMMER TYPE:							
	JILLIOLL	LOOA	_			20000	.00, L	1233324.12 (WT Gt. 11.14AD33)	TIPAWIWIER THE.	140	ib ac	110				
			SAI	MPLES	S			This log is part of a report prepared by Pione project and should be read with the report.	eer Technical, Inc. for this			ΡΤ				
	စ္			ED			(%)	only at the location of the boring and at the t Subsurface conditions may differ at other loc	me of the drilling.		I	IS (>	8		
ر ا), LC	Ē		RB		₽	Z	at this location with the passage of time. The	e data presented is a	₹	PLASTIC LIMIT	CORRECTED SPT	SIT	Щ Щ		
의	呈	Ξ.		DRIVE UNDISTURBED BULK		Ш	ΛE	simplication of actual conditions encountered	J.		은	EC	EN EN			
WELL LOG	GRAPHIC LOG	ОЕРТН (FT)	DRIVE	임	2	SAMPLE ID	RECOVERY		r locations and may change The data presented is a lered.		AST	RR	ر ا ا	MOISTURE (%)	REMARKS /	
×	GR		DR	UNDIS	2	SA	R	MATERIAL DESCRI		LIG	7	00	DRY DENSITY (pcf)	M	TESTING	
		_						Moist, Reddish brown [5YR 4/3], CLAYEY GC.	GRAVEL with Sand,							
ď		- 1 <u>-</u>													Blowing dust some chips	
		– 2 –														
Ś		_														
E		- 3 -														
Ĺ		_ 4														
ľ																
Ķ		_ - 5 =														
		_ 6 _		1											Cuttings have less dust and an increase in moisture	
Š																
					П											
2		_ / _		-		D.//0										
				Ш	1	B#2										
9		– 8 <u>–</u>		Ш												
		– 9 <u>–</u>														
_ 6	*////////////////////////////////////	-10 <u>-</u>		-	-			Moist, Reddish brown [5YR 4/3], CLAYEY	GRAVEL with Sand,							
=k				1				GC.								
		-11_		- 1												
=}				$ \rangle$												
7		-12 <u>-</u>			П											
						B#3										
		_13 <u></u>		- 11	\											
=[Ш												
={		 _14													Water Level 11 10 12	
=		_			1										Water Level 11-19-12	
*		 _15													SB-206T2 = 14.4'	
															Total Depth = 15.0'	
		 -16-													B: 4 65 55575	
		10_													Piezometer SB-206T2	
															1" Sch 40 PVC	
		-17 <u>-</u>													Stick-up 3.4'	
		10													0-10' Riser	
		-18 <u>-</u>													10-15' 0.010" Screen	
	-	-19 <u>-</u>													Annulus	
															0-10' Bentonite Chips 3/8"	
		-20-													10-15' 10-20 Sand	
				~	<u> </u>	-/	/	$\overline{}$						Envir	onmental Quality	
) 7) 7 7		$\overline{z}p$	1			2009 Ianta		200.1	2004	
			· A	y / 4	~ <i>)</i>	/ / /	4 M	K 🔽	l l	-reler	ıa, №	ionta	na 596	020-(TUBUT	
		TECHNICAL SERVICES, INC. Helena, Montana 59620-0901 PHONE NUMBER:														

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

-	TE STAR): 10/24	1/12 -	10/26/12	DRILLER: Axis D						
	GGED BY							DRILL TYPE: Da						
							03 (U.S. Feet) NAV88	HOLE DIAMETER						
ВС	REHOLE	LOCA	TIOI	N: N1	020845	5.92, E	E1233326.98 (MT St. Pl. NAD83)	HAMMER TYPE:	140	lb au	ıto			
WELL LOG	GRAPHICLOG	DEPTH (FT)	DRIVE	BULK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other loc at this location with the passage of time. The simplication of actual conditions encountered MATERIAL DESCRI	This summary applies ime of the drilling. cations and may change e data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		- 1 2 3 4					Moist to wet, Reddish brown [5YR 4/3], SACL, low to medium plasticity.	NDY CLAY with Gravel,						cuttings are dry
		- 8 9			B#1		Moist to wet, Reddish brown [5YR 4/3], CL Sand, GC, low to medium plasticity.	AYEY GRAVEL with						
٨		-14 -15 -16 -17 -18 -19			B#3		Wet, Very dark gray [5YR 3/1], LEAN CLA' plasticity, Tuff cuttings, with chips of Argillite	Y, CL, medium 3.						Water Level 11-19-12 SB-206D = 19.2' SB-206T3 = 18.5' Intermittent Color change to gray at 19'
	Y Y Y Y	-20-		Ы										
			_		$ egthinspace{-1mm} otag$	\ <u></u>		CLIENT: Mon	tana	Dep	artme	ent of	Envir	ronmental Quality
				<u> </u>	, ,			ADDRESS:	P.O.	Вох	2009	01		
					J/V	EL	$\mathcal{C}\mathcal{R}$	-	Heler	na, M	lonta	na 590	620-0	0901
			ים בי				CES, INC.	PHONE NUMBER:						

PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-206D PAGE 2 of 5 SAMPLES This log is part of a proof prepared by Biogent Technical lag for this												
WELL LOG GRAPHIC LOG DEPTH (FT) DRIVE UNDISTURBED BULK	SAMPLE ID RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING				
Y Y Y Y \	<i>"</i>	Wet, Very dark gray [5YR 3/1], LEAN CLAY, CL, medium plasticity, Tuff cuttings, with chips of Argillite. (Continued)	-	_	_			TEOTINO				
\(\lambda \ ambda \ \lamb	B#4	piedasty, run editings, with onpo of rugilities. (editable)										
	B#5											
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		Wet, Very dark gray [5YR 3/1], CLAYEY SAND, SC, low to medium plasticity.						produced some water less than 0.1 gpm Lost water at 31', becoming higher plasticity clay, sticking to drill stem Chips harder at 33'				
\(\begin{array}{cccccccccccccccccccccccccccccccccccc								Very little return, cuttings are chips of Argillite mixed with Clay				
\(\lambda \) \(B#6							Cuttings dusty at 39'				
		CLIENT: Mor	ntana	Den	artma	ent of	Envir	ronmental Quality				
	~ ~		P.O.				∟ı IVIÍ	onnental Quality				
$D10.$	NEL	7 73				na 596	620-0	0901				
	IL SERVI	CES, INC. PHONE NUM	BER:									

_ F	PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-206D PAGE 3 of 5 SAMPLES This log is part of a report prepared by Pioneer Technical, Inc. for this Hole No. S35SB-206D													
- I	WELL LOG GRAPHIC LOG	DЕРТН (FT)	: STURBED		SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer T project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The dat simplication of actual conditions encountered.	summary applies of the drilling.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	DEM DIVO
W	S	DEF	DRI	BULK	SAI	REC	MATERIAL DESCRIPTI	ON	g	PL/	CO	(pcf	8	REMARKS / TESTING
	Y Y Y Y X X X X X X X X X X X X X X X X	-43 -44 -45 -46 -47			B#7		Wet, Very dark gray [5YR 3/1], CLAYEY SAND medium plasticity. (Continued) Wet to Saturated, Dark brown [7.5YR 3/2], SAN Gravel, CL, medium to high plasticity.							Chips of Argillite in Tuff, cuttings with gravel/grayish purple Switch to open hole hammer.
		-48 -49 -50 -51 -52			B#8									(greenish clay chips) Small amount of water on bit return
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-53 -54 -55 -56 -57 -58			B#9		Wet to Saturated, Dark reddish brown [5YR 3/2 GRAVEL with Sand, GC, medium plasticity, Ch less weathered Tuff, less altered, coming as ch clay.	ps are argillite and						Switch back to casing advance, too clayey to clean open hole
DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13	Y Y Y Y X X X X X X X X X X X X X X X X				B#10									Switch back to open hole hammer
SOMBINE	Y Y Y Y Y			/\										more water, less than 0.1 gpm
90			<u> </u>	<	/	Y							Envir	onmental Quality
) 				T	21/		TP.	ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901						
위			ונים של מנים של	VIII	1/ V L	מעל	T CES, INC.	PHONE NUMB		ia, ivi	Jiilai	ia 530	, <u>_</u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
		<u> </u>		110	AL SL	ALV I	DU, IITU.	. HOIVE HONE	\.					

PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-206D PAGE 4 of 5												
	STURBED	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Te project and should be read with the report. This s only at the location of the boring and at the time o Subsurface conditions may differ at other location at this location with the passage of time. The data simplication of actual conditions encountered.	ummary applies f the drilling. s and may change	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)		
WE GR	UNDIS	SAI	REC	MATERIAL DESCRIPTION	NC	ΔH	PL∕	Ö	DR) (pcf	MO	REMARKS / TESTING	
Y Y Y Y 64 A A A A A Y Y Y Y Y A A A A A A A Y Y Y Y Y Y 65		B#10		Wet to Saturated, Dark reddish brown [5YR 3/2] GRAVEL with Sand, GC, medium plasticity, Chilless weathered Tuff, less altered, coming as chilles, (Continued) Saturated, Dark brown [7.5YR 3/2], GRAVEL will GP-GC, low plasticity, Some chips are hard Argi	os are argillite and os not globs of h Clay and Sand,						water misting from hole	
** * * * * * * * * * * * * * * * * * *		B#11		are weathered clays, weathered Tuff.	ше, ѕопе ипрѕ							
70 70 70 70 70 70 70 70 70 70 70 70 70 7											producing more water	
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		B#12									No more than 2-3 gpm, one large chip of Argillite, one large chip of black volcanic w/epidote approx 1" in size	
*** *** *** *** *** *** *** *** *** **		B#13										
** * * * * * * * * * * * * * * * * * *		B#14									Biotite, Argillite, and weathered Tuff chips	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		B#15										
					OLIENT 11		D -					
	~	\	Y			tana P.O.				⊏nvir	ronmental Quality	
)/(2NZ	EL		Helena, Montana 59620-0901							
TE		CES, INC.	PHONE NUMBER:									

PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-206D PAGE 5 of 5 This log is part of a report prepared by Pioneer Technical, Inc. for this												
WELL LOG GRAPHIC LOG DEPTH (FT)	DRIVE UNDISTURBED BULK	SAMPLEID	RECOVERY (%)	project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /		
<u>×</u> <u>9</u> <u>9</u>		8	22	MATERIAL DESCRIPTION	Ĕ	PL	ည	占호	Σ	TESTING		
		B#15		Saturated, Dark brown [7.5YR 3/2], GRAVEL with Clay and Sand, GP-GC, low plasticity, Some chips are hard Argillite, some chips are weathered clays, weathered Tuff. (Continued)						producing less than 3 gpm, still in Tuff although less weatherd, Cutting are Argillite and Tuff chips producing less than 3 gpm, still in Tuff although less weatherd, Cutting are Argillite and Tuff chips		
										Low water production. Less than 3 gpm. Tuff and Argillite. Total Depth=100.0' Piezometer SB-206D 1" Sch 40 PVC Stick-up 3.2' 0-85' Riser 85-90' 0.010" Screen Piezometer SB-206T3 1" Sch 40 PVC Stick-up 1.8' 0-43' Riser 43-48' 0.010" Screen Annulus 0-43' Bentonite Chips 3/8" 43-48' 10-20 Sand 48-85' Bentonite Chips 3/8" 85-90' 10-20 Sand		
	<u></u>		$\overline{}$						Envir	onmental Quality		
		717	T'I	ADDRESS:					320 C	0001		
	DIC						iontai	na 596	020-0	J9U1		
	ECHNI	CAL SI	ZRVI.	CES, INC. PHONE NUM	5EK:							

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-207	GE 1 of 2
DATE STARTED / FINISHED: 10/30/12 - 10/30/12	DRILLER: Axis Drilling	
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent	
GROUND SURFACE ELEVATION: 5142.09 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX	
BOREHOLE LOCATION: N1021091.10, E1233314.65 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto	

Ľ	SAMPLES This log is and of a good spread by Discost Tableigh In a faultic												
WELLIOS	GRAPHIC LOG	DEPTH (FT)	rurbed		SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
Į.	GR/	DEF	DRIVE UNDIST	BULK	SAN	REC	MATERIAL DESCRIPTION	ğ	PLA	SO	Pcf.	9	REMARKS / TESTING
				\vdash			Moist, Black [10YR 2/1], ORGANIC SANDY SILT, OL.	1	_				12011110
		- 1 - - 2 - - 3 -				78 44	Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, gravels are subangular.					12.8 3.6	
		- 3				83				41		7.6	
		- 7 - - 7 - - 8 - 8 -				89				24		12.5	
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	- 9 - -10- -11-					Moist, Dark brown [7.5YR 3/2], CLAYEY SAND with Gravel, SC, Weathered Tuff, greenish gray with rust staining and some purple.	_		100+		9.0	Sampler stuck at 10.5'
	A A A A A A A A A A A A A A A A A A A	-12 13 				33				100+		13.2	
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-15 -16 17								100+		13.9	
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-18 19 					CLIENT: Mon	tana	Dens	artme	ent of	=nvir	Boulder from 19-20.5'
			<u> </u>	<	\checkmark	X	CLIENT: MON	ıaıld		artme		_11/11	Onnental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

Note 10 10 10 10 10 10 10 1	PF	PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35MW-207 PAGE 2 of 2													
Most, Dark brown (7 3/R 3/Z), CLAYEY SAND with Gravet ISC, Westhered Tuff, greenish gray with rust starting and some purple. Water Level 11-19-12 SB-207 = 25.1' Water Level 11-19-12 SB-207 = 25.1' Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' 100 100 Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' 100 Total Depth=35.25 Pizzoneter SB-207 2' Sch 40 PVC Slisk-up 3.7' 0-28 Riser 28-37 0.028 Riser 28-37 0.010' Screen Annutus	:LL LOG	APHIC LOG	РТН (FT)		STURBED	MPLE ID	COVERY (%)	project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other location at this location with the passage of time. The dat	summary applies of the drilling.	UID LIMIT	ASTIC LIMIT	RECTED	Y DENSITY f)	STURE (%)	DEMADKS /
Most Date Noon (7 SYR 3/2), CLAYEY SAND with Gravel. SC. Wednesdord. Till, greenish gray with road staining and some purple. Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' 100 Water Level 11-19-12 SB-207 = 25.1' ME	GR		DR	BUI	SAI	RE	MATERIAL DESCRIPTI	ON	P	<u> </u>	CO	DR Pod	Σ		
CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:	2/27/43 				0 N	∀ S	100	Moist, Dark brown [7.5YR 3/2], CLAYEY SAND Weathered Tuff, greenish gray with rust staining (Continued) Wet, Very dark brown [7.5YR 2.5/2], SANDY CI medium plasticity, no reaction to HCI, Weathere	with Gravel, SC, gand some purple.	FIG	14		<u>Ā</u> (<u>)</u> (pc	31.2	TESTING Water Level 11-19-12 SB-207 = 25.1' bouncing on rock 10 blows for 1st 2 inches Total Depth=35.25' Piezometer SB-207 2" Sch 40 PVC Stick-up 3.7' 0-28' Riser 28-33' 0.010" Screen Annulus
CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:	ABINED REPOSITORY.G														28-33' 10-20 Sand
ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:									CLIENT: Man	tana	Den	artmo	nt of	Envir	conmental Quality
Helena, Montana 59620-0901 TECHNICAL SERVICES, INC. PHONE NUMBER:					\	\	~								Onnicital Quality
TECHNICAL SERVICES, INC. PHONE NUMBER:	OF I				11	21/	FA							320-C	0901
<u>I IBURIVICAL SERVICES, IIV.</u> I HONE NOWDER.	비			S.		_ , _					, 17	J. 1601	500		
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PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-208B PAGE 1 of 2
DATE STARTED / FINISHED: 10/26/12 - 10/26/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5087.19 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1021028.74, E1232765.17 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

L	DUKENULE	SAMPLES SAMPLE								ulo			
			\vdash				This log is part of a report prepared by Pioneer Technical, Inc. for this	5		Ţ			
	WELL LOG	DEPTH (FT)	DRIVE	UIS LURBED 'K	MPLE ID	RECOVERY (%)	project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	DEMARKO (
!	GR.	DEF			SAN	RE(MATERIAL DESCRIPTION	Z	PLA	00	DR) (pcf	MO	TESTING
	WELL LOG	#HEGO	DRIVE	BULK	SAMPLE ID SAMPLE ID S S S S S S S S S S S S S S S S S S	100 100 100		TIGNDIT	PLASTIC	36 34 19	DRY DEF (pcf)	9.6 11.3 12.0	spoon with water on outside
Ţ		-17- -18- -19- 20-	1/ \ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		B#2		Moist, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, medium plasticity, stiff.						Water Level 11-19-12 SB-208B = 17.3'
					~/	\	CLIENT: Mor	ntana	a Dep	artme	ent of	Envir	onmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35MW-208B PAGE 2 of 2														
WELL LOG	DEPTH (FT)	-	UNDISTURBED	_	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer I project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The da simplication of actual conditions encountered.	summary applies of the drilling. ns and may change	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
W R		씸	5	BD	SA	2	MATERIAL DESCRIPTI		1	귑	8	R 9	ĭ	TESTING
	-21 -22 -22 -23		7		ST#3 SS#5	89	Moist, Reddish brown [5YR 4/3], SANDY CLAY medium plasticity, stiff. (Continued)	with Gravel, CL,	29	14	15		11.6	
	-24 -25 -25	\exists			B#3		Boulder. Moist, Reddish brown [5YR 4/3], SANDY CLAY medium plasticity, stiff.	with Gravel, CL,	-					Blowing dust at 24.9, boulder quartzite cuttings at 25'
	-26 -27 -28 -28 -29				B#4		Boulder. Saturated, Dark reddish brown [5YR 3/2], GRA Sand, GP-GC, angular Argillite gravels.	VEL with Clay and						
	30 -31 -32		7		SS#6	89					26		12.0	2" heave on top of SS#7
	-33 -34 -35				SS#7	50	Saturated, Very dark gray [5YR 3/1], Argillite, fil quartz.	lled veins with			25		17.1	Water to 16' in casing on bit return, producing approximately 4 gal/min, cuttings are Argillite chips
	-36 -37 -37 -38		B#6								Hard drilling, angular hard chips Total Depth=40.0' Piezometer SB-208B			
	—39 —40 —41													1" Sch 40 PVC Stick-up 1.4' 0-34' Riser 34-39' 0.010" Screen Annulus 0-34' Bentonite Chips 3/8" 34-39' 10-20 Sand
					. /			CLIENT: March	ons	Doz	net-ma	nt of	En:	
				<	\sim	7					artme 2009		⊏⊓VIľ	ronmental Quality
			7	1	2N	FA	$\mathbb{Z}R$					na 59	620-0	0901
		TE	- A CH		CAZ SZ	TIT.	CES, INC.	PHONE NUME	ER:					

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_	ATE STAR					_		DRILLER: Axis D						
_	GGED B			=\/^	TION	E007	41 (U.S. Feet) NAV88	DRILL TYPE: Day						
							1232767.34 (MT St. Pl. NAD83)	HAMMER TYPE:						
	()	SA	MPL	ES		(%	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t	This summary applies		 -	SPT		(%)	
. LOG	GRAPHIC LOG	DEPTH (FT)	UNDISTURBED		SAMPLE ID	RECOVERY (%)	Subsurface conditions may differ at other lor at this location with the passage of time. Th simplication of actual conditions encountere	cations and may change e data presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED	DRY DENSITY (pcf)	MOISTURE (%)	
WELL LOG	GRAF	DEPTH	ND	BULK	SAME	RECC	MATERIAL DESCRI Moist, Reddish brown [5YR 4/3], CLAYEY		LIQUI	PLAS	CORF	DRY [(pcf)	MOIS	REMARKS / TESTING
		- 1 2 3 4			B#1		Moist, Readish prown [51K 4/3], CLAYEY GC, medium plasticity.	SKAVEL With Sand,						Cuttings are moist, but blowing a lot of dust
		- 5			B#2		Moist, Reddish brown [5YR 4/3], SANDY C medium plasticity.	LAY with Gravel, SC,						White dust with cuttings, likely cobbles
		-10			B#3		Moist, Reddish brown [5YR 4/3], CLAYEY GC, medium plasticity.	GRAVEL with Sand,						
	Y_/ KX_/ X)	-20-		Ш				CLIENT: Mand	anc	Don	artm	ant of	Env <i>i</i> i-	ronmental Ouglity
				<	\	~		CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901						
		L	$\mathbb{Z}R$	Helena, Montana 59620-0901										
							CES, INC.	PHONE NUMBER:						

	PROJECT N	AME:	_			5 Repos	sitory I	Design investigation	Drill Hole	No.	S	35S	B-2	C80	PAGE 2 of 2
OO I	WELL LOG GRAPHIC LOG	DEPTH (FT)	DRIVE	OISTURBED №		SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer 1 project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The da simplication of actual conditions encountered.	echnical, Inc. for this summary applies of the drilling. ns and may change ta presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
	GR/	DEF	DRI	N	BUL	SAN	REC	MATERIAL DESCRIPT	ON	ğ	PLA	COF	DR)	Θ	
DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13		世 -21 -21 -22 -23 -23 -24 -25 -26 -27 -28 -29 -31 -31 -31 -31 -31 -31 -31 -31	DRN	JND	BULK	SAM	REC	MATERIAL DESCRIPT Moist, Reddish brown [5YR 4/3], CLAYEY GRAGC, medium plasticity. (Continued)			PLA PLA	COF	DRY (pcf)	OM MO	REMARKS / TESTING Water Level 11-19-12 SB-208T = 21.7' Total Depth= 23.0' Piezometer SB-208T 1" Sch 40 PVC Stick-up 1.4' 0-18' Riser 18-23' 0.010" Screen Annulus 0-18' Bentonite Chips 3/8" 18-23' 10-20 Sand
OMBI		-													
<u>ပ</u>							abla		CLIENT: Mont	ana	Depa	artme	nt of	Envir	onmental Quality
ELO				•	< -	, , , ,	· • • •	7.0				2009			
HOLE		Ž			C	$2N_{Z}$	EB	$R \searrow$	H	leler	na, M	ontar	na 596	520-0	901
	TECHNICAL SERVICES, INC.						PHONE NUMB	ER:							
RI															

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-209B PAGE 1 of 2
DATE STARTED / FINISHED: 10/14/12 - 10/14/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5089.89 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020518.90, E1233261.87 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

L	DOTTETIOLE	LO0/		/IN. IN	1020310	.50, L	1233201.07 (WIT St. 11. NADOS) TIAWWENT THE.	140	ib ac	110			
			SAI	MPLES			This log is part of a report prepared by Pioneer Technical, Inc. for this			Ļ			
	၂ ဖွ			Ω.		(%)	project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change		╘	CORRECTED SPT	_	(%	
- ,	WELL LOG	Ē		UNDISTURBED BULK	□	RECOVERY (%)	at this location with the passage of time. The data presented is a	LIQUID LIMIT	PLASTIC LIMIT	丑	DRY DENSITY (pcf)	MOISTURE (%)	
	WELL LOG	ОЕРТН (FT)		STU	SAMPLE ID) VE	simplication of actual conditions encountered.	DL	12	ЗEС		10	
l li		ΞPΤ	DRIVE	UNDIS	\MF	$\frac{1}{2}$		Ę	AS)RF	} } }	OIS	REMARKS /
:	> ত		۵	E G	/S	22	MATERIAL DESCRIPTION	Ĭ	굽	ö	ը 호	Σ	TESTING
		_	M				Dry, Black [10YR 2/1], ORGANIC SILT with GRAVEL, OL, medium plasticity, stiff.						
		_ 1 _	X		SS#1	100						9.5	
	 77777777		$\langle \cdot \rangle$				Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, low to						
		_ 2 _	M		SS#2	61	medium plasticity, stiff.					7.8	
					33#2	01						7.0	
		— 3 <u>—</u>	\vdash										
		— 4 —											
			Μ										
		_ 6 _	X		SS#3	78				38		13.7	
		_					Moist, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, SC,						
		_ 7 [_]	M		00//4	400	low plasticity.			07		44.0	
			$ \Lambda $		SS#4	100				37		11.2	
-		_ 8 <u>_</u>	Н										
-		_											
-		— 9 <u> </u>											
=													
-		-10 <u>-</u>	X		SS#5	100				33		5.2	
-		_ _11_	M		SS#6	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, medium plasticity, stiff.			33		12.2	Weter Level 44 40 40
-					000		Wet Peddieb broup IEVD 4/21 CLAVEV CDAVEL with Send CC						Water Level 11-19-12 SB-209T = Dry
-			1				Wet, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity.						3B-2091 - DIY
			M		SS#7	100				39		9.5	
		13	\mathbb{H}										
		—14 <u>—</u>											
		45											
		—15 <u>—</u>	17				Moist, Reddish brown [5YR 4/3], Organic Clay with Gravel, CL, medium plasticity, stiff.						
		 16	XI		SS#8	100				28		11.2	
					00.110	400				4-7			
			Š		SS#9 SS#10	100 100	Saturated, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL,			17 17		11.1 10.4	
			$ \chi $		SS#9	100	medium plasticity, stiff.			17		11.1	
Ţ		-18 -	\mathbb{H}										Water Level 11-19-12
		_											SB-209B = 18'
		—19 <u>—</u>											
-		—20— —	Ш				CLIENT: Mar	tons	Des	artma -	nt of	Envir	onmontal Quality
			_	< /			CLIENT: MOF	ıaıld	neb	ai iiiile	SHE OF I		onmental Quality

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PROJEC	Г NAME	: Se	ecti	on 3	35 Repos	sitory l	Design Investigation	Drill Hole	No.	S	358	B-2	.09E	PAGE 2 of 2
WELL LOG GRAPHIC LOG	ОЕРТН (FT)	-	UNDISTURBED	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Te project and should be read with the report. This sonly at the location of the boring and at the time of Subsurface conditions may differ at other location at this location with the passage of time. The data simplication of actual conditions encountered.	summary applies of the drilling. Is and may change a presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS/
≥			>	M	Š	2	MATERIAL DESCRIPTION Saturated, Reddish brown [5YR 4/3], GRAVELL		=		Ö	□⊜	2	TESTING
	-21				SS#11		medium plasticity, stiff. (Continued)				23		11.9	
	—22 —				SS#12	56	Saturated, Reddish brown [5YR 4/3], SANDY Cl SC, low to medium plasticity, stiff.	.AY with Gravel,			16		18.9	
	—23 — —24							VOLAV OL						
			7				Saturated, Reddish brown [5YR 4/3], GRAVELL medium plasticity, stiff.	Y CLAY, CL,						
	-26	$\frac{1}{\sqrt{2}}$			SS#13	100					23		11.1	
	-27 - -28	$\exists \! \! \! \setminus$			SS#14	100					17		13.3	
	-29													
	-30				SS#15						19		13.1	Piezometer SB-209B 1" Sch 40 PVC
Y Y Y A A A A Y Y Y A A A A	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	= X 			SS#16		Saturated, Dark gray [5YR 4/1], CLAYEY GRAV low plasticity, very stiff.	EL with Sand, GC,			19		18.5	Stick-up 1.6' 0-35' Riser 35-40' 0.010 Screen
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	33		7		B#3		Saturated, Light gray [2.5Y 7/1] multicolored, LE plasticity, very stiff.	AN CLAY, CL, low						Piezometer SB-209T 1" Sch 40 PVC Stick-up 2.4' 0-8' Riser 8-12' 0.010 Screen
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-36 -37 -37 -37 -38				SS#17		Saturated, Light gray [2.5Y 7/1] multicolored, LE medium plasticity, stiff.	AN CLAY, CL,	_		18		31.2	Annulus 0-8' Bentonite Chips 3/8" 8-12' 10-20 Sand 12-35' Bentonite Chips 3/8" 35-40' 10-20 Sand
	, —40- , —41-		7		SS#18						12		33.3	
			_					CLIENT: Mon	tana	Dep	artme	ent of	Envir	onmental Quality
			7	~	7	· • • • • • • • • • • • • • • • • • • •	7.0	ADDRESS: I	P.O.	Вох	2009	01		-
					//\/					a, M	lonta	na 59	620-0	9901
		TEC	CH	W	CAL SE	RVI	CES, INC.	PHONE NUME	BER:					

DDO ISOT NAME OF IT OF D	Drill Hole No. S35SB-210B/T PAGE 1 of	
PROJECT NAME: Section 35 Repository Design Investigation	PAGE 1 01	<u> </u>
DATE STARTED / FINISHED: 10/16/12 - 10/16/12	DRILLER: Axis Drilling	
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent	
GROUND SURFACE ELEVATION: 5107.75 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX	
BOREHOLE LOCATION: N1020675.56, E1233448.48 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto	

_							1200110110 (1111 0011 11111 1200) 1111111111111111111111111111111111						
	WELL LUG GRAPHIC LOG	DEPTH (FT)	DRIVE	UNDISTURBED STATE	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
.		_	M		SS#1	100	Dry, Black [10YR 2/1], ORGANIC SILT, OL, low plasticity.					30.6	
	जन्त		Θ				Dry, Dark reddish brown [5YR 2.5/2], SILTY GRAVEL with Sand,	-					
		_ <u>'</u> _	Д		SS#2	100	GM, low plasticity, medium dense.					4.9	
		- 2 <u>-</u>			SS#3	100	Dry, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, low to medium plasticity, medium dense.					4.2	
		- 3 <u>-</u> 											
		- 4 - - - 5 -					Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, very stiff.						
					SS#4	100				38		9.3	
		- 7 <u>-</u> - 7 <u>-</u> - 8 -	M		SS#5	28	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			37		10.5	
				\times	ST#1	100							
111111111111111111111111111111111111111		-10 -11	M		SS#6	67	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			34		12.4	
1111111		-12 											
11111111111		-13 <u>-</u> -14-											
-													
		15 16 	M		SS#7		Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			32		11.9	Water Level 11-19-12 SB-210T = Dry
		 17	M		SS#8					26		14.9	
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	 18	X		SS#9		Moist, Very dark gray [5YR 3/1], SANDY CLAY, CL, low plasticity, no reaction to HCl, multicolored, weathered Tuff, hematite, limonite, biotite.			26		21.4	
	^ ^ ^ ^ ^ ^	-19 											
		—20 —					CLIENT: Moo	tana	Don	artm	ant of	Envir	onmental Quality
- 1					~ /	~	· UTIENT, MOU	ıalıd	1.70(1)	71 III IE	-: II () []	TIVID	ODDEDIAL GUANIV

CLIENT: Montana Department of Environmental Quality

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PROJECT N		ecti SAMP		35 Repos	sitory [Design Investigation	Drill Hole	No.	S	35S	B-2	10E	B/T PAGE 2 of
WELL LOG GRAPHIC LOG	DEPTH (FT)	TURBED		SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer T project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The da simplication of actual conditions encountered. MATERIAL DESCRIPT	summary applies of the drilling. ns and may change ta presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
Y Y Y Y Y		- -	ш	o)	Ľ	Moist, Very dark gray [5YR 3/1], SILTY GRAVE	L with Sand, GM,		п.	0		_	TESTING
4	\ 21/			SS#10		weathered Tuff with pieces of argillite intermixe Moist, Very dark gray [5YR 3/1], SANDY SILT,	d, multicolored.			15		12.1	Water Level 11-19-12 SB-210B = 21.7'
-	22			SS#11	100	stiff, weathered Tuff with purple Argillite.				20		13.6	OB 210B = 21.7
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-24					Moist, Very dark gray [5YR 3/1], CLAYEY SAN medium plasticity, stiff, weathered Tuff with pur	D with Gravel, SC, ple Argillite.						
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-25 -26			SS#12	100	Saturated, Very dark gray [5YR 3/1], CLAYEY:	SAND with Gravel			20		13.5	
Y Y Y Y Y X A A A A A A A A A A A A A A	-27 -28 -28 -29			B#1		SC, low to medium plasticity, multicolored, bioti hematite, weathered Tuff.						18.4	No Argillite in cuttings
A A A A A A A A A A A A A A A A A A A	-30 -31			SS#13	100					29		20.1	water from casing upon bit return
Y Y Y Y Y X X X X X X X X X X X X X X X	-32 -33 -34 -34			B#2									Drilling rock, Argillite chips and weathered volcanics
Y Y Y Y X X X X X X X X X X X X X X X X	35			SS#14	100	Saturated, Gray [7.5YR 5/1], LEAN CLAY, CL, multicolored, weathered Tuff.	medium plasticity,			21		23.1	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-37 			B#3		Saturated, Brown [10YR 4/3], SILTY GRAVEL plasticity, weathered Tuff with pieces of argillite multicolored.							Harder drilling at 37', more water
Y Y Y Y X X	39		$\left \right $	D#3									Open hole drilling, volcanic and argillite cuttings Heave in hole at 39', drill through heave to 41.5'
	-40 -41 -41			SS#15	28	Saturated, Very dark grayish brown [10YR 3/2] with Sand, GC, low to medium plasticity, weath pieces of argillite intermixed, multicolored.	, CLAYEY GRAVEL ered Tuff with			34		16.9	
						<u> </u>	CLIENT: Mont	ana	LLL Depa	artme	ent of	Envir	onmental Quality
			Y	7 ^ 7 7	-		ADDRESS: F						-
			10	INI	Y E	\mathcal{K}			na, M	lonta	na 596	620-0	0901
	A TE	CH	W	CAL SE	RVI	CES, INC.	PHONE NUME	ER:					

PROJECT NAME: Section 35 Repository	Design Investigation Dr	ill Hole N	o. S	35S	B-2	10E	B/T PAGE 3 of 3
SAMPLES	This log is part of a report prepared by Pioneer Techn project and should be read with the report. This sumr	mary applies		SPT			
WELL LOG GRAPHIC LOG GRAPHIC LOG DEPTH (FT) DRIVE UNDISTURBED BULK SAMPLE ID RECOVERY (%)	only at the location of the boring and at the time of the Subsurface conditions may differ at other locations ar at this location with the passage of time. The data pre simplication of actual conditions encountered.	nd may change -	PLASTIC LIMIT	CORRECTED 8	DRY DENSITY (pcf)	MOISTURE (%)	
GRAF GRAF DRIV UNDI BULK SAMF	MATERIAL DESCRIPTION		PLAS	COR	DRY (pcf)	MOIS	REMARKS / TESTING
SOUTH SOUT	MATERIAL DESCRIPTION Saturated, Very dark grayish brown [10YR 3/2], CLA with Sand, GC, low to medium plasticity, weathered pieces of argillite intermixed, multicolored. (Continue)	YEY GRAVEL Tuff with	PLAST	CORRI	DRY D (pcf)	MOIST	Piezometer SB-210B Total Depth = 44.5' Heave in Hole from 39-44.5' 1" Sch 40 PVC Stick-up 1.7' 0-35' Riser 35-40' 0.010 Screen Piezometer SB-210T 1" Sch 40 PVC Total Depth=40', Heave in hole from 39-40.0' Stick-up 3.7' 0-10' Riser 10-15' 0.010 Screen Annulus 0-8' Bentonite Chips 3/8" 8-15' 10-20 Sand 15-35' Bentonite Chips 3/8" 35-40' 10-20 Sand
-61- -62- -63- 63-							
	CL	IENT: Montan	na Depa	artme	nt of I	Envir	onmental Quality
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	CES, I/VC.	IOINE INUIVIBER	٦.				

	Drill Hole No. S35SB-211B	
PROJECT NAME: Section 35 Repository Design Investigation	Difficion 5555D-211D	PAGE 1 of 3
DATE STARTED / FINISHED: 10/17/12 - 10/17/12	DRILLER: Axis Drilling	
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent	
GROUND SURFACE ELEVATION: 5129.26 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX	
BOREHOLE LOCATION: N1020811.18. E1233635.42 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto	

l	ВОР	REHULE	LUCA	ПС	JIN.	INT	020811	.18, ⊑	1233635.42 (MT St. Pl. NAD83) HAMMER	ITPE.	140	ib au	ιο			
				SAI	MPL	ES			This log is part of a report prepared by Pioneer Technical, Inc.	c. for this			F			
	WELL LOG	GRAPHICLOG	ОЕРТН (FT)	DRIVE	UNDISTURBED	BULK	SAMPLE ID	RECOVERY (%)	project and should be read with the report. This summary aronly at the location of the boring and at the time of the drilling Subsurface conditions may differ at other locations and may at this location with the passage of time. The data presented simplication of actual conditions encountered.	g. change	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
	¥	В	В	씸	5	B	SA	牊	MATERIAL DESCRIPTION		\equiv	7	8	R 9	ĭ	TESTING
			 	\bigvee			SS#1	100	Dry to moist, Black [10YR 2/1], ORGANIC SILT with Sand, plasticity, with roots, and pine needles.	OL, low					10.9	
			- 2 <u>-</u> - 2 <u>-</u> 	X			SS#2		Dry, Reddish brown [2.5YR 4/4], GRAVEL with Sand, GP, I plasticity. Dry, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, (medium plasticity, stiff.		-					
			- 3				SS#3	56					38		8.6	very dusty cuttings
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	/ Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	- 8 - 9 - 10 - 11			\ /	ST#1 SS#4	100	Dry, Very dark gray [7.5Y 3/1], CLAYEY GRAVEL with San medium plasticity, very stiff, weathered Tuff, multicolored.	d, GC,	41	29	28	108.8	16.7 14.9	volcanics cuttings
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	A A A A A A A A A A A A A A A A A A A	-12_ -13_ -13_ -14_ -15_				B#1		Dr. Vog derk grav [7.5V.2/d] SANDV CLAV CL. modium							
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	/ Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-16 17 				SS#5	83	Dry, Very dark gray [7.5Y 3/1], SANDY CLAY, CL, medium plasticity, very stiff, weathered Tuff.				25		16.0	
	* * *	/	-19 						,							Water Level 11-19-12 SB-211B2 = Dry
					\		\checkmark	\							Envir	onmental Quality
.						~		•	\ ADDDE	.cc. I	20	Day 1	2000	Λ1		



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	PROJECT N	AME:	Sec	ctior	า 3	5 Repos	sitory [Design Investigation	Drill Hole	No.	S.	35S	B-2	11E	PAGE 2 of 3
	WELL LOG GRAPHIC LOG	DЕРТН (FT)	DRIVE	NDISTURBED IN INC.	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other location at this location with the passage of time. The desimplication of actual conditions encountered.	summary applies of the drilling. ns and may change ta presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
			▭	5 7	m _	S)	쬬	MATERIAL DESCRIPT			Ы	ŏ	20	Σ	TESTING
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	 	M			SS#6	83	Dry, Very dark gray [7.5Y 3/1], SANDY CLAY, plasticity, very stiff, weathered Tuff. (Continued	CL, medium)			25		14.9	starting bouncing after 12"
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-22				B#2									hard drilling, blowing dust
		-33				B#5		Dry, Very dark gray [7.5Y 3/1], SILTY SAND wiplasticity, weathered Tuff.	th Gravel, SM, low						mixed Argillite chips and weathered Tuff, dry, more argillite below 39', more dust below 39' Water Level 11-19-12 SB-211B1 = 38.8'
	A A A A A A A A A A A A A A A A A A A	-41 		\		B#6									Water encountered at 41.0' on 10-17-12
				$\overline{}$		$\overline{\mathcal{I}}$	~	<u> </u>	CLIENT: Mon	tana	Depa	artme	ent of	Envir	onmental Quality
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	PROJECT N	NAME:			sitory l	Design Investigation	Drill Hole	No.	. S.	35S	B-2	11E	PAGE 3 of 3
	WELL LOG GRAPHIC LOG	ОЕРТН (FT)	DRIVE STAMPS BULK	LEID	RECOVERY (%)	This log is part of a report prepared by Pioneer 1 project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The da simplication of actual conditions encountered.	summary applies of the drilling. ns and may change ta presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
	-	<u> </u>	밀밀	S	<u> </u>	MATERIAL DESCRIPTION		ĭ	Ъ	$\ddot{\circ}$	占	ž	TESTING
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	43 44		B#6		Dry, Very dark gray [7.5Y 3/1], SILTY SAND win plasticity, weathered Tuff. (Continued)	h Gravel, SM, low						cuttings Argillite chips, hard to stiff drilling
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-45 -46 -47											small amount of water from hole Argillite chips, hard to stiff drilling
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-48 -49 -50 -51 -52 -53		B#7									Small amount of water from hole upon bit return, some chips dacite, some argillite
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-54 55 56 57											Total Depth= 55.0' Piezometer SB-211B1 1" Sch 40 PVC Stick-up 4.1' 0-50' Riser 50-55' 0.010" Screen
COMBINED REPOSITORY.GPJ 2/27/13		-58- -59- -60- -61- -62- -63-											Piezometer SB-206B2 1" Sch 40 PVC Stick-up 1.5' 0-15' Riser 15-20' 0.010" Screen Annulus 0-15' Bentonite Chips 3/8" 15-20' 10-20 Sand 20-45' Bentonite Chips 3/8" 45-55' 10-20 Sand
BINEL													
COM							CLIENT: Marie	ana	D^~	ortno -	nt of '	Enville	onmontal Quality
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DRILL HOLE LOG		1		2N	FA						าล 596	320-0	901
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DR						•							

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-212B PAGE 1 of 3
DATE STARTED / FINISHED: 11/7/12 - 11/7/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5137.78 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020846.07, E1233943.38 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

	OKLHOLL	LO0,	1110		11020040).O1 , L	1255945.50 (WT St. FT. NADOS) TIAWWENT THE.	170	ib ac	110			
	ō		П	IPLES	3	(%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling.		<u></u>	SPT	>	(%)	
WELL LOG	GRAPHIC LOG	DEPTH (FT)		UNDISTURBED BLIFK	SAMPLE ID	RECOVERY (%)	only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED	DRY DENSITY (pcf)	MOISTURE (
VELL	RAF.	EPT	DRIVE	BUNDIN K	AME	ECC	MATERIAL DESCRIPTION	<u>S</u>	LAS	ORF	RY [NOIS	REMARKS /
>			 	۳ ر	SS#1	93	Dry, Black [10YR 2/1], ORGANIC SILT, OL, low plasticity.		<u>п</u>	0		19.2	TESTING
			\mathbb{H}		33#1	93	Dry, Dark reddish brown [5YR 3/2], GRAVELLY SILT with Sand,	-				19.2	
		- 1 <u>-</u>			SS#2	94	ML, low plasticity.					3.9	
		- 2 -	M		SS#3	22	Dry, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, low to medium plasticity, stiff.					E 0	
			\mathbb{N}		55#3	33						5.9	Dusty Cuttings
		- 3 - - 											3.
		- 4 <u>-</u>					Dry to moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, low to medium plasticity, very stiff.						
		- 5 <u> </u>											
		- 6 <u>-</u>			SS#4	100				38		9.1	
		 _ _ 7 _	\mathbb{H}										
		_	<u> </u>		SS#5	50				35		5.4	
		- 8 - 	\mathbb{N}										
		- 9 <u>-</u>		\setminus	/ B#1								
		 10		<u> </u>	\								
		 11			SS#6	100				33		11.2	
			$\langle \cdot \rangle$				Moist to wet, Reddish brown [5YR 4/3], CLAYEY GRAVEL with						Rocky during drilling
		-12- - 			SS#7	100	Sand, GC, low to medium plasticity, dense.			39		10.2	
		-13 <u>-</u>	7		/								
		 14		$ \rangle$	B#2								approximate 1.0' diameter boulder from 13.5-14.5'
		_		/\	\								
		-15 <u>-</u>	\mathbf{H}										Water Level 11-19-12
		_ <u></u> _16_			SS#8	100				28		9.3	SB-212T = Dry
		=											50/5", stopped at 20 for 3"
		-17- 											
		-18 <u>-</u>											Switch to open hole hammer
	Y Y Y Y X	 _19_					Moist, Brown [7.5YR 5/4], CLAYEY GRAVEL with Sand, GC, low plasticity, dense, Weathered Tuff.						
	Y Y Y Y	_	1										
	Y Y Y Y	-20-					l augus			1			Language and all Occasion
					\sim		CLIENT: Mon	ıana	Depa	artme	ant ot I	⊏nvir	onmental Quality

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Helena, Montana 59620-0901

PROJECT N	PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-212B PAGE 2 of 3										PAGE 2 of 3		
WELL LOG	ОЕРТН (FT)	DRIVE INDIGHT IDBED		SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Te project and should be read with the report. This sonly at the location of the boring and at the time of Subsurface conditions may differ at other location at this location with the passage of time. The data simplication of actual conditions encountered. MATERIAL DESCRIPTIO	s and may change presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
S O			В	Ŋ	<u>~</u>				Д	O	ㅁ유	2	TESTING
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	 21 			SS#9	100	Moist, Brown [7.5YR 5/4], CLAYEY GRAVEL witt plasticity, dense, Weathered Tuff. (Continued)	roand, GO, low			16		5.7	Maybe weathered Tuff
\(\begin{align*} \text{Y} \tex	-22 			B#4		Moist to wet, Brown [7.5YR 5/4], Fractured Argilli	te.						
	 24 			B#5									
	-25 - - -26												Hole collapsed, blow out
				B#6									Caved material in spoon (B#5)
	—28— —— —29—												Hard, fractured Argillite
	-30 												
	-31- -32-			B#7									
	-33 34 34	- - - - - - - -		<i>□</i> #7									
	-35 -36 												
	-37- 												
	-40 			B#9									
			$/\!\!/$										
						_	CLIENT: Mont	ana	Denr	artmo	ant of	Envir	onmental Quality
			\		~	<u> </u>	CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901						
	D IONEER —					Helena, Montana 59620-0901							
	TECHNICAL SERVICES, INC.				PHONE NUMBER:								

SAMPLES	PROJECT NAME:	Section 35 Repository	Design Investigation Drill Hole	No.	. S35SB-212B PAGE 3 of					
Most to wet, Brown (7.5YR 6.4), Fractured Argillite. (Continues) -43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -57 -58 -59 -60 -60	ELL LOG RAPHIC LOG PTH (FT)		project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	ZUID LIMIT	ASTIC LIMIT	Y DENSITY	DISTURE (%)	REMARKS /		
	M GF	S BU UN S		 ≟ 	집 :	2 R 8	Ĭ			
CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:	-44 -45 -45 -46 -47 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -56 -57 -58 -59 -60	B#9	Moist to wet, Brown [7.5YR 5/4], Fractured Argillite. (Continued)					SB-212B = 43.9' More competent Argillite Total Depth= 50.0' Piezometer SB-212B 1" Sch 40 PVC Stick-up 1.5' 0-43' Riser 43-48' 0.010" Screen Piezometer SB-212T 1" Sch 40 PVC Stick-up 1.7' 0-10' Riser 10-15' 0.010" Screen Annulus 0-5' Bentonite Chips 3/8" 5-15' 10-20 Sand 15-20' Bentonite Chips 3/8"		
TECHNICAL SERVICES, INC. ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:		~~~					Envir	ronmental Quality		
TECHNICAL SERVICES, INC. PHONE NUMBER:		DIONER	ADDRESS: I							

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-213B PAGE 1 of 3
DATE STARTED / FINISHED: 11/5/12 - 11/5/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5110.54 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020602.46, E1233865.26 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

	JIKEITOLL			•••••	1020002	то, ш	1200000.20 (IVIT St. 11. NADOS) HAIVIIVIER 111 E.		ib aa				
WELL LOG	GRAPHIC LOG	ОЕРТН (FT)		BULK	LE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
			M		SS#1	100	Moist, Black [10YR 2/1], ORGANIC SILT with GRAVEL, OL.					19.6	
	 6/2/ <i>X</i> 8/8/	- 1 <u>-</u>	\square		SS#2	100	Dry, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC,					7.2	
							low to medium plasticity, stiff.						
					SS#3	61						6.2	
		- 3 _											
		- 4 -											cuttings are dusty
							Moist, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, medium plasticity.						
		- 5 - -	\bigvee		00.114	70	, , , , , , , , , , , , , , , , , , , ,						pp= 2.5 tsf
		- 6 <u>-</u>			SS#4	78				55		6.6	
			$ \sqrt{} $				Moist, Reddish brown [5YR 4/3], CLAYEY SAND with Gravel, SC, medium plasticity, stiff, 0.25" sand lense at 7.75'.						
		_			SS#5	78				23		11.7	
		- 8 - - 											
		- 9 <u>-</u>											
		-			ST#1	93	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			17			
		-11 <u>-</u>			SS#6	78						11.5	
		_ _12_											
				\mathbb{N}									
		-13_		\	B#1		Moist to wet, Reddish brown [5YR 4/3], CLAYEY SAND with						
		-14 <u>-</u>					Gravel, SC, medium plasticity, stiff, interbedded with medium plasticity sandy clay with gravel.						
		 15		<u> </u>			Moist to wet, Reddish brown [5YR 4/3], CLAYEY GRAVEL with						
					SS#7	89	Sand, GC, medium plasticity.			15		10.6	
		-16- 					Moist to wet, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, medium plasticity, stiff.						2" diameter cobble in spoon
		-17 - 			SS#8	83				31		10.0	outside of spoon is wet, pp=3.2 and 3.0 tsf
		-18 <u>-</u>											Water Level 11-19-12
v=		 _19		$ \rangle$	B#2		Boulder.						SB-213B = 19.0' SB-213T = Dry
				$/ \setminus$			Moist, Reddish brown [5YR 4/4], CLAYEY GRAVEL with Sand, GC.						2.3.
	u 1/ V: / /- M	-20-							\bigsqcup				



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PF	PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-213B PAGE 2 of 3														
WELL LOG	GRAPHIC LOG	DEPTH (FT)		UNDISTURBED	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Tr project and should be read with the report. This sonly at the location of the boring and at the time could be subsurface conditions may differ at other location at this location with the passage of time. The data simplication of actual conditions encountered. MATERIAL DESCRIPTION AND THE PROPERTY OF THE PROPERTY	summary applies of the drilling. ns and may change a presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
			$\frac{1}{\sqrt{2}}$					Moist, Reddish brown [5YR 4/4], CLAYEY GRANGC. (Continued)	/EL with Sand,						dusty cuttings, cobble/boulder at 19', put on open hole
		 21	$\frac{1}{1}$			SS#9	0					17			hammer 50/5" no recovery
			7 \												,
		-22- -													large boulders, open hole, cuttings come up 1" diameter
		-23 -													with reddish lean clay stuck to it
		-25 -													
					$\setminus /$										cuttings are bits of clay sand
		=			\setminus										cuttings are bits of clay, sand with chips up to 1.5" diamete
		-27 - 			V	B#3									
		28			Λ	20									Driller states it will be difficult
		 29			\mathbb{N}										to get casing through, should consider open hole the rest
					$/ \setminus$			Moist, Dark yellowish brown [10YR 4/4], SANDY	CLAY with						6" of heave/collapse
		-30 -	1					Gravel, CL, Limonite secondary soil.							·
		 31	\mathbb{X}			SS#10	100					100+		9.9	weathered rock, looks like till
		_	1 \		\										matrix is clayey soil, granules of volcanics, Argillite
		-32 - 			$\backslash /$										
		-33 -			V	B#4		Moist, Dark brown [7.5YR 3/2], CLAY with Grave	el, CL.						
		_ <u>_</u> _34_			Λ	<i>D.</i> , 1									
					$/ \setminus$										
		-35 -	1												
			$\frac{1}{4}$			SS#11	75					23		13.0	
		_	∄/\												
		-37- -		1											
		38													
								Saturated, Dark yellowish brown [10YR 3/4], CL CL, organics, gravels to 1/2" diameter.	AY with Gravel,						
			-												cuttings sticking to rods, high plasticity
		-40 -		V		ST#2	100			39	15		111.9	19.6	
		 41	1			_					.5			.5.5	
	//////////////////////////////////////	-	X			SS#12	100					19		12.8	clays are limonite, purple and
				Ш					CLIENT: Mon	tana	Depa	artme	ent of	Envir	ronmental Quality
				10	く ァ	7	<u> </u>		ADDRESS: F	P.O.	Box	2009	01		
				_		<i>]</i> // ₂		~ ~			na, M	lonta	na 59	620-0	0901
TECHNICAL SERVICES, INC.						PHONE NUMBER:									

PROJECT NAME:	Section	35 Repos	sitory I	Design Investigation Drill Hole	No	. S35SB-213B PAGE 3 of 3						
WELL LOG GRAPHIC LOG DEPTH (FT)	DRIVE UNDISTURBED BILLK	LE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /		
	-	8 6	22	MATERIAL DESCRIPTION Moist Reddish gray [5YR 5/2] CLAY with Grayel CL weathered	<u> </u>	П	S	급흥	Σ	TESTING greenish white, weathered		
		ST#3 SS#13	100	Moist, Reddish gray [5YR 5/2], CLAY with Gravel, CL, weathered Tuff, with argillite chips, possible bentonite chips in sample. (Continued)			25		12.2	greenish white, weathered Tuff with Argillite chips Minor amount of chips on the return, casing clogged with clay form above Sample ST#3 and SS#13, likely collected materials stuck to inside of casing. Total Depth=49.3' Piezometer SB-213B 1" Sch 40 PVC Stick-up 1.5' 0-38' Riser 38-43' 0.010" Screen Piezometer SB-213T 1" Sch 40 PVC Stick-up 1.7' 0-14' Riser 14-19' 0.010" Screen Annulus 0-14' Bentonite Chips 3/8" 14-19' 10-20 Sand 19-34' Bentonite Chips 3/8" 34-43' 10-20 Sand		
-63-												
		//							Envir	onmental Quality		
		- 	ŢZ	ADDRESS:				01 าа 596	320-0	0901		
	II (ILVI TOTE O	SE			ıa, IVI	orital	ia 590	<i></i> U-U)		
	CCH/V	ICAL SE	KVI	CES, INC. PHONE NUM	>⊏K:							

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-214B	PAGE 1 of 3
DATE STARTED / FINISHED: 10/15/12 - 10/16/12	DRILLER: Axis Drilling	
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent	
GROUND SURFACE ELEVATION: 5082.86 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX	
BOREHOLE LOCATION: N1020332.83, E1233297.12 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto	

BONEFICEE ECCATION: N1020032.09, E1203297.12 (W1 St. 11. NAD00) HAIVIMEN 111 E. 140 Ib duto													
			П	IPLES			This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies			SPT			
	90.	$\overline{}$		BED		۲ (%)	only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change	⊨	MIT	ED S		(%)	
	WELL LOG	ОЕРТН (FT)		UNDISTURBED BULK	SAMPLE ID	RECOVERY	at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED	DRY DENSITY (pcf)	MOISTURE	
	APP	F	DRIVE	UNDIS	MPL	60		ang	AST	RRE	Σ£: □	TSIC	REMARKS /
	G W		占		SA	R.	MATERIAL DESCRIPTION	П	Ъ	8	Ho	Ĭ	TESTING
			M		SS#1	100	Dry, Dark brown [7.5YR 3/2], GRAVELLY SILT with Sand, ML, low plasticity, firm.					7.1	
		- 1 <u>-</u>			33#1	100	Dry, Brown [7.5YR 4/3], SILTY GRAVEL with Sand, GM, low					7.1	
			М				plasticity.						
			X		SS#2	100						4.7	
		- 3 <u>-</u>	\mathbb{H}										
		_											
		- 5 <u>-</u>			SS#3	100	Moist, Dark brown [7.5YR 3/2], SANDY CLAY with Gravel, CL, medium plasticity.			41		12.4	
		 _ 6 _	\bigvee		SS#4	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.			41		11.7	
		_	A		00#1	100	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY, CL, medium			••			
		- 7 <u> </u>	V		SS#5	100	plasticity, stiff.			33		11.3	
		 _ 8 _											
		_											
		- 9 <u> </u>											
		 10											
				$\sqrt{}$	SS#6	100	Moist, CLAYEY SAND with Gravel, SC, low to medium plasticity, stiff.			40			
		-11 <u>-</u>		\land	33#0	100				40			
		 12	X		SS#7	56	Moist, Reddish brown [5YR 4/3], SILTY SAND with Gravel, SM, low plasticity.			19		10.6	
V			M		SS#8	56	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity.			19		11.0	Water Level 11-19-12
		-13 <u>-</u>	\vdash										SB-214B = 12.7' SB-214T = 14.6'
		_ <u></u> 14											
¥													
		-15 <u>-</u>					Boulder, Quartzite.						Boulder, sampler refusal
		_ _ 16											
							Moist to wet, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, stiff.						
		-17 <u>-</u>											
		 18											
		-19 <u>-</u>											
-						\	CLIENT: Mont	ana	Depa	artme	ent of I	Envir	onmental Quality
1				~	•	\	ADDDEGO. F			2000	~ -		

PRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

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SAMPLES This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change H S C C C C C C C C C	
BOT JOH LET COVER CONTROL OF THE CON	KS/
MATERIAL DESCRIPTION	
SS#9 100 SS#9 SS#9 100 SS#9 100 SS#9 SS#9 SS#9 SS#9 SS#9 SS#9 SS#9 SS	
SS#10 100 12 10.4	
Moist, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, medium plasticity, stiff. SS#11 100 SS#11 100 23 10.8 clayey sand cutting reports clayey, slow	
No recovery, sand outside of spoon SS#12 0 Water from casing turned back on	
Wet, Gray [7.5YR 6/1], SANDY SILT with Gravel, ML, low plasticity, weathered Trachyte. SS#13 100 Wet to Saturated, Brown [10YR 4/3], SILTY GRAVEL with Sand, GM, non-plastic, Cuttings are fine grained, white, alkaline feldspars, dark minerals hornblende and biotite. 5-10 gpm water at	37'
SS#14 100 100+ 30.3	
CLIENT: Montana Department of Environmental Quality	<u>, </u>
ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901	
TECHNICAL SERVICES, INC. PHONE NUMBER:	

SAME SET	PROJECT NAME: Section 35 Repository Design Investigation Drill Hole No. S35SB-214B PAGE 3 of 3									
### ASS ASSET OF THE PROPERTY			echnical, Inc. for this summary applies of the drilling. ns and may change a presented is a	-IQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY pcf)	MOISTURE (%)		
- 43 - 44 - 45 - 46 - 47 - 48 - 48 - 49 - 49 - 49 - 50 - 50 - 51 - 51 - 52 - 53 - 54 - 55 - 56 - 56 - 57 - 56 - 56 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 60 - 61 - 61 - 62 - 63 - 63 - 64 - 64 - 64 - 64 - 65 - 65 - 65 - 65 - 65 - 65 - 65 - 65				_+	-			_	TESTING	
DIONEER Helena, Montana 59620-0901	-44- -45- -46- -47- -48- -49- -51- -51- -52- -53- -54- -55- -56- -57- -58- -59- -60- -61- -62-	GM, non-plastic, Cuttings are the grained, whit feldspars, dark minerals hornblende and biotite		ana D	Фера	urtme	ent of	Envir	Piezometer SB-214B 1" Sch 40 PVC Stick-up 3.0' 0-40.5' Riser 40.5-45.5' 0.010" Screen Piezometer SB-214T 1" Sch 40 PVC Stick-up 1.7' 0-18' Riser 18-23' 0.010" Screen Annulus 0-18' Bentonite Chips 3/8" 18-23' 10-20 Sand 23-40.5' Bentonite Chips 3/8" 40.5-45.5' 10-20 Sand	
	DIONE	TR.					0901			
			·							

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35SB-215T PAGE 1 of 3
DATE STARTED / FINISHED: 11/6/12 - 11/6/12	DRILLER: Axis Drilling
LOGGED BY: J. Riedel	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5088.99 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020393.31, E1233994.42 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

L	DONLINGEL	LOOM	110	/IN. I	V 102	20000.	J 1, L	1200994.42 (WIT St. 11. NADOS) TIAWWELT 111 E. 140 to duto
	(5)		П	MPLES	S		(%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the horizon and at the time of the drilling.
	WELL LOG	(FT)		UNDISTURBED		₽	RECOVERY (%)	Inis log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION This project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. LIWIT OLIVING WATERIAL DESCRIPTION REMARKS / TESTING
	WELL LOG	ОЕРТН (FT)	틧	ZISI	۲	SAMPLE ID	SOVI	WID UID IISTU
	GR.	DEF	DRIVE	UNDIS	5	SAI	RE(
		_	M		S	SS#1	89	Moist, Very dark brown [7.5YR 2.5/2], CLAYEY GRAVEL with Sand, GC, some roots.
		- 1 <u>-</u>	X		s	SS#2	89	6.0
			M					Dry, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, low to medium plasticity, stiff.
			\mathbb{N}		5	SS#3	94	6.2
		- 3 <u>-</u>						
		- 4 <u> </u>						
								Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, Spoon very difficult to retrieve
					S	SS#4	89	GC, medium plasticity, very stiff. 63 9.3
		— 6 — —	\mathbb{A}					
		- 7 <u>-</u>		\				
				$ \rangle$	Π.	B#1		Drilled cobbles for entire run, fines low plasticity
				1/	\ '	D#1		
					\			
		-10 <u>-</u>						
		_ _11						
		 12						
				\	(B#2		
		-13 		\parallel	\setminus			
		14						
		_ <u>_</u> 15						
			M			SS#5	28	Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, 16 9.8
Ţ		-16 				233	_0	Water Level 11-19-12 SB-215T1 = 16.3'
		17						SB-215T2 = 17.6'
Ţ		 18						
)	(B#3		
		-19 <u>-</u>						
		20						
				<u>.</u>	<u> </u>	_/^		CLIENT: Montana Department of Environmental Quality

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PROJECT N	IAME:	_			5 Repos	itory I	Design Investigation Drill Hole	No.	. S.	35S	B-2	157	PAGE 2 of 3
WELL LOG GRAPHIC LOG	ОЕРТН (FT)	DRIVE	NDISTURBED N	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
≥ <u></u>	٥	ā	5	М	8	~	MATERIAL DESCRIPTION Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL,		교	ŏ	ق ق	Σ	TESTING Spoon is wet. pp= 2.5 tsf
	 21				SS#6	100	low to medium plasticity. (Continued)			12		11.1	Spoot is wet. pp= 2.3 tal
	-22 23 23 24				B#4		Saturated, Reddish brown [5YR 4/4], CLAYEY GRAVEL with Sand, GC, low to medium plasticity, stiff.						Rock at 22.5'
		X		/ \	SS#17	33				28		15.5	Rocky to 25'
	-27 -27 -28 -28	-		V	B#5								Rock in end of sampler
	29 30 31 				SS#8	6				13			Saturated spoon, trace organics in spoon
	-32 32 33 33 34			\bigvee	B#6		Boulder. Wet, Reddish brown [5YR 4/4], CLAYEY GRAVEL with Sand, GC, low to medium plasticity.						1.0' boulder, quartzite from 33-34'
					SS#9	44	Wet to Saturated, Reddish brown [5YR 4/3], SANDY CLAY with Gravel, CL, low to medium plasticity, stiff.			15		12.3	
0	-37_ - - -38_ - -39-				B#7		Boulder. Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand,						
	40 				SS#10 B#8	67	GC, low to medium plasticity, stiff.			19		12.0	pp=2.0 tsf and 1.5 tsf
9V7 F-L8,			\ \ \	\ < 'C	2/1/2	\ EB	ADDRESS: F	P.O.	Box	2009			ronmental Quality

PROJECT	NAME:				5 Repos	itory [Design Investigation	Drill Hole	No.	S.	35S	B-2	157	PAGE 3 of 3
WELL LOG GRAPHIC LOG	ОЕРТН (FT)		UNDISTURBED □	BULK	SAMPLE ID	RECOVERY (%)	This log is part of a report prepared by Pioneer T project and should be read with the report. This only at the location of the boring and at the time Subsurface conditions may differ at other locatio at this location with the passage of time. The dat simplication of actual conditions encountered. MATERIAL DESCRIPTI	summary applies of the drilling. ns and may change ta presented is a	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
				\			Moist, Reddish brown [5YR 4/3], CLAYEY GRA GC, low to medium plasticity, stiff. (Continued)	VEL with Sand,						
	43			$\left \right $	B#8									Drilling cobbles and clay
	-45 -46 -47	X		/ \	SS#11	67					19		8.2	
	-48 -49 -49													
	50 51 52	X			SS#12	67					16		12.0	
	-53 -54 -55													25 to 6 2 5 to 6 2 0 to 6
		M			SS#13	67	Moist, Reddish brown [5YR 4/3], SANDY CLAY medium plasticity, stiff.	with Gravel, CL,			17		12.9	pp=3.5 tsf, 3.5tsf, 3.0 tsf
	-57 -58 -59	/\												Total Depth=56.5' Piezometer SB-215T1 1" Sch 40 PVC Stick-up 1.5' 0-50.5' Riser 50.5-55.5' 0.010" Screen
COMBINED REPOSITORY.GPJ 2/27/13	-60 -61 -62													Piezometer SB-215T2 1" Sch 40 PVC Stick-up 1.8' 0-25.5' Riser 25.5-30.5' 0.010" Screen Annulus 0-25.5' Bentonite Chips 3/8"
BINED REPC	-63 -													25.5-30.5' 10-20 Sand 30.5-50.5' Bentonite Chips 3/8" 50.5-55.5' 10-20 Sand
					$\overline{}$			CLIENT: Mont	ana	Depa	artme	nt of I	Envir	onmental Quality
DRILL HOLE LOG				< T/	Э <i>Л</i> Л	T	TR.	ADDRESS: F				01 na 596	320-r	0901
SILL H		EC.	H	VIC	IL VIL CAL SE	LL RVI	A CES, INC.	PHONE NUMB		.ح, ۱۷۱	Jinal	000		
<u>م</u>														

	Drill Hole No. S35SB-216B
PROJECT NAME: Section 35 Repository Design Investigation	DITIL HOLE NO. 3333D-210D PAGE 1 of 2
DATE STARTED / FINISHED: 11/2/12 - 11/2/12	DRILLER: Axis Drilling
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5145.84 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1020935.25, E1233542.80 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

L.	DOTTETTOLL	200/1	11011.	1102000	0.20, L	1233342.00 (WIT St. 11. NAD03) HAWWEN THE.	140	ib au	10			
	4-		SAMPLE	S	(9)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies			SPT		(
ç	GRAPHIC LOG	Ē	DRIVE UNDISTURBED	₽	RECOVERY (%)	project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	IMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	
	APHIC	ОЕРТН (FT)	VE DISTL	SAMPLE ID	COVE	Simplication of actual conditions checumered.	LIQUID LIMIT	STIC	REC	/ DEN	ISTUI	
Ļ	GR.	DEF	DRIVE	SAN	RE(MATERIAL DESCRIPTION	g	PLA	00	(pcf	MO	REMARKS / TESTING
			$\bigvee \uparrow$			Moist, Black [10YR 2/1], ORGANIC SILT, OL, with trace subangular gravel, oganic roots.						
		- 1 <u>-</u>	M		100	Moist, Very dark brown [7.5YR 2.5/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, no reaction to HCl, gravels are subrounded.					9.0	
			\bigvee			Sublourided.						
			\triangle		22							
												Gravel/Cobble fragments in spoon
		- 4 <u>-</u>										
		- 5 =	\exists									
		_ 6 <u></u>			83				56		12.0	
												Top 6" sluff in hole
			\triangle		17				49		6.0	
						Moist, Dark brown [7.5YR 3/2], CLAYEY SAND, SC, low plasticity,						
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- 9 <u>-</u>				Weathered Tuff w/frequent zones of rusty yellow, purple, breaks down to a fine grain clayey sand.						
=		-10 <u>-</u>										
		 11	\mathbb{N}		89				100+		16.0	
-		 12			94				100+		16.0	
-		 13	Δ		94				100+		10.0	
		_										
		14 										Harder Drilling, larger rock fragments
-	-\	-15 <u>-</u>	\forall									Water Level 11-19-12
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	-16 <u>-</u>	\mathbb{N}		78				29		14.0	SB-216B = Dry
	\	 _17										
	\	 18										
	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y											
	\	-19 <u>-</u>										
	Y Y Y Y	-20-				CLIENT: Mas	tons	Don	ortma	nt of I	Envis	conmontal Quality
			/	\sim	X	CLIENT: MOR	tana	_epa	ai ume	ent Of b	=I IVII	onmental Quality

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

PROJECT N	IAME:				5 Repos	sitory [Design Investigation Drill Hole	No	. S	35S	B-2	16E	PAGE 2 of 2
WELL LOG GRAPHIC LOG	DEPTH (FT)		UNDISTURBED	BULK	SAMPLEID	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for thi project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
GR GR	DE	DR	<u>S</u>	BC	SA	R	MATERIAL DESCRIPTION	12	<u>7</u>	8	P. S.	M	TESTING
V V V V V V V V V V V V V V V V V V V						100	Moist, Dark brown [7.5YR 3/2], CLAYEY SAND, SC, low plasticity, Weathered Tuff w/frequent zones of rusty yellow, purple, breaks down to a fine grain clayey sand. (Continued)			27		11.0	Too hard for SPT, switching to open hole hammer Water Level 11-19-12 SB-216A = 30.5'
Y Y Y Y Y Y X X X X X X X X X X X X X X													Total Depth= 35.0' Piezometer SB-216A 1" Sch 40 PVC Stick-up 1.5' 0-30' Riser 30-35' 0.010" Screen Piezometer SB-216B 1" Sch 40 PVC Stick-up 1.7' 0-10' Riser 10-15' 0.010" Screen Annulus 0-8' Bentonite Chips 3/8" 8-15' 10-20 Sand 15-23' Bentonite Chips 3/8" 23-35' 10-20 Sand
		Ш	_				CLIENT: Mo	ntana	Dep	artme	ent of	Envir	onmental Quality
				<	7		ADDRESS:						
	7			7/	2NZ	FL		ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901					
		_		<i>(</i> -	// V /	シアン		PHONE NUMBER:					7501

	Drill Hole No. S35SB-217A/B						
PROJECT NAME: Section 35 Repository Design Investigation DATE STARTED / FINISHED: 10/31/12 - 10/31/12	DRILLER: Axis Drilling						
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent						
GROUND SURFACE ELEVATION: 5137.73 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX						
BOREHOLE LOCATION: N1021345.73, E1233083.26 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto						
SAMPLES BOOT JOHN LED BOOT JO	his summary applies me of the drilling ations and may change data presented is a LIMI J CLE LIM						
-1	Water Level 11-19-12 SB-217B = Dry SB-217A = 25.0'						
PIONEER TECHNICAL SERVICES, INC.	CLIENT: Montana Department of Environmental Quality ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:						

PROJECT NAME	E: Section 35 Repo	sitory	Design Investigation Drill Hole	No	. S	358	SB-2	174	A/B PAGE 2 of 2
WELL LOG GRAPHIC LOG DEPTH (FT)	SAMPLES	RECOVERY (%)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.	" " " " " " " " " " " " " " " " " " "	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
		2	MATERIAL DESCRIPTION	<u> </u>	<u>_</u>	ŏ	<u> </u>	Σ	TESTING
-21 -21 -21 -22 -23 -24 -24 -25 -26 -27 -28 -29 -30 -31 -32 -33 -34									Piezometer SB-217B 1" Sch 40 PVC Stick-up 1.7' 0-10' Riser 10-15' 0.010" Screen Piezometer SB-217A 1" Sch 40 PVC Stick-up 3.8' 0-23' Riser 23-28' 0.010" Screen
-34 -35 -36 -37 -38 -39 -40 -41			ADDRESS:	P.O. Hele	Box na, M	2009			Annulus 0-8' Bentonite Chips 3/8" 8-15' 10-20 Sand 15-22' Bentonite Chips 3/8" 22-28' 10-20 Sand 28-30' Bentonite Chips 3/8"

PROJECT NAME: Section 35 Repository Design Investigation	Drill Hole No. S35MW-217 PAGE 1 of 2
DATE STARTED / FINISHED: 10/31/12 - 10/31/12	DRILLER: Axis Drilling
LOGGED BY: M. Browne	DRILL TYPE: Davey-Kent
GROUND SURFACE ELEVATION: 5137.95 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX
BOREHOLE LOCATION: N1021341.29, E1233088.18 (MT St. Pl. NAD83)	HAMMER TYPE: 140 lb auto

BOTTETIOLE	200/11/011. 111	102 10 11.20	·, <u>-</u>	1233000.10 (WT St. FT. NADOS) TIAWWENT TTE.		ib ac				
WELL LOG GRAPHIC LOG	DEPTH (FT) DRIVE UNDISTURBED STANDING	SAMPLE ID	NECOVERT (70)	This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		10	00	Moist, Very dark grayish brown [10YR 3/2], ORGANIC SANDY SILT WITH GRAVEL, OL, contains organics, tree roots. Moist, Dark reddish gray [5YR 4/2], SANDY CLAY with Gravel, CL.					8.1	
	- 2 -	1	7						8.0	
	- 3 - / \			Moist, Dark brown [7.5YR 3/2], SANDY CLAY with Gravel, CL, Argillite gravels are angular, with rust on stain on surface, has structure when broke apart, yellow inclusions, some gravels are purple in color.	-				8.0	
	- 7 8 9 9	C	0				19			
	-10 -11 -12			Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, gravels are subrounded.	_		25		13.9	
	-13	7:	2				16		13.0	
	-14- 15- 	10					20			Water Level 11-19-12 SB-217B = Dry 16-21' higher rock content
	-19- 20-			CLIENT: Mont	tana	Depa	artme	ent of	Envir	onmental Quality

PIONEER TECHNICAL SERVICES, INC.

ADDRESS: P.O. Box 200901

Helena, Montana 59620-0901

This log is part of a report prepared by Flones? Technical, Inc. for the project and should be read with the report. This summay applies only at the location of the boring and at the time of the drilling. Subsurface conditions may offer at other locations and way change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. MATERIAL DESCRIPTION Moist, Reddish brown [SYR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, gravels are subrounded. (Continued) Moist, Reddish brown [SYR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, gravels are subrounded to soils above. 72 Moist, Reddish brown [SYR 4/3], CLAYEY GRAVEL with Sand, CL, medium plasticity, stiff, no structure compared to soils above. 26 13 Moist, Reddish brown [SYR 4/3], CLAYEY GRAVEL with Sand, CL, medium plasticity, stiff, no structure compared to soils above. 27 Moist, Reddish brown [SYR 4/3], CLAYEY GRAVEL with Sand, CL, medium plasticity, stiff, no structure compared to soils above. 28 13 Moist, Reddish brown [SYR 4/3], CLAYEY GRAVEL with Sand, CL, medium plasticity, stiff, no structure compared to soils above. 28 12.1 This top is part of a report thresports only at the form and proper in the point at the classic part of the point at the class of the point at the point at the data presented is a simplication of actual conditions encountered. 19 10	on top
Moist, Reddish brown [5YR 4/3], GRAVELLY CLAY with Sand, CL, medium plasticity, gravels are subrounded. (Continued) No SPT, driller reports of rock at 21.5' No SPT, driller reports of rock at 21.5' Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, stiff, no structure compared to soils above. 26 13 Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, stiff, no structure compared to soils above. 10 10 12'' of Shelby crumpled. pp= 0.25, 0.0.75 isf Water Level 111-19-12 SB-217 = 24.8' Bottom of run on rock Piezometer SB-217 1" Sch 40 PVC Stick-up 3.7' 0-35' Riser	on top
medium plasticity, gravels are subrounded. (Continued) No SPT, driller reports of rock at 21.5' No SPT, driller reports of rock at 21.5' Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand. GC, medium plasticity, stiff, no structure compared to soils above. 100 Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand. GC, medium plasticity, stiff, no structure compared to soils above. 101 102 Bottom 1/2" of Shelby crumpled. pp= 0.25, 0.075 isf Water Level 11-19-12 SB-217 = 24.8' Bottom of run on rock Piezometer SB-217 1" Sch 40 PVC Stick-up 3.7' 0.35' Riser	
Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, stiff, no structure compared to soils above. 26 72 Moist, Reddish brown [5YR 4/3], CLAYEY GRAVEL with Sand, GC, medium plasticity, stiff, no structure compared to soils above. 10 10 Bottom 1/2" of Shelby crumpled, pp= 0.25, 0. 0.75 tsf Water Level 11-19-12 SB-217 = 24.8' Bottom of run on rock Piezometer SB-217 1" Sch 40 PVC Stick-up 3.7' 0-35' Riser	
35-40 0.010 Screen	
72 Moist, Dark yellowish brown [10YR 3/4], SANDY CLAY, CL, medium to high plasticity, Tuff, some subangular gravel fragments. Moist to wet, Very dark gray [7.5Y 3/1], SANDY CLAY with Gravel, CL, Tuff, breaks down to Sandy Clay, some angular gravel fragments. Moist to wet, Very dark gray [7.5Y 3/1], SANDY CLAY with Gravel, CL, Tuff, breaks down to Sandy Clay, some angular gravel fragments.	3/8"
61 Wet, Dark gray [7.5YR 4/1], GRAVEL with Sand, GP, Tuff, drill cuttings are rock fragments.	
Driller reports too rocks SPT at 40.0' Total Depth= 40.0' Total Depth= 40.0' ADDRESS: P.O. Box 200901 Helena, Montana 59620-0901 PHONE NUMBER:	y for
CLIENT: Montana Department of Environmental Quality	
ADDRESS: P.O. Box 200901	
Helena, Montana 59620-0901 TECHNICAL SERVICES, INC. PHONE NUMBER:	
TECHNICAL SERVICES, INC. PHONE NUMBER:	

PI	ROJECT N	AME: S	ec	ction	1 35 Re	oosit	tory D	Design Investigation	Drill Hole	No.	. S.	35F	PZ- 0	1T	PAGE 1 of 1
_	ATE STAR								DRILLER: Axis D	rilling]				
-	OGGED BY								DRILL TYPE: Da						
								31 (U.S. Feet) NAV88	HOLE DIAMETER: 4.5" ODEX						
B	DREHOLE	LOCAT	Ю	N:	N10200	193.2	20, E	1234544.98 (MT St. Pl. NAD83)	HAMMER TYPE:	140	lb au	ito			
WELL LOG	GRAPHIC LOG	DEPTH (FT)		UNDISTURBED	BULK SAMPLE ID		RECOVERY (%)	This log is part of a report prepared by Pione project and should be read with the report. only at the location of the boring and at the t Subsurface conditions may differ at other locat this location with the passage of time. The simplication of actual conditions encountered.	This summary applies ime of the drilling actions and may change e data presented is a d.	LIQUID LIMIT	PLASTIC LIMIT	CORRECTED SPT	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS /
≥	5	<u> </u>	5 :	בֿן כֿ	S B		짪	MATERIAL DESCRI		ت	PL	ö	무호	Σ	TESTING
		- 1 2 3 4			В#^			Moist, Reddish brown [5YR 4/3], SANDY C medium plasticity.	LAY with Gravel, CL,						
		- 5 6 7			B#2	?		Moist, Reddish brown [5YR 4/3], CLAYEY GC, medium plasticity.	GRAVEL with Sand,						
		-10- 11- 12- 13- 14- 15-			B#3	}		Moist, Dark reddish gray [5YR 4/2], GRAVI GP-GC, fines medium plasticity.	EL with Clay and Sand,						Water Level 11-19-12 PZ-01T = Dry
		-16- -17- -18- -19- -20-													Total Depth =15.5' Piezometer PZ-01T 1" Sch 40 PVC Stick-up 1.8' 0-10' Riser 10.5-15.5' 0.010" Screen Annulus 0-5' Bentonite Chips 3/8" 5.5-15.5' 10-20 Sand
			_		<u>~</u>		V							Envir	ronmental Quality
				2		71	, , , , , , , , , , , , , , , , , , , ,	70			Box :				2004
			A				Ľ	$K \sim$			na, M	onta	na 596	520-(J9U1
L		TE	C	HN	ICAL.	SEL	RVIC	CES, INC.	PHONE NUMBER:						

DRILL HOLE LOG COMBINED REPOSITORY.GPJ 2/27/13

PROJ	ECT NA	ME: MH Sachon 355	-	ı Dril		Ηо	le 1	NO. MUZOR PAGE _ OF 3			
DATE	STARTE	D/FINISHED: 10-11-12		DRILLER: Axis							
LOGG	ED BY:	JR		DRILL TYPE: Davey Kent							
		RFACE ELEVATION:		HOLE DIAMETER: 41/2 ODEX							
BORE	HOLE L	OCATION:		HAMMER TYPE: 140 15 Auto							
	ပ္ခ	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with			SAM		(%)				
ОЕРТН (FT)	SRAPHIC LOG	the report. This summary applies only at the location of the boring and at the time of the drilling. Suburface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	TH (FT)	SAMPLE	1 2	BULK	RECOVERY (41			
DE	GR.	MATERIAL DESCRIPTION	DEPTH	SAMPLE NO. DEPTH	DRI	BE	REC	REMARKS			
1 = 2 =	u-	Dry reddish brown, From cloque) grovel (CL), roots, medium fift Dry reddishwhile, Landon w/ groud Shift, med plos	- 1 <u>-</u> - 2 <u>-</u>	35#1 2" -	6 6 6 0		7/18	10:30 A In			
3 = 4 = 5 = 5			- 3 - - 4 - - 5 -		E			Cuttings, redolists/white Legencloses/growel chips, mostly(CL), very that			
6 =	SC	Most reddish brown clay of grands (Ch) Arg. 11 to grands, med plus Most reddish brown	-6	S\$#3 2"	1000		718	Shedly from DER			
3 =	30	woist reddish brown silogey sound by ground (SC), Stiff, rounded sound sound clony sound	- 7 <u>-</u> - 8 <u>-</u>	1"	十四		1/0				
0		at 9: booken in spoon and		35A5.	18/6/3	Z	8/21	II:so			
1=	- 24	were thin layer of sand at 11.	-11	55#6	1 1 1 1 B	-	18				
3=	CL	moist reddish brown than close w/ sand and grovel (Ch) stiff.	-12= -13=	5544	10/2		14/18				
4=	SC	Moist/wet reddish brown claysands	-14		4			cloger ou things, sargle sound			
5=		(SC) stiff, unter Ledded wy W/srond SRIFT 15.5! Usibb water at	-	55#B	7110		18/10				
7 = 3 = 4	ماطاه	15.5m SPW1 growl Longer ~ 1"this medples clay of Most reddish brown claysand w/growel (SC) wax med plost shift. Loist 6" sha Hered avg. 111to	-17 <u>-</u> -18-		16			au spron dust and eller at 17.5-12.75			
	55	2017. Loist 67 sha Hered avgillite	-19					backento se wigrand at			
0=	_	wet reddish boom sandy w/ clog and grovel medium, but plast		53-410	10 77 8		16/18	spoor's moister			
	_	~~	CLIEN	T: "							
		1215 APPLES WAY BELGRADE, MONTANA 59714	ADDRE				100				
		OIVEER (406)-388-8578	ll.c	11 -			1				
_	L TECHN	IICAL SERVICES, INC.	PHONE	E NUMB	FP.	e UT	100				

RO.	ECT NA	ME: Section 35		Dril	I He	ole	NO.5B-202 PAGE 2 OF					
		ED/FINISHED: 10-11-12		DRILLE	p. Ax	CIS	DE AUL INCL DE OF					
	ED BY:			DRILL		_						
		RFACE ELEVATION:		HOLE I	DIAMET	ER: 4/	/2_					
ORE	HOLE LO	OCATION:		HAMMER TYPE:								
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	DEPTH (FT)	SAMPLE NO. DEPTH	JRIVE JNDISTURBED	_	DEMON					
-	sc	A		DEFIN			REMARKS					
2= 3= 4= 5= 6= 7=		most reddish brown closes sand with growel (SC), med plastic, Stiff.	-22 -23	55#11 111	19/20	1%						
4=			-24 <u>-</u>				10.54					
5=		Moist reddish brown dayey sand wygranel (SC) med plostic medium Still ness amorphis.	-25 -26	SS#12-	8/9	19/18	1:30					
	SP	most nellish brown Lean elos w/sand under bedded w/ sandw/clos and w/clos Eines LSwet	-27 -28	S\$# 13	9 14	13/18	ust spoon					
	Boulder	Lswet		55#14 -		_	Cutings are chips and dust my clay at 29"					
			1 6 2 2 2	ss#14 -			2125					
			-31=		H		prefusal					
	ch		-32 <u>-</u> -33		11		I I I I I I I I I I I I I I I I I I I					
Ξ			-34 -34				SC Cuthings					
		mondfust reddidn brown flow along.	-35 -	45 17	5 X 8 X	18	3:20 3 Brass					
		wil Sand and granel (CL) med plas medium stillness	-36 - 4 -37 -	117	X	10	Spoorinuit					
=	CL		-38-				Pock chips c+ 37					
=			-39				to grow cloye y sand					
	krep.	Saturaled grow purple clayer grovely/ Sund (GE) low plushic forces. medium	-40 -41	الم الم	3	15/18	Blowing dust at 39-40 some (2"Chips avg. 114, grow/parple 4:10					
			-42=				Notes on turning					

ROJECT NA					e N	10.513-202 PAGE 3 OF	-
OGGED BY:	ED/FINISHED:	-	DRILLER				
	RFACE ELEVATION:		DRILL 1				CON.
DREHOLE L		7	HAMME	NAMETER R TYPE:			_
	This log is part of a report prepared by Piedmont	T					
GRAPHIC LOG	Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	VINE NDISTURBED AWAY	RECOVERY (%)		100
-	MATERIAL DESCRIPTION	B	DEPTH	문으로	RE	REMARKS	
3	- and for dois, start 8:15 another Bull preas Severe 45-40 Sand 45-40 blank 40-0 bentonite 40-0 5 bugs bent 3 bags sand well hole While I have been to the same the sa	-43- -44- -45- -46- -47- -48- -49- -50- -51- -52- -53- -54- -55- -56- -57- -58- -60- -61- -62- -63-				5-10 gaVmin return water fairly solid at 42' Drill string at 38' in morning. Tam on air, water out of casing.	
	AAA	CLIENT					_
PI	ONEER (406) 388-8578	ADDRE	777				
I IECHN	ICAL SERVICES, INC.	PHONE	NUMBE	R:			_

		DRILLER DRILL	R:	Axi	2	NO.SBROZ PAGE _1 OF _	
E ELEVATION:		DRILL	IVDI				
	OUND SURFACE ELEVATION:						
		HOLE [
log is part of a report prepared by Pledmont nearing, Inc. for this project and should be read with report. This summary applies only at the location of boring and at the time of the drilling. Subsurface litions may differ all other locations and may change at location with the passage of time. The data presented simplification of actual conditions encountered.	ЕРТН (FT)			NDISTURBED SET OF SET O	ECOVERY (%)		
MATERIAL DESCRIPTION		DEPTH	0) m	22	REMARKS	
Runtu toward Pentu toward Pentu toward Strand Ske, med plast St reddish brown closers and grovel (Sc), med plast st reddish brown closers sand provid (Sc) ned plast	-17 -18 -19 -20 -21	0#3				11:07	
	Runtus toward Clarge Sand Is well see, mad plast. St raddish brown clarges and gravel (SC), mad plast	Panto town -1 -2 -3 -4 -5 -6 -6 -7 -8 -9 -10 -10 -10 -11 -12 -13 -14 -15 -17 -18 -17 -18 -19 -10 -17 -18 -19 -10 -10 -10 -10 -10 -10 -10	Panto toward -1 -2 -3 -4 -4 -5 -6 -7 -8 -9 -9 -10 -9 -10 -11 -12 -13 -14 -12 -13 -14 -15 -17 -18 -18 -19 -17 -18 -18 -19 -19 -10 -10 -10 -10 -10 -10	Punto traver — 1 — 2 — 3 — 4 — 4 — 5 — 6 — 7 — 8 — 9 — 10 — 10 — 11 — ph — 12 — 13 — 14 — 15 — 14 — 15 — 15 — 16 — ph — 17 — 18 — 19 — 17 — 18 — 19 — 19 — 17 — 18 — 19 — 19 — 19 — 19 — 19 — 19 — 19	MATERIAL DESCRIPTION BY NO. DEPTH ON D	Punto trans -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -9 -10 -11 -9 -10 -11 -12 -13 -14 -12 -13 -14 -15 -17 -18 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -17 -18 -19 -19 -10 -17 -18 -19 -19 -10 -10 -10 -10 -10 -10 -10 -10 -10 -10	

REUND SURFACE ELEVATION: BRHOLE LOCATION: This log is part of a report propored by Piedmont Superinson, to, to be this project and should be read with the project and the project a	ATE START	AME: Section 35 FED/FINISHED: 10-12-12		Dril DRILLE	R:	10	ie i	NO.SB-202T PAGE _ZOI			
DEFINITION DISTRICT TO SENDENCE OF THE PROPERTY OF THE STATE OF THE ST	OGGED BY:										
This log is part of a report proposed by Fateness Proposed by The Secretary Secretary (in the Test Proposed of Secretary Secretary spiles only of the location and proposed on Secretary spiles only of the location and proposed on Secretary spiles only of the location and proposed on Secretary spiles only of the location and proposed on Secretary spiles only of the location and proposed of this tocation with the passage of this tocation with the passage of this tocation with the passage of the location and proposed conditions encountered. Secretary											
22 -23 -24 -25 -25 -25 -25 -26 -27 -28 -28 -29 -28 -29 -29 -28 -29 -29 -29 -29 -29 -29 -29 -29 -29 -29	HIC LOG	the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The determinant			SAM	PLES					
SC Most Paddish brown, clopey -23 -24 -24 -25 Sound Wys rowel (2c) need plast -26 -27 -28 -29 West reddish brown closys sand wys rowel (SC) med plast -31 -32 End hole at 23' moball wast press -34 -35 -34 -35 -36 -37 -38 -37 -38 -38 -37 -38 -38	GRAP		DEPTH	NO. DEPTH	DRIVE	BULK	RECOV	REMARKS			
BELGRADE, MONTANA 59714 ADDRESS:		Moist reddish brown, closely sand w/s revel(SC) med plast - End hole at 33' moball mest preses	-29 -30 -31 -32 -33 -34 -35 -36 -37 -38 -40 -41	四半十	, L			12:20 Pockier drilling 12:21 1" Prego 33-27 Somen 33-27 Sond 27-22 Bondonille 27-22 Bondonille 22-17 Sand			
1900) 388-857R	DI	1215 APPLES WAY	The state of the s								

PROJE	CT NA	ME: Section 35		Dril	1 }	10	e N	0.53-206 PAGE _1 OF 43		
DATE	STARTE	D/FINISHED: 10-12-12		DRILLE	R: /	Axic				
	ED BY:		_	DRILL				Kent		
		RFACE ELEVATION: DCATION:	3	HAMME	HAMMER TYPE: 140 Aus					
BOKE	TOLL L	T		I	SAME		100	10.45		
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summery applies only of the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	IBBED	BULK	RECOVERY (%)			
B	25	MATERIAL DESCRIPTION	핌	DEPTH	-	ם	8	REMARKS		
- 1 - 1 - 2 - 3 - 4 - 1 - 4 - 1 - 1 - 1 - 1 - 1 - 1 - 1	02	Dry don't brown organists sit(DL) twigs, roots, pino needbes Dry lite brown organics if (OL) [voots. Low plostisty Dry Rak tun sand w Sittand gravel	- 1 = - 2 = - 3 = - 4 = -	2502	6 6 6 7 3 2		5/18	Overhole at 3:00 pm Startdrill 3:20		
- 5 6 7 8 9	SC Boulded	Most brownish red claying sundses stiff, how/wed prost with worst reddish brown close sand the w/growd (sc), stiff, wed play.	- 5 - - 6 - - 7 - - 8 - - 9 -	50#5 211 55#10 1"	四四日日日日		16/18			
-10 <u>-</u> -11 <u>-</u> -12 <u>-</u> -13 <u>-</u>	SC	Must redish bown closery grand a Joand (GC), very stiff, med ploshi lives worst readlish brown closery sand w/groul (SC), very stiff, med plast.	-10 -11 -12 -13	-	15 20 30 12 11 20		18/18	4:00 outside al spoon damp		
-14 -15 -16 -17 -18	-	moist reddish brown bean coop w/ sandond growel, very shift, moist reddish brown clayers and w/g rouels, had plost. very shift	-14- -15- -16- -17- -18-	55#9 2" 50#10	किलिक्षिण का कार्या का			Z Bross Linero		
-19 -20 -21		moist reddish brown lean aby ay sand and graced mils, they stiff	-19 -20 -21	10	200			5:00		
		1215 APPLES WAY BELGRADE, MONTANA 59714	100000000000000000000000000000000000000	RESS:						
	P	ONEEK (406) 388-8578		STANIAL TO				No. of the last of		
	I TEC	HNICAL SERVICES, INC.	PHO	NE NUM	BER:	-				

DDO IFOT NA	45. C 45. 35		Drill	Ho	le N	O 58 20% PAGE 3 OF 3
DATE STARTE	ME: Section 35 D/FINISHED: 10-12-12	- 1,00	DRILLER		5	
LOGGED BY:	7/2		DRILL T		D.	
BOREHOLE LO	FACE ELEVATION: DCATION:		HAMMER			
(FT)	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	н (гт)		STURBED AND	ERY (%)	
DEPTH (I	MATERIAL DESCRIPTION	DEPTH	SAMPLE NO. DEPTH	DRIVE UNDIST BULK	REC	REMARKS
-22 -23 CH	wet group purple clay w/ Sand and stronger medium plus, weathered rack. Lis elugua partir wet group parties clay all good and gravel, mad plus, weathered bedrake	-22 -23 -24	35#172 111	ROLE (2)	18/9	water +1.5 beet from 20's start drilling again 10-13-1
-25 GC -26	Saturated, parple, groy, ned groyeel w/ sand and clay (Claying grovel w/sand GC med plant, stiff weathened rock	-25 -26	2	14 18 19 6	18/18	
-27 -28 -29	Solaroled pende/white (Soltandpepper) days w/sundenelgrand, Imanita, whentered feld spores, fine ground porontrock.	-27 -28 -29	,"	12/1	16/18	- Haval drilling at 29
-30 -31 -31	convoted purple/groy, salt pepper day wisand and ground, whatered feldspars		51422	10 10 19	7/18	
-32= -33= -34=		-32 -33 -34	e ^A			
-35- -36- -37-	Saturated purple, white (Scalf peppers) clay as sand. weather abdomics small gtz, feld spar, he modblered, I monet	-35 -36 -37	557116	5237	18/18	water or return
38 Anghil		-38 -39 -40	SHQ			Bowing dust
-40 <u>-</u> -41 <u>-</u> -42 <u>-</u>	Sahvated puple grow growel will clay, avoillite, #noular, very shift.	-41 -42	SHI	50		may be weather volcanies
	1215 APPLES WAY	CLIE			100	. And the second
1	BELGRADE, MONTANA 59714 (406) 388-8578	ADD	RESS:	F 5		
TEC	CHNICAL SERVICES, INC.	PHO	NE NUM	BER:		- ph2 - y

15.

PROJECT NAM	ME: Section 35		Drill Hole No.5B-2	06 PAGE 3 OF 3
DATE STARTE	D/FINISHED: 10-03-17		DRILLER: Asers	,
LOGGED BY:	FACE ELEVATION:		ORILL TYPE:	
BOREHOLE LO		- T	HOLE DIAMETER: HAMMER TYPE:	
DONE TOLL CO			SAMPLES	
DEPTH (FT) GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	рертн (гт)	DRIVE DRIVE BULK RECOVERY (%)	REMARKS
-43 -44 -45 -46 -47 -48 -50 -51 -52 -53 -54 -55 -56 -57 -58 -60 -61 -62 -63	Saturated, oliver sceneral serverel. Saturated, oliver sceneral serverel. Saturated, oliver per place black per	-43 -44	Hand de Cutturgs chips. chips. chips.	
	~~	CLIEN		
	1215 APPLES WAY BELGRADE, MONTANA 59714	ADDR		
PI	ONEER (406) 388-8578 VICAL SERVICES, INC.	7 5 63		-Y10, 40%
A TECHI	VICAL SERVICES, ATC.	PHON	NUMBER:	

_ DEPTH (FT)	DRILLER DRILL T HOLE D HAMMEI	R: TYPE: DIAME R TYP SAMPL	TER: PE: LES	RECOVERY (%)	10.2068 PAGE 1 OF 1
_ DEPTH (FT)	HOLE D	NAME R TYP SAMPL	E: LES	RY (%)	
_ DEPTH (FT)	HAMMEI	R TYP	E: LES	RY (%)	
DEPTH (FT)	(SAMPL	ES	RY (%)	
DEPTH (FT)				RY (%)	
30	DEPTH	αz	\succeq	COVE	
-1=		حام	B	Æ	REMARKS
- 8 = - - 8 = - - 9 = - -10 = - - 11 =					Cuttings less dust from return unchesse worsture
-20 <u>=</u>					
-21-					-11
The state of the state of the state of		1			
ADDR	ESS:			-	
1 13 1					
	- 4	- 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 14 - 15 - 16 - 17 - 18 - 19 - 20 - 21 - 21 - 20 - 20 - 21 - 20 -	- 4	- 4 =	- 4 =

DATE	START	ED/FINISHED: 10-14-12		DRILLER		A.		14 - 15 - 17 - 17 - 17 - 17 - 17 - 17 - 17
		JIZ		DRILL 1				1-
		RFACE ELEVATION: OCATION:		HOLE D				12 S Auto
BOKE	HOLE L	CONTION.				MPLE		PINCO:
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH	-			REMARKS
	٥٢			45件	-	=	Cont.	SENT ANII ZINSAM
	02	Lop soil, Pry Formics (1402)		59#2	6		15/18	SELL QUEIL TIMES WAY
-	OL	Tout high brown organic solt (62)	713		10	14	100	
- 2 =	SL	Down coddict white class	- 2 =	551	10		4/10	
7 -		Two trone groved. Dry raddish white cloudy sanday grand (SC). bourlost, very still.		杨小	0		118	У.
3 =		town ost. very still.	- 3 =					Blowing lots of dust
- 4 =	_		- 4 =					lament loss as west
=	Sun	1)	=					Fundowner from crepross
- 5 =		Dry, recollish white send we street	- 5 =	59#14	22	1	. 0.1	the shout stopped by:
6		(SM) low to non postic verse HF	- 6 =	211	25		13/18	askerfuse more denling
-	-1	Dry reddign white closered sound with	-		20			I don't levery
- 7 =	50	(SE) low/may plant, stiff.	7 =	5545	9		190	Jack Mainnis
- 8 =			-8=	100	14	H	100	
_			3					11
9 =			- 9 🗏					Cuttings loss dusty
-10			-10=					
-		(SE) to be all about the	-10	SSH	13		Po.	
-11=			-11=	16	200		Politi	
-12=		morest reddish bown clowns sand u)	-12	55417	io		13.1	
-		magnum plant stiff	2=	11	12		13/18	
-13=		-	-13	- 10	16	-		
. =		4		- 4-1	1	1		
14-			-14=	判		V		
-15=		March and died 1	-15		0			1 12"BL Brassling
10		Moist reddish brown claysand was red		SS#8	12		10/18	1-12"BL & Brass Line
-16		A MANAGEMENT	16=	2"	13			
-17=			-17=	50 H	5		%	reselectucion int, no
=			-	1	b		,0	recovery
-18-			18	-	~	17	7	Colin de al
-19-			-19	0x+2		V		Cuting stow clayer sand
=			-	V		/\		13.000
-20=		Moret redderly brown clayers and	-20	SH	12		18/	BEASS Lines 3x
-21-		-depart, shift and place	-21	10	21		1/8 1	21-21-5 2 11
		- ^-	CLIEN	T·	200	1		21-61.5 form by
		1215 APPLES WAY	ADDRI					
	DI	ONEER (406) 388-8578						

ATE START	ME: Section 3 = 10-14-12 -> 10-15-12	777	DRILLER: Age							
GGED BY:	RFACE ELEVATION:		DRILL TYPE: HOLE DIAMETER: HAMMER TYPE:							
REHOLE L	Control of the contro									
GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH		UNDISTURBED TO BULK	RECOVERY (%)	REMARKS			
CL SECL	Moist reddish brown bean class	-22 -23 -23	SSMI!	9 21			Cattings color change to			
John John	chay. weathered volcomics, and ester searching seatibe, (monte, hematib. Weathered hematib. and fracher faces.	-24 -25 -26 -27	5±12 27	2 3 3	77		11:20			
Jol John Market	Most purple, tan clayey sand Secondoro minarolo, limerile mgCz, chlorite, maybe altered algillite/moybe altered solvaning Otype are plotey when fractured.	-28 = -29 = -30 = -31 = -32 = -34 =	1 SH 3 J	101	(OK)	1.	50/5 Refusal No recovery Promis 11 Sample Any Minsons spot 50/4" sencond run. Samples very handa			
	35-30 Screen 30-15 bend 18-13 Seven 13-0 bent.	-35 -36 -37 -38 -39 -40 -41 -41		1/2			Stop as to not gol samples stuck.			
P	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578	CLIENT		V.						

PROJ	ECT NA	ME: Section 35		Drill Hole No. Space PAGE LOF 2								
DATE	STARTE	ED/FINISHED: 10-14-12		DRILLER: Axis								
	ED BY:	JR.		DRILL			ODE					
		RFACE ELEVATION:	-		E DIAMETER: 4/2 MER TYPE: 140 Auto							
BURE	HOLE L	OCATION:		HAMME				D HOLD				
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		NDISTURBED TO ULK						
		MATERIAL DESCRIPTION	0	DEPTH	0	D B	22	REMARKS				
- 1 = - 2 = - 3 = - 4 = - 5 = - 7 = - 8 = - 8 = 8 = 8 =	02	Dry processor for, association (02) and plust of the mount clayey sund wigrover, stiff, in tomid plus.	- 1 - 2 3 3	SATI SATI	としては中日		148	dusty catings				
- 4 <u>- </u>		moist, roddish brown, cloyey said w/ growl stiff, ned plast moist roddish brown cloyey said w/ growel stiff, med plast	- 5 6 7	SS#3 2" SS#"	11100		14/18					
9 =	3P	moist pinkish brown said u/	- 8 = - - 9 = -	1	14.		18/10	Rocket cuttings				
-10 -11 -12 -13	St.	Most redden bown lean closely we send wet redden brown closely sand we grovel, sfift mod/loss plant.	-10 -11 -12 -13	25#5 25#6 25#6	14 15 10 13 18		200 200	4:00				
-14 -15 -16		Most Redust boun days and wyrard Stiff wed plast.	-14 -15 -16	53#ED 2"	9 16 20		18/18	430 - 55410 16.75-18.0				
-17 -18 -19	30	and gravel, stiff, med plast and capital	-18 -19	OITES	111111111111111111111111111111111111111		18/18	55#9 16.5-16.75+ 17.0-18.00				
-21		1215 APPLES WAY BELGRADE, MONTANA 59714	-20 -21 CLIEN ADDRE	T:	7							
9	PIECH	ONEER (406) 388-8578	PHONE NUMBER:									

		ME: Section 35		Dril	-	Но	le N	O. 209 PAGE _ OF .				
	STARTE ED BY:	D/FINISHED: 10-14- 10-15-12		DRILLER: DRILL TYPE:								
ROU	ND SUR	FACE ELEVATION:		HOLE DIAMETER:								
ORE	HOLE LO	OCATION:		HAMMER TYPE:								
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		NDISTURBED OF STA	_					
		MATERIAL DESCRIPTION	0	DEPTH	0) m	2	REMARKS				
222 223 224 225 226 227 228 229 330 331	sc	Sahvated reddish larown clougesand w/g varel, medilemstill bow hand plasheity.	-22 -23	S#12	0 13 12		10/18					
24	_		-24 <u>-</u>					Sandy Hoy cloyey sand				
25 =	CL	Saturated restion bown leanely we sand and grovel med plast.	-25 - <mark>26</mark>	55# 13 2"	14 18 20		19/0					
27 <u>=</u> 28 <u>=</u>		Suturated reddish brown lean class w/sand and growl stiff, med plant.	-27 -28	55#	13		18/18					
29			-29					. 30				
30=	1 00	Most puple grow stayen	-30 <u>-</u> -31 <u>-</u>	2151	11 25							
	yolean GC	(GC) very staff, how plastic.	-32			17		Culting yellowish.				
33=	ch		-33 -34	BH3				groy clayey sand				
34 35 36		Salovako gellar, purple, white	-35 <u>-</u>	55#	7	4						
36		Sandy clay (ch), weathered volcanics, limonito hemalito servicite. Host, maybe boundede.	-36 <u>-</u>	17	12	The same		40-35 Sand Screen				
	et		-38				19.	35-12 bent 12-8 screen				
39 10			-39=					8-0 bent				
		suturated yellow, green, purchlack white orange groy fat clay, wheathered volcanic mydrothamel.	-40 <u>-</u> -41 <u>-</u>	551	569							
12=	Endhal	mayor bandonite myanotherme.	-42-	-			1 Si					
	CLIE				LIENT: DDRESS:							

PRO.	JECT NA	ME: Section 35	6	Dril	II H	lole	9 1	10.53-	214	PAGE _	/_ OF	2	
DATE	START	D/FINISHED: LONS-12		DRILLE		16	Axi				-		1
	GED BY:		y	DRILL				en Kent	97-7-	1 25			
		RFACE ELEVATION:		HOLE				12				7	
BORE	HOLE L	OCATION:	_	HAMME			12	W Aubo					
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	RIVE WOISTURBED W		RECOVERY (%)						
0	9	MATERIAL DESCRIPTION	8	DEPTH	0 5	8	8	*		REMARK	S		
- 1 <u>-</u> - 2 <u>-</u> - 3 <u>-</u> - 4 <u>-</u>	٥١	Dry tunish sort organic 31H (OL) medicinistit lowplast - to Dry whitished clayey sand w/grovel and very shift, lowplast.	- 1 <u>-</u> - 2 <u>-</u> - 3 <u>-</u>	2 542	19 28 -01	1	8/10						176 11
- 4 = - 5 = - 6 = -	- /	Moist reddish brown clayey sand w/growel, med plasting	- 4 = - 5 = - 6 =	2"	8	18	18	2:25	1	4 40		*	1 7
- 7 =	CL	moist/wet veddish brown lean close w/ growl and sand, stiff med plosherts	- 7 <u>-</u> - 8 <u>-</u>	55915	1500	18	YIB						
- 8 = - 9 = -10 = -11 =	SC	moist/wet cloggysand w/s rovel (SC) stiff, wed/Las plast.	-9 -10 -11	2#b	= 15 2	16	1/8		4				
-12= -13= -14=	SP	Most reddish brown sandw/. dogand grovel (SP). Moist reddish brown lean clingui/sand and grovel.(CL)	-12= -13= -14=	\$5#7 \$#8	371	10	18		4.1				
-15 -16	Boulder		-15 -16		50			chary chary thr	a hour	efisal	doan	och.	100
-17 -18			-17 -18		No.				9		mne	2.5	
-19 -20 -21		most wet lean class w/ Sand and is gravel; Shill med plast	-19 -20 -21-	SSH 9 a"	19 14			4:50	* 1				
	PI	ONEER 1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578	ADDRI		FP.				1				

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PROJI	ECT NA	ME: Section 35		Drill	Но	le N	NO. 58214 PAGE 2 OF 2				
DATE	STARTE	D/FINISHED: 10-15 -10-16-12	A.	DRILLER:							
	ED BY:	RFACE ELEVATION:	3.70	DRILL TY							
		OCATION:	-	HOLE DIAMETER: HAMMER TYPE:							
	N/S		1		SAMPLES						
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be ead with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO.	9	(%)					
0	5	MATERIAL DESCRIPTION	ā	DEPTH	2 2 2	22	REMARKS				
-22	۵_	meet net banday wished. med plant medium.	-22 -23 -24	S#10 = 1" 1			Stopler day 500				
-22 -23 -24 -25 -26 -27 -28	50	worst reddish brown cloysand wilgravel stiff med plast	-25 -26	55#1 II	NO PORT	15/18	Heavy Ron				
29			-27 -28 -29				drill states closury son				
-30 -31 -32 -33		sc	-30 -31 -32	SS# 12 10 第1 7 2	2	9/18	No recovery clayey sund on outside of spoon				
33	trachyle desit		-33 -34				Colorcharge to light tan at 34				
36 37	7 M	(a) weathered volcamics.	-35 -36 -37	211 g			work casing, water hom casing " Refusal "				
38		Piezo 455-40.5 Screen/san/ 40.5-23 Bent 23-18 Screen Sund	-38 -39 -				5-10 gals/mm				
40=	9	18-0 bent	-40 <u>-</u> -41 <u>-</u> -42	SOLIT Z	2	00	Advance to HS / hackste end hole, Andients/hackster				
	1	~~	CLIEN	T:							
-		1215 APPLES WAY BELGRADE, MONTANA 59714	1000	ADDRESS:							
	PI	ONEER (406) 388-8578	**	Total Control of the							
-	I ECH	MUNE DEA PICED, INC.	PHON	E NUMBE	R:	19.00					

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PROJ	ECT NA	ME: Section 35		Drill Hole No. 210 PAGE 1 OF 2							
DATE	STARTE	ED/FINISHED: 10-16-12		DRILLE		KU			1		
LOGG	ED BY:	The	7.0	DRILL	TYPE:	1	me	skent ODI	SX ·		
		RFACE ELEVATION: OCATION:		HOLE DIAMETER: 4 B							
BUKE	HOLE L	OCATION:		SAMPLES SAMPLES							
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH			RECOVERY (%)				
	0	MATERIAL DESCRIPTION		DEPTH	٥٦	8	∞		REMARKS		
- 1 - 2 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3	sm	take by the self-yeard sity sand (Sim) to self-yeard sity sand Dry parkers white portygraded sand wellow and ground (SPSU) medium dense	- 1 <u>-</u> - 2 <u>-</u> - 3 <u>-</u>	242	21 16 9		18/18				
- 4 <u>-</u> - 5 <u>-</u> - 6 <u>-</u> - 7 <u>-</u>	SC	Most reddish boson claylysand w/ gravel (SC) med to the very shift most reddish brown less clays w/	- 4 = - 5 = - 6 =	55#4 2" 2"	11 18		13/18				
- 2 = - 3 = - 4 = - 5 = - 6 = - 7 = - 10 = - 12 = -	SC	Most reddish brown lean clayer/sand and grovel (CL) still mad plast most Eloged Sound my grovel stiff	- 8 - - 9 - -10 -	9#1 5#1	X	49	1/18	9/23/4		, (, -	
-13			-11 -12 -13 -14		4		10	9. 2 481			
-14 -15 -16 -17	CL	moist reddish brown lean closery. Sand and grand, (CL) stiff, med. plast	-15 -16	soft soft	9 41			← Coldule in	znolvuh		
18_	rock	moust purple gross, rust, yellow, green clay uf sand weathered rock, remetite limoute, butile hereaction to HEL	-18 -19	649	0 12			5			
_		weathered nock with firm proceed	-	5H10	11			1		ž.	
21		arzilly enterward	-21-	3, 1	90			50/5	4	1	
	DI	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578	CLIEN ADDRE		ĘR:	er.	*		T a		

ROJI	ECT NAM	AE: Section 35		Drill Hole No. 20 PAGE 2 OF 2								
ATE	STARTE	D/FINISHED: 10-		DRILLER:								
	ED BY:	JR FACE ELEMENTS		DRILL TY	2112222							
		FACE ELEVATION:		HOLE DIAMETER: HAMMER TYPE:								
JKE	HOLE LO	OCATION:	_									
חברות (רו)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of octual conditions encountered. MATERIAL DESCRIPTION	DEPTH (FT)	SAMPLE NO. DEPTH	UNDISTURBED JAMES BULK	-	REMARKS					
-			-			1						
3	Not Arg	moist, cloyed sand wignered. Inter larded my pumpe Annillate, clayed sand isother, mad prost	-22 -23 -24	14 2	ाजां का	18/19						
	44	Monst, cloy sand wynerel weathered budrock vacanics interbedded at purple hard overlite, cloyage sends	-24- -25- -26-	3#12 14 14 9		18/18						
	volcani	STIT, MO PLAST	-27 -28 -29	Brl (roamilitani cuttings					
	Arg. My	Saturated yellow red rest sets white, brother knowith humatide, weatherd volcanics No availled	-30 -31 -32	55#13 / 22 / 1 23		18/	water in spoon.					
	IN Cu	TV	-33 -34	13#2			- Brilling rock, a 151 11 to Chips and weathered					
		Schroled wellow red, not good white hitely luminites humality was wellowed. Build Reso	-35 -36 -37	SS#14 10 12 1 37		18/18	Horder Anilling @ 37, more					
		44.5-1310 heavy	-37 <u>-</u> -38 <u>-</u> -39 <u>-</u> -40 <u>-</u>	B#3			OFEnhale drill Volcanic and armilide					
		seturely exclosioned, rut, grow remarks, biotites, limite, clogsand up grown.	-40 -41 -42	SE 18 18 18 18 18 18 18 18 18 18 18 18 18		5/8	heove in hole, at 39' drive throw heove. to					
	-	~~	CLIEN			-						
100		1215 APPLES WAY BELGRADE, MONTANA 59714	ADDR	SS:			r e					
	11 111	NEER (406) 388-8578										

ROJECT NAME: Sechon 35		Dril	1 +	lol	e N	10.5B-211 PAGE 1 OF 3			
ATE STARTED/FINISHED: 10-17-12		DRILLER: AKIS							
OGGED BY: ンピ		DRILL							
ROUND SURFACE ELEVATION:		HOLE I							
DREHOLE LOCATION:			HAMMER TYPE: 170 Aug						
This log is part of a report prepared by Pledmont			SAMP	-					
Engineering, inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	DEPTH (FT)	SAMPLE NO.	DRIVE	BULK	RECOVERY (%)				
	8	DEPTH		8	8	REMARKS			
Dry organie silt w/ voots, needlo I sur Pinking white siltywesend (SIM) Dry. low plast	- 1 <u>-</u> - 2 <u>-</u> - 3 <u>-</u>	2" 55#2 1"	8 17 17 MB		वर्गाठ	Stortdriling 1:30			
Dry Ponkish with Gloger Sound (Sc) headlow plost, Stiff.	- 4 = - 5 =	42	13		, , ,	very disty outlings			
hed how prost Stiff.	- 6 <u>-</u> - 7 <u>-</u>	55#3 2"	12/14			cont find hate, where I'spoon			
Dry Pinkish with Glogery Sand (Sc) had law plost, Stiff. Nokanii Dry yellow, purple, green day sand w/g vorsel. weathered vocanics lawplest fires y stiff, but excavability	- 8 - - 9 - -10 - -11 -	等件1 550叶	116 217 119	V	46 7/18	b"Push Shellsy Tube Vulcanies cuthings			
	-12 -13 -14 -15		CIS			Adicami? Sumon?			
6	-16 -17 -18 -19		90			50/5.5" Openhole Storted Lowning Y Storted Low 12"			
Dry black, green, yellow clargey sand (54) weathered volcanics. Veryshift	-20 -21		班 化高		0	90/4" ·			
1215 APPLES WAY	CLIENT:								
BELGRADE, MONTANA 59714	ADDRESS:								
(406) 388-8578									
TECHNICAL SERVICES, INC.	PHONE NUMBER:								

ROJECT NAM	ME: Section 35		Dril	l Ho	e 1	NO. 38-211 PAGE 2 OF				
ATE STARTE	D/FINISHED:	- 4	DRILLER:							
OGGED BY:	FACE ELEVATION:		DRILL I	CARLO THE CARLO THE						
OREHOLE LO			HOLE DIAMETER: HAMMER TYPE:							
GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions any differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH	DRIVE UNDISTURBED AN BULK		REMARKS				
A STATE OF THE PARTY OF THE PAR	MATERIAL DESCRIPTION	_	DEI III			REMARKS				
22-	Volcavico, dry	-22 -23 -24 -25	BHA			Handdrutting Herwing dust				
22-23-24-25-25-25-25-25-25-25-25-25-25-25-25-25-	Reseathened yold anis along	-26 -27 -27 -28 -29	B#3			Dry grong gulow				
31- 32- 33-		-30 -31 -32 -33	Bth							
14- 15- 16- 17- 18- 19- 10-		-34 -35 -36 -37 -38 -39	B#5			mixed Argillto chips and volcaries dry more argillto solow 39° Note dust below 39 also				
11		-40 <u>-</u> -41 <u>-</u> -42	BAG							

D/FINISHED: 10 - 18 - 12 FACE ELEVATION: CATION: This log is part of a report prepared by Piedmont Englanded to the project and should be report with			YPE:	122					
CATION: This log is part of a report prepared by Piedmont		HOLE D	DRILL TYPE:						
This log is part of a report prepared by Piedmont	1		HOLE DIAMETER:						
This log is part of a report prepared by Piedmont		HAMMER TYPE:							
Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	тн (гт)		VE DISTURBED THE						
MATERIAL DESCRIPTION	DEF	DEPTH	SS	REC	REMARKS				
	-43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -59 -60 -61	847			Cattings thousand with drilling Water from hole, and and Grow Sitt wis and and any II to chips Hand stiff drilling A 11th water from hole some chippy are docide some one anguillet Some one anguillet Shill well 10-18-12 Water of All bys Prezo 56-46 sand 56-57 screen 46-20 bent, blank 20-15 Sand screen 15-0 bent				
	.=								
1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-63-	- "							
1215 APPLES WAY BELGRADE, MONTANA 59714 AD									
	MATERIAL DESCRIPTION 1215 APPLES WAY	-43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -59 -60 -61 -62 -63 -62 -63 -62 -63	-43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -59 -60 -61 -62 -63 -62 -63 -62 -63 -62 -63 -64 -62 -63 -64 -62 -63 -64 -62 -63 -64 -62 -63 -64 -62 -63 -64 -64 -64 -64 -64 -64 -64 -64	-43 - 44 - 45 - 46 - 47 - 48 - 49 - 50 - 51 - 52 - 53 - 54 - 55 - 56 - 57 - 58 - 59 - 60 - 61 - 62 - 63 - CLIENT: ABARTAL APPLES WAY BELGRADE, MONTANIA 59714 (406) 398-8578 CONEER (406) 398-8578	MATERIAL DESCRIPTION A NO. DEPTH B NO. DEPTH B NO. DEPTH B NO. DEPTH B S B D DEPTH B S D				

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OGGED BY:	ED/FINISHED: 10-24-12 / 16-26	DRILLE	8: AX	S DK	O. 206D PAGE OF _						
ROUND SUI	RFACE ELEVATION:	HOLE [HOLE DIAMETER: 46								
OREHOLE L		HAMME	HAMMER TYPE: 140 AUTO								
GRAPHIC LOG			DRIVE UNDISTURBED THE BULK	RECOVERY (%)	REMARKS						
1 50 3 1 50 3 1 1 1 1 2 1 3 1 1 1 1 2 1 3 1 1 1 1 1		2 3 4 5 6 7 2 10 11 12 13 3 3 2		c	cuttings are dry sand w/gravel						
Vocanics	-1 -1 -1 -1 -1 -1 -2	5 6 7 8 9		3	S3 Color charge, informations						
9 Vocanic	-2 -2 1245 ADDLES WAY	20		4	Marie Control of the						

STR.

		ME: Section 35 ED/FINISHED: 10-24-12 /16-26	-	DRILLE		114	NO.SB-206DPAGE 2 OF
	ED BY:		75		TYPE:		
		RFACE ELEVATION:		HOLE			1 1 1 1 1 1
BORE	HOLE L	OCATION:		HAMME			
		This log is part of a report prepared by Piedmont		1	SAMPLE		
1	ပ္ခ	Engineering, Inc. for this project and should be read with					
(F)	. 50	the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change this location with the passage of time. The data present is a simplification of actual conditions encountered.	et E			\ _	
	을	this location with the passage of time. The data present	at L	Land	1 5	E .	
DEPTH	SRAPHIC	is a simplification of actual conditions encountered.	픋	SAMPLE	NS >	RECOVERY	
DE	GR	MATERIAL DESCRIPTION	DEPTH	SAMPLE NO. DEPTH	N N	REC	REMARKS
-22	6-		-22	,	gs/		Cuttings, Claywisand Vocanics cultings, wil chips of argulity also
			-22	10#4			Control of Section 2007
-23	100	4	-23-	0			beanies en Hurse, wi
	W	I N					Cally of arguing also
-24	Se	*	-24-			1	39
-	50	1 L	1 7				
-25-		80 a	-25-		-	_	-4:35
-24 -25 -26 -27 -28 -29		1000	-				1 5
-26-		× 1	-26-				Close Weared
_			1 2				cloy w/sand weathers volcanics, w/ aroullity chips
-27-			-27				ship arollid
() ·				115			C1.153
-28-		5	-28-	8#5			4
			1 2 5	100			
-29-			-29				
-30	4		1 -			- 1	
-30-			-30				4:50 412 hom "
					- 10		1 0
-31	1	1	-31-				4:50 water from " hole on bit Produced return some water, wilson "
	/.		-	1			Produced Teturn
-32	Not		-32_			6	Some water, Wil spin
	Or	0. 0.	0.972				
-337	de		-33				· Lost water becoming
1,7-	and		1023				
-34=	CIT		-34_				very degry, 6+
75-				3. 4		1	day. Sticking to
⁻³⁵ =			-35-			-	docall share 11 1
-36=			7.0				chips at 320 Harder
30			-36-	LS-			St -tosa: 1-3
-37			77		3 - 1		35: 14:11:14
			-37	BEE			Cutter veture
-38			-38	00			35: very little veturn cuttings, chips of avgilled unfor in ixed w/ class
		,	30=				around when moved wholes
-39		A	-39	10.			prying about at sq" dustr
	r (ii		33_	7 1			cutting 1 ausig
-40			-40=	E	1 1		The Management of the Control of the
-		9	70	Der	17		
-41			-41				
_			:0:				
-42			-42=		1	5	
	_	1215 APPLES WAY	CLIEN	39	4.		
-	DI	ONEER (406) 388-8578	ADDR	SS:			
_	TECHI	VICAL SERVICES, INC.	PHON	E NUMBI	ER:		
			LIVI	- INVINIO	-11-		

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PROJECT NAME: Section 35		ı Dril	H	loh	e 1	NO. PAGE 3 OF S
DATE STARTED/FINISHED: 16-24 / 16	-16	DRILLEI	_			
OGGED BY:		DRILL				
GROUND SURFACE ELEVATION:		HOLE [
BOREHOLE LOCATION:		HAMME	R TY	PE:		
This log is part of a report prepared by Pie Engineering, Inc. for this project and should the report. This summary applies only at the boring and at the time of the drilling conditions may differ at other locations and this location with the passage of time. The is a simplification of actual conditions encou	be read with e location of Subsurface may change at	SAMPLE NO. DEPTH	IVE NICTIODEN WAS		RECOVERY (%)	
B MATERIAL DESCRIPTIO	N Ä	DEPTH	DR	B	REC	REMARKS
43 144 45 145 145 146 47 48 49 50 50 51 52 53 54 165 165 165 165 165 165 165 165 165 165	-44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -59 -60	B#7 B#8				Blowing growdood. Chips of arguillotin volcenies Cutting Moiston clones sand with growd, grow ich purple. Begin open tole. Cuttings: cloged submated/ wet cloney send. Some sign of bentiate of correction cly chips) Small strug amount of water on but return Very clony, very little cutting; Waterentering hile, little bit two clayes to clear open hade, Swatch books to casing advonce - Hard drillingat EH Chirs are arguint and less weathered volcanics, less allered, comingue chips not globs of clog. Chips are still clayer though Try open hole. Wester rose to 5th during switch
53	-63	J = 1				The state of the s
			44	1		some water less than 0.15 at he
1215 APPLES W		1-5 - 5-1		- 11		
BELGRADE, MONTANA	59714 ADDR	SS:	18	-4		
TECHNICAL SERVICES, INC. (406) 388-857	The second second			Ht I w	92	
# THE HAVIE AT CERVICES INC	DUOL	NUMBE	-0	73.8		

1	e i e folye	THE PROPERTY OF THE PROPERTY O		Deill Hala Al
	ECT NAM		1100	Drill Hole No. 2665 PAGE 4 OF _
	ED BY:	D/FINISHED: 1174/17-26-12		DRILLER: AXIS DRILL TYPE: OK
GROU	IND SUR	REACE ELEVATION:	J. 18 . 1. 1	HOLE DIAMETER: 11/2
BORE	HOLE LO	OCATION:	罗生.	HAMMER TYPE:
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	БЕРТН (FT)	SAMPLE NO. ILK
1 1 1 L	THE STATE	MATERIAL DESCRIPTION	0	DEPTH CO DE REMARKS
-64 - -65 - -66 - -67 -	h		64 65 66 67	Misting water homes asle Saturated gray cloyed sand
-68 = -69 = -70 = -71 =	*		-68 _ -69 _ -70 _ -71 _	Roducing more water
-70			-72 - -73 - -74 - -75 -	Concluye chip of blacke volcanie and opidate in per in gize. (chips)
-76 - -77 - -78 - -79 - -80 -			-76 <u>-</u> -77 <u>-</u> -78 <u>-</u>	Slight Warker colored cuting.
-81 <u>-</u>			-79 -80 -81	
-82 -83 -84			-82 <u>-</u> -83 <u>-</u> -84 <u>-</u>	Slightly redder colored
	PICHN	DNEER BELGRADE, MONTANA 59714 (406) 388-8578		ENT: DRESS: DNE NUMBER:

1 1 1 1 1 1 1	CT NA	ME: Section 35		1 Dril	I F	lol	e N	10.2060 PAGE 5 OF
DATE	START	ED/FINISHED: 10-24/10 - 26-12		DRILLE		0.577	Axia	2001
OGGE	D BY:	JIZ /		DRILL			D	K
		RFACE ELEVATION:		HOLE I				1/6_
BOREL	OLE L	OCATION:		HAMME	R TY	PE:		
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	IVE NISTLIRRED AW		RECOVERY (%)	
픱	8	MATERIAL DESCRIPTION	呂	DEPTH	N N	8	핆	REMARKS
X = X = X = X = X = X = X = X = X = X =			29 -1 -3	g#15				producing i the gullmin stillin vokanics, vokanis aremuch less weathered prepartion of clay pieces is much smaller saturated clay growl, ships of arguilte and vokanics.
8 6 7 E			- 5 - 5 - 7		m			
8 10 1/			- 8 = - 6 = -10 =	时的				producing ~ <3001/min stillin volcaines, trocanics are less weathered, still some cloy thangh. chips are grown of angulite and volcanics
1/2			-12 -15 -14					Lacurater production, ~ < 3 gal min. Volcanies and avgilling, Chips are volcanier and avgillite
1/5 1/7 1/8 1		Endhole	-18 -16 -17 -17 -18				3	
1/9 2/0 2/1			-19 -20 -21	×				
		1215 APPLES WAY	ČLIEN ADDR		1.0			

	AME: Section 35 TED/FINISHED: 10-29-12			I Но		No. 208T PAGE _L_ OF				
LOGGED BY	: JR		DRILLER DRILL T	YPF:	D12.					
	URFACE ELEVATION:		HOLE DIAMETER: 4/2							
BOREHOLE	LOCATION:		HAMMER TYPE:							
DEPTH (FT) GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	DEPTH (FT)	SAMPLE NO. DEPTH	DRIVE UNDISTURBED WE BULK	RECOVERY (%)	REMARKS				
1=	spanest Riddish brown sandy day	-1-				Cuting are worst, but bowing lots of dust.				
2 3 4		- 2 = - 3 = - 4 =	B#1			blewary lets of dust.				
4	Most Reddesh brown sundy closs w/g melke thed plast	- 5 - - 6 - - 7 - - 8 - - 8 - -	3F2			white dust w/ cathings likely callies				
	moist Reddish brown sandy closy (25 med plost	- 9 = -10 = -11 = -12 =	343		1					
3 - 4 - 5 - 5 -		-13 -14 -15 -16	51.2	1						
# Vr		-17 -18 -19				PHO 3 crun 23-18 Sand 23-18 Sand 18-0 Bent. 18-0 Bent.				
	End Holl at 23"	-20 <u>-</u> -21-				18-0 Bent.				
PI	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578	ADDRES								

ON IE	CT NAM	ME: Sechon 35	-	Dril	1 1	Hol	e N	NO. 200 PAGE _ OF A				
ATE	STARTE	D/FINISHED: 10-26-12		DRILLER: AXIS								
OGGED BY: JC					DRILL TYPE: DK							
ROUND SURFACE ELEVATION: OREHOLE LOCATION:				HOLE DIAMETER: 41/2 HAMMER TYPE: Auto 140								
JREF	HOLE LO	OCATION:		-	_		Afr	to 140				
DEFIN (FI)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH	0100	UNDISTURBED 331	RECOVERY (%)	REMARKS				
-	ال		-			\Box						
1	10.	wet/Setoveted lean closs wy ground (Ch) medium, med plast welf saturated reddish brown sandy rean class w/ ground, med plast, med stiff weddish brown sandy lean class w/ ground, med plast, med weddish brown sandy lean class w/ ground, med plast, medium; weddish brown, sandylean class w/ ground, med plast, medium shift	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	50年	1011125619		18/8	Spoon for Water on sutside spooned water or outside spooned water or outside lean closely groved cathings				
6 <u></u>		S The same was and the	-16 -17 -18	ST.	100	1		End Son day 10-29-12				
9 -	1	most ordaigh brown sandy branday wil grandly med plant, med plant, med stiff			V	A	46-	Cutting: Sandy closus				
1		wegetel (CL), med plast, medstift 0	-21-	5/2		4	452					
- 1			CLIEN	IT.	-	П	1.50					
1215 ADDIEG WAY				IT: ESS:				the state of the s				

200	FOT MAN	r 10 291-12 5 \ 1		Dril	LH	ole N	10.203 PAGE 2 OF _
		ME: 10-29-12 Souha 35		DRILLE		AXQ	TAGE STOP
	ED BY:	P, MB	- "	DRILL	- 40	AT S	
		FACE ELEVATION:	7 - 2	HOLE		TER:	7
BORE	HOLE LO	OCATION:	0	HAMME			
Œ	907 JI	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented	(FT)	SAMPLE NO. DEPTH	CURBED CAWS		
DEPTH	GRAPHIC	is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	DEPTH	NO.	DRIVE	BULK RECOVERY	REMARKS
-	1 1 1	The same of the sa		OLI 111	9		4.
22=	CL	Most, reddish brown sandy closer/ sevel/CG, Stat, med plant.	-22 -	55th 5	100	16/18	Cost 5 (20.7-22,3)
23-			-23-			17	
- 1	1.57					V	Cathings reddish brown sundy
24_	75 1		-24-	p#3		1	clayersonel.
25-	Doulder		25				blowing alust at 24.9
	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		-25_				boulder, gte the custings out of boulder of 250
26			-26-	175	11/19		Dutet boulder at 251
27-			27			Y	Intermixed day and
120			-27_	BAH	10	A	Intermixed day and colololes, clay sounding
28 <u> </u>	16		-28-	0			Just . to blowing
				Line			quevel. Sandy cloyal
29_			-29-	194			grovel.
30-	GR-GL	(1 14 1 17 11 11	-30-		1		
	Av2:110	Suboroted pourly sorted graded gravel w/ show (GP-GC) Angular, Angulite	_	1146	72	16/12	
31_	Arzilda Arzilda		-31_	55th	7	118	
72		Saturated poorly graded grovel as	-32 ⁻	-	6	11 11	2" HEAVE ON TUP SP;
32 -		Cloz Angular, Argillet	-32	5年7	12	9/10"	2
33-	Argilid		-33-	1	18	7	
(5) H	P. 7	Agraillet, Address love, filled	1	3A5		M	water to 16 in
34_		viens a/gtz.	-34_	(34)	1	1112	casing an bitretire
35-	19/19		-35-	(A)	2	A	preducing a 4 galfinar cuttings a Argulite chips,
			33_			1)	Postly gredel grovel w/ Sand
36-			-36			1100	Plack, sabrated
7.7	1320		/==	WIL WI		The state of	Harddrilling, Angular
3/-			-37_	C#4.	Gr A	1000	hard chips
38-			-38-			10	Cutings 1 Black, grow
31 32 333 334 335 336 337 338	144 10		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	WYS!			Sand w/gravel.
			-39	S. Carlot	S 1		
41=		End of hole	-40 <u>=</u>	- 1	100		
41-	17.13	O To cover HO 35	-41	E.	15	4.	
	711	Bent/Blank 35-0.	10,00	3	7		The same of the sa
42-	The state	Bentistanti	-42-	200	1	MATERIA	Mill Property
		1215 APPLES WAY	CLIEN	the first control of	17.19.0		
	Di	BELGRADE, MONTANA 59714	ADDR	ESS:	-		
	TECH	VIVEEK VICAL SERVICES, INC. (406) 388-8578	PHON		W 1 1 2 2		All

ES	TARTE	ME: UBMC D/FINISHED: 40/24/12 /		DRILLEI	1.7	-	X13	10. 203 B PAGE OF			
GED	BY:	MB		DRILL	_	E:	MAURY	1 K.P.W.			
		FACE ELEVATION:		HOLE I							
REHO	DLE LC	CATION:		HAMMER TYPE: Obe V							
	907	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface	(SAI	RBED	(%)				
1	GRAPHIC I	conditions may differ at other localions and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	DEPTH (FT)	SAMPLE NO. DEPTH	IVE	DISTURE	RECOVERY				
	and the second	MATERIAL DESCRIPTION	E	DEPTH	PR	SS	RE	REMARKS			
- 53	PSOIL	MOIST: V. DARN BROWN; NO HCL. MED DL GRAS ROOTS		2/2	X		1000	4-14-27			
		CLAYEY SAND (SC) W/ SOB AND CRAVEL, DAMP; REDUCH EPON	- 2 <u>-</u>	SPT 2	V		3/8	20-25-19 HIGHER GRAVES & FORM			
	7	MINOSTAD IS WITH NO HELL	- 3 <u>-</u> - 4 -	A Thomas	1.3			1.5 - 3.0'			
200	*		- 5 -	5P7 3	11.						
3	SW	WELL GRADED SAND W/ SUB (IN GRAVELY MOIST; BROWN; NP CORRECT	1 1	276"	107		av.	501 U No.			
	4		- 8 <u>=</u>	11/2	198		1/1/18	91/21 REC,			
4	pr.	EANSY LEAN CLAY WY GENTLY	- 9 -				W 114				
*	a	MED PL	-10 <u>-</u> -11 <u>-</u>	507/ 501/	28						
-			-12 <u>-</u>	- 11	700	1					
		×	-13- -14-		*(_						
		WELL GRADED SAND LY CLAY &	-15 <u>-</u>	SPT Y	50	- 105	.21	8:16;50			
5	500	GRAVELS, MOIST REDDISH BROWN,	-16 -17	21/2 587 B	26万円	£,	19/18				
		NO PL	-18	1)/1	17		1/18				
		SANDY LEAN CLAY (CL) WY GRAN	-19 -					BIZINS OF RUN IS CLAVER			
	e Capi	MED PL MOIST, REDOISH BROW	-20 -21	12" Shollo Y		X	19/0"	A STATE OF THE STA			
1215 ADDI SS WAY					ENT:						
	DI	ONEER (406) 388-8578	ADDE	RESS:	_	1					

Drill Hole No. 708 B PAGE 2 OF 2 Copic 36 PROJECT NAME: STRY DATE STARTED/FINISHED: MI DRILLER: LOGGED BY: DRILL TYPE: GROUND SURFACE ELEVATION: HOLE DIAMETER: BOREHOLE LOCATION: HAMMER TYPE: This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. SAMPLES DRIVE UNDISTURBED BULK 8 200 E RECOVERY DEPTH DEPTH MATERIAL DESCRIPTION REMARKS SANDY LEAN CHAY -Y GRAVEL CON PERTECHT 2.25, 5, 5, 5P79 18/12 MOIST, REEDISH BROWN; WICH PL. 11/2 22-22-MO HCL 23-23-24-9108:30 25,25 TO 25.5 NIGHER GUE ANG 25-25-54710 9:44:15 13/18 CONTENT: SAMPLE IS WED 26-21/2" 26-17 MOIST BELOW GRAVEL LAYER SPT 11 27-27-4/18 11/2 28--28-GRAVELLY CLAY! WET , PEDDISA 21 BROWN , MED PLI SUB ANG 29-29-GRAVETLY CLAY W/ LORCANKS VOLCHINGS GREENISH IN COLOR 30-30-SPT 172 24 ONLY APPARENT IN SEAMS HARD, STOPED SAT DUE 17/2" 1/2. 4164 BL ARGILITE , REDDISH BROWN ; DAMP 31-31-32-32-33 DRILLIND AP614176 38" FLYING HARD 34-34-REDDISH BROWN 35-35-NO SPT 10:44:31) MERL 36-36-SURGEN PLYING ROCK 37-37-FRARMENTS -38-38 器 39-39-40-40-BOY@ 40' 41-42-42-CLIENT: 1215 APPLES WAY ADDRESS: **BELGRADE, MONTANA 59714** (406) 388-8578 TECHNICAL SERVICES, INC. PHONE NUMBER:

LOGGED BY:			DRILL TYPE:							
	OUND SURFACE ELEVATION: DREHOLE LOCATION:			HOLE DIAMETER: HAMMER TYPE:						
STILL YOUR DO	the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface			SAMPL	ES	ERY (%)				
DEPTH (F	MATERIAL DESCRIPTION	DEPTH	SAMPLE NO. DEPTH	DRIVE	BULK	RECOVERY	REMARKS			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 10 11 12 13 14 15 16 17 18 9 10 10 10 10 10 10 10	REDDISH BROWN, MOIST, SANDY CLAY SOME REDDISH BROWN, MOIST SANDY CLAY SOME SANDY BRAWN BELGRADE MONTANA 59714	- 1 -	VT:				ABOUT 5' NORTH OF MW 203'B BURNER THROUGH 4/6 SAMPLING CUTTINGS, GETTI BENTONNTE CUTTINGS			

535 SB-207

TE	STARTE	ME: UMBC SEC 35		DRILLER: 14-715									
GGE	D BY:	MR		DRILL	7.7			×					
		FACE ELEVATION: DCATION:		HOLE									
\LI				HAMMER TYPE:									
	GRAPHIC LOG	This tog is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		URBED	_	D.C.R.L.					
	S	MATERIAL DESCRIPTION	핑		DR	28	RE	REMARKS					
-		SANDY SILT WY CREARIES	1 ==	50T	2		14/10	14/20140					
=		GRAVELLY CLAY; MOIST; REDDISH	- 1 =	Zaf 40	14								
=		BROWN MED PL	- 2 =		17		9/18"						
Ξ		GROWERS ARE SOBAMS	=	11/2"	20		116						
=			- 3 -		1	1							
=		6	- 4 =	BOLK	1	Y		LAURUEL IN SO					
2			- 5 -			\triangle		14:14:35 70					
	- 3			SPI	123		15/18	14:35:05					
=			- 6 -	21/21	13								
			- 7 -	SPT	5		16/18						
			- 8 -	11/2"	9		10	- DOSTY CUTTINGS					
=					,			-00317 601770065					
Ξ			- 9 -				1						
Ξ			-10-		-			14(42) 50					
		VOLCHNICS	-	3/37	21			- SAMPLER STUCK					
_		HIGHLY WEATHEREN DOV.	-11-	21/2	50	15"		- SHITTER STOCK					
Ξ		GREENIGH GRAY IN PIRT CTRIMI	-12	SP7	15		6/						
=	- 2	Some PURPLE	-13	1/2"	7		/12	_DUSTY CUTTING					
-		LABREAKS DOWN TO SILTY SAUD	-					DAMB, BROWN					
	85	4 CL	-14-			1							
			-15-	19 207	-	-	-	15:43:00					
-		i vi	10	1/2 SPT	45	-		~ (C.C. 이 마음(C.C. 이 작업 :					
			-16-					DOSTY CUTTINGS					
Ξ			-17				,	A					
Ξ		[] [[] [] [] [] [] [] [] [] [-18-				1						
		P (
\rightarrow	4	200	-19-					7 ~10 MIN TO GO 71+1					
			-20		-			16:05 & ROCK BOULDERS 19-					
1=	٠.	Section 1	21		1		4	16:06:40					
			-21-	NT.		H.	1						
100		1215 APPLES WAY BELGRADE, MONTANA 59714	A	RESS:	v		-	Yang Qirina and Xi					
	PI	ONEER (406) 388-8578	1022	NE NUM									

	STARTE	ME: SEC 36 D/FINISHED: FLANSH 10/81 5 10.1/5	n 20	Drill Hole No. 20 7 PAGE OF _						
	D BY:		i.	DRILLER DRILL 1			773	4		
GROUI	ND SUR	FACE ELEVATION:		HOLE D	MAIC	ETE				
BOREL	HOLE LC	OCATION:	100	HAMME	R T	YPE:				
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH		UNDISTURBED TO BULK		REMARKS		
100		VOLCORAGE CONT.	-			.31				
22=		GRAYIBU MATMIX	-22			1				
23		SAMPLE BASAGE DOLL TO G	-23-		3		(- 1)			
							1			
24			24				A			
25	7.7		-25	11	. 1	1		16:25:20		
		N. IV		192507	16		10/12"	7:46:00 STOP FUR DAY UN		
26=	9 8		-26	-	1000	7-	716	-D RESUMB- 8/30/12		
27=			-27-		1.3		1 1	AUGGNETIUG ON 8/8/17		
28			1 = 7		i ia		1	DRILLER WOTER A		
28=			-28			. 1	1	C. LITTLE BIT OF WATER		
29			-29-			1	100	COCCUECTED IN HOUSE ON		
30	135						49.15	~8:00		
50=		MEI	-30-	1 12	18	-	9/9	8:39:30		
31	9.1	BUSTY YELLOW/ BROWN MATRIX	-31-	SPT	3/2	1/a		Lo Boncine on Doc		
32-		POETY VELLOW / BROWN MINTRIX	-32					DRILL OFFICES THROUGH		
		NO HCL				1/		LONG INDICATION OF		
33			-33	1780	П	X	, -1. a.	DRILL CUTTINGS THROUGH		
34-	11/1		-34-			1		SAMPLER		
1			1 500	3 3 4 3 W			LACT I	1.24		
35		" JATCS MARD	-35-	17440		-	27	8:57:30		
36-	4	BOH @ 35.25	70	IV any			13			
16. 4			-36	1/25PT	1					
37=			-37		1	1		-30/211		
38	M.	BUILD WELL	-38				1 1 1 1			
2 8 1340		# 71 PVC	1		1					
39		SILETTED FROM 35-30	-/39 <u>-</u>		4					
39 40		\$AND 35 - 28	-40-	A W		N/	, .			
		BENTONITE 0-28	1 4 5		3					
41=		OF THE STATE OF TH	-41		*					
41 42	\$13.5°	DPOLLED UP 26" W	142) (1)	516	3 3	N. C	0		
			CLIE	OT:	1	T. 10. 1	110	Late 4		
		ADD ED1215 APRLES WAY O BELGRADE, MONTANA 59714	ADD		5	10				
1	111	ONBER (406) 388-8578	PHONE NUMBER:							

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PROJE	CT NAM	/E:		Uril		H	016	9 N	10.217 PAGE 1_ OF				
	11 W 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	D/FINISHED:	-	DRILLE		i.							
	D BY:		- 1/	DRILL TYPE: HOLE DIAMETER:									
		FACE ELEVATION:											
BOREL	OLE LO	OCATION:	1	HAMMER TYPE:									
рертн (гт)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		DISTURBED		RECOVERY (%)					
Charles and the Control of the Contr	88	MATERIAL DESCRIPTION	DEI	DEPTH	DR	N	B	RE	REMARKS				
1 =		SANDY CLAY BY BRAVEL ; DAMP;	- 1 <u></u>	21/2 SPT	5 7 5			8/19	26 (2)				
2 =			- 2 <u>=</u>	172°	121		2	3/18"					
3 = 4 =	10 . A		- 3 <u>=</u>		16	-	V						
4	1 1	HIGHLY WEATHERED ARGILITE	- 4 =	CUTTINE			1		11105:05				
5 =		SANDY CLAY LY GRAVET ANGUER R GRAVEL HAS RUST STAIN ON GUAF	- 6 -	Z'Z"	*********		*	11 1					
7 =	is C	GRAVEL HAS ROST STAIN ON GVAF	- 7 =	11/2581	77			0/18	*				
3 =	£, v	WHEN BOOKE APART YELLOW INCOLON !	-8=		7	- Toward							
9 =	# 1°		- 9 <u>-</u>				70		H;29,00				
0=		GRAVELY CLAY W/ SAND; BROWN, MOIST; MED PL; SUB POUNDED	- 9 -10 -11	21/2"	931				SAME STRUCTURE AS				
2=	a 0		-12-	11/2,	57			71B	COMPLETLY WEST-THERED,				
3=			-13	7	10	-							
5		ų.	-14- -15-	SHELBY		1		74.41	11:58:35				
6=		MOIST, REDDISH BROWN	-16	SPT	-	X	\	7/18	12:24:04 — TUBE BENTY OBLONG MO				
7=		8000	-17	1/2"	131412	-	-	110	HIGH ROUR CONTENT				
8 <u> </u>		1 () 1 () () () () () () () ()	-18- -19-	4				, 5°4					
ō		PIEZO # 18 (" SAND (8-15 STICKUP (5-17) STICKUP (5-17)	-20	70	Q2	W 14	PL		SKIAPISA SPTTIED H				
21=			-21-	NT:					SKIAPES STATES OF STATES OF SKIAPES				
	PI	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578 MICAL SERVICES, INC.	ADDI	RESS: NE NUM		. X ()							

LOGGED BY	AME: IED/FINISHED: IRFACE ELEVATION:	DRILLER: DRILL TYPE: HOLE DIAMETER:						
BOREHOLE		, i	HAMMER					
DEPTH (FT) GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change of this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	DEPTH (FT)	SAMPLE NO. DEPTH	DRIVE UNDISTURBED THE		REMARKS		
-22 -23 -24	DRILL CUTTINGS ARE & GRAVERY CLAY WOLST MOLST	23				DRILLER NOTES OF HOCKS & 21		
-25 -26 -27 -28	GRAVELLY CLAY, MOIST, REDDISH BROWN; MED AL (ROUS TO VI6" WO ADDING 420) STIFF NO STRUCTURE TO	-25 -26 -27 -27	91251 1/2" 50T	X 3 5	911	13:20:00 POCKET PEN = 0.25, 0,5 8		
-29 -30	SOIL AS MOTED AT HIGHER DEPTHS. DIVE SUBROUNDED PURPOLLISH DEPTHS	-29 -30 -31	11/2 SP7	4-158	13/18	15:30 SON ROC 13:57:/0.26 =PP		
-32 VOL	MOIST; GRAY TO BROWNISH YELLOW; DANK MED TO HIGH PL; SOME. SUB AND GRAVEL FRAGMENTS.	-32 -33 -34				-D CUTTINGS CHANGE		
-35 -36	MOIST TO WET; DARK GRAY BRAKES DOWN TO SANDY CURY MED PL; SOME ANG GRAVELA	-35 -36	11/2 SPT	8 14 4/11	%	2141135		
-37 -38 VOV	PHARD VOLCANIC ROCK	-37		*	* * * * * * * * * * * * * * * * * * * *			
-41 -42	BOH @ 40' SCREEN 35:40', SAND 33-40', SANT. 0=33' STICKUP 44"	40				HISTION DRILLERY LD TO ROCE FOR SIPT.		
10	A24E ADDITIONAL		IT: ESS:	* **		**************************************		

MW-201B

	STARTE	ME: SE 35 D/FINISHED: N/V/IZ MIS	1,00	DRILLER: ASCAS							
	A second second	FACE ELEVATION:		HOLE D	2 10 7		FR-	7.1			
		OCATION:	- M.	HAMMER TYPE:							
DEFIN (FI)	GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION	ОЕРТН (FT)	SAMPLE NO. DEPTH	3	UNDISTURBED	1	RECOVERY (%)	TMW LOCATED BETWEEN ACLESS ROADEL SLASH -		
1 =	TOPIL	TOP SOIL SANDY SILT MANNAMAN WAS SOME GRAVELS; LOW PL' DARK BROWN W/ TRACE YELLOW	+ 1 =	SPT	781			1/8	10:31:50		
2 = 3 = 4 =		DARK BROWN OF TRACE YELDING	- 2 <u>-</u> - 3 <u>-</u>	172 5PT	100 000			7/0			
5 =	TILL	SANDY CLAY (C) GEAVEL, MOIST, READISH BROWN, MED PL,	- 4 - 5 =	CUTTING	6	\h/\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		The second second	10.140 lod 10156:55		
6 = 7 =		GRAVEL CONTENT DECREASE	- 6 <u>-</u>	LINE'S	2000		1	5/18	ECOVERED 2 RASS LA		
3 = = = = = = = = = = = = = = = = = = =			- 8 <u>-</u>	11/2	22			12/18			
0 =			- 9 <u>-</u> -10 <u>-</u>	SHELBY	AC (AC	V		membranica proprieta de la companya del la companya de la companya	11:01:30 " CRUM PLED ON CH		
1=	12.2%	Just	-11= -12=	11/2 SPT	46	Δ	100	11/18	_ 10\frac{1}{2}2\frac{1}{2}\text{2}		
3= 4=		CLAYEY, F. GRAIN SAND, MED PL', 100 ARMEN WET (W/GRAVEL OKCASIONAL LAYERS OF	-13 -14		1				TO SPTS. END CRUMPLED (PUSHED 2") - NO RECOVER		
5=		PODELY GRADED SAND	-15	21/2	9		1	14/10	12:09:30		
6 <u>-</u> 7 <u>-</u>	13.5		-16 -17	3PT	1312 58		10	13/18			
8	e (Essis	GRAVELS & CORNELS (WET)	-18	507	17	14 0 0 0		110	LYLE STATED WATER SEALERD		
0=		CLAMEY, SANDY, GRAVEL, WOT, REDDICH BROWN; LOWEL	-20 -	2/2	18	170		13/18	OFF @ 19		
1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578			-21- CLIE ADDI	SPT	42		÷ .	118			
			46±	NE NUM	BEI	?:					

MW-201B

PROJI	ECT NAM	ME: UBMC SEC 35	7 4	Dril	10	Но	le N	10. PAGE 2 OF		
DATE	STARTE	D/FINISHED: 11/1/12	3.1	DRILLER			assis _			
		FACE ELEVATION:	11/2	DRILL	4 4 -	2-	p.			
		OCATION:	13.1	HOLE DIAMETER: HAMMER TYPE:						
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	- 1	NDISTURBED 3	8	272 SF7 (SEE PS I)		
700	ဗ	MATERIAL DESCRIPTION	٥	DEPTH	0	3 m	8	REMARKS		
22 23 23		SILTY SAME W/ GRAVEL, f. GRAM. WET; REBUGH BROWN;	7 ²² -23	17/z 607	10 9		3/18			
24	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	7 2 3 - 3 - 3	_24=	1	8.0			(8)		
	3	HIGHLY WEATHERED ARGENTE		W				~18:05		
25-	4 0 000	Growsany -> Gravery Chy W	-25-	2/2	13		18/18	V13,41		
26	1 3	HIGHLY WEATHERED ARGILLIE SECONDARY -> GRAVERY CLAY WY SMAND, REDDIN BROWN; MOIS? GRAVERS AME SUB ANSWERS 9	-26	SPT	27	1	7/8			
25 26 27 27 28		GRAVERS ARE SUB ANSULARL 9	-27-	1/2	9	- 1	13/18	7 27-28'		
20		PURPLE VERY STIFF	-28	SPT	13		1/18	LYLE NOTES CLAY		
20-	1. 1.1		-20		-			3		
29_			-29_				All			
30=	100		30	1111111	0	-		Salar in and		
30 31 32 33		VERY STIFF	-31-	11/2" 507	9	. \	18/	14;25		
			17		13	- \	110	SPOON IS WET BOT SAMPLE IS ONLY		
32_			-32		3			BOT SAMPLE IS ONLY MOIST WHEN BROW		
33			-33		3			LOMAY WEED TO		
34-			-34-					BAL PICZO BERZ		
-			-				10.75	14148 READING		
35	1 - 1 - 5		-35-	. ·		CANADIST OF STA		14:58 NO SPT		
36_		BEDTON	-36-							
36 37			-37				1,500			
38			-38-				ne.			
-	100			1 45		**				
39_	1019		-39				100			
40=	to do		-40				-	15:21 - TO HARTO FOR SPT		
-41-	the He		41		1		1	13.		
1 100	4 . 4				100	i i				
-42-	1 1 0 ap		-42-	7-1-5			1			
7		1215 APPLES WAY	CLIE	NT: RESS:		P 11				
, the	PIONEER BELGRADE, MONTANA 59714 (406) 388-8578		10.		inc.	an in				
	1 TECHNICAL SERVICES, INC.			NE NUM	RF	(:				

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JECT NAME:				Drill Hole No. PAGE 3_ OF							
STARTE											
	FACE ELEVATION-										
				SAMPLES							
APHIC LOG	Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	РТН (FT)	SAMPLE NO.	SIVE	ADISTURBED JLK	COVERY (%)					
GR	MATERIAL DESCRIPTION	30	DEPTH	DR	등 교	RE	REMARKS				
	BED ROCK CONST	-43 -44					W.				
X	Sanda IIII	-45 <u>-</u>	1								
	BOH/@ HIM. 44	-46 <u>-</u>	1								
	ali Dir PIEZO	-47 <u>-</u>									
	5' SCREEN FROM 39' TO 44'										
	7' SAND FROM 37' TO 44'	-50									
	BENTONIL	-51									
		-52					1 1				
		-									
		-55									
		-56									
		-57									
		-60									
		-61									
		-62		14		,3	*				
	1215 APPLES WAY	CLIE	14.	1	1						
D	BELGRADE, MONTANA 59714	ADD	RESS:		-						
	STARTE D BY: D SUR OLE LO	STARTED/FINISHED: D BY: D SURFACE ELEVATION: DUE LOCATION: This log is part of a report prepared by Piedmont Engineering, inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The delap presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION BED ROCK BOH PIEZO 5' GREEN FROM 39' TO 44' 7' SAND FROM 37' TO 44' BENTONITE TO SUMFACE BENTONITE TO SUMFACE	STARTED/FINISHED: D. BY: D. SURFACE ELEVATION: DILE LOCATION: DISTINATION: DISTINATION: DISTINATION: DISTINATION: DIST	DRILLEI STARTED/FINISHED: D BY: D SURFACE ELEVATION: DILL LOCATION: HOLE I DILL LOCATION: HAMME DILL LOCATION: HAMME This log is port of a report prepared by Piedmont Engineering, inc. for this project and should be read with the property. This summary applies only of the location of the boring and at the time of the drilling. Subsurface this location with the peasage of time. The dole presented is a simplification of actual conditions measurement. MATERIAL DESCRIPTION BON PROW PIEZO The PUC PIEZO THE STARTED FROM 37 TO 444 TO SAND FROM 37 TO 444	STARTED/FINISHED: D. BY: D. SURFACE ELEVATION: DILE LOCATION: DILE LOCATION: This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only of the location of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the drilling. Subsurface of the baring and all the times of the baring and all the times of the baring and the times of the drilling. Subsurface of the baring and the times of the baring and times and the times of the	STARTED FINISHED: D. BY: D. SURFACE ELEVATION: D. BY: D. SURFACE ELEVATION: DIFF CONTROL TYPE: D. SURFACE ELEVATION: DIFF CONTROL TYPE: D. SURFACE ELEVATION: DIFF CONTROL TYPE: D. SURFACE ELEVATION: D. BY: D. SURFACE ELEVATION: D. BY: D. SURFACE ELEVATION: D. BY: D. BULL TYPE: HOLE DIAMETER HAMMER TYPE: SAMPLE SAMPLE HOLE DIAMETER HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMMER TYPE: HAMMER TYPE: HOLE DIAMETER HAMMER TYPE: HAMME	STARTED/FINISHED: D. BY: D. SURFACE FLEVATION: DIEL LOCATION: DIEL TYPE: DAMMETR: HOLE DIAMSTER: HAMMER TYPE: SAMPLES SA				

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		ME: UBMC SEC 35	ų,	DRILLER	-		e N	O. PAGE OF			
	D BY:	IM B		DRILL 1			N-K				
		FACE ELEVATION:		HOLE D							
OREL	OLE LO	OCATION:		HAMMER TYPE: STADLEY							
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	INE STURBED A	BULK	RECOVERY (%)				
2	.8	MATERIAL DESCRIPTION	DE	DEPTH	8 5	8	RE	REMARKS			
=	TOP SOIL	TOP SOIL (SANGY SILT BY TIRME SUB ANG GRAV V BARK BROWN) MOIST, ORGANIC ROOTS		21/2		V	18/	11:55:50			
î =	GC		-1-	SPT		Λ	13/18				
2 =		GRAVELLY CLAY WYSAND (GC); DAMP; MED PL; BROWN; GRAVELS ARE SOBROUNDED; NO HCL	-2=	11/2 SPT	18 17 16		4/18	- POUND GRAVEL/CORDEL (FREGMENTS IN SPOON)			
4 =			- 4 <u>-</u>			X	- W	LINERS			
6			- 5 - - 6 -	2½ (SPT (14 16 222 3	1	15/18	12:20:50 BRASS LINER			
7 =			- 7 <u>-</u> - 8 <u>-</u>	11/2 SPT	15	-	3/18	> TOP ON SLUFF IN HOLE			
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		VOLCANIC BEDIZOCK; MOIST, PIZIMARLY DARN BROWNIH GRAY W/ FREQUENT SOMES OF RUSTY YELOW; PURPLE LDBREAKS DOWN TO A FINE GTAIN GURYEY GAND LOW PL	- 9 10 11 12 13		31 /2 30 /2	Y	7 1418 17/8	/LINERY 12:24130 12:53:30 - GOOD BRASS TUBE SAME			
4 -			-14 -15	\V <u>\</u> 68-1	12 16 22	X	14/18	HARBER BRUCING LARGER ROCK FRAGMER 13:03:35			
7 8 9			-17 -18 -18			V					
9 = 20 = 21 = 21 = 21		LIGHT GREENSH GRAN WY PURAL DAMP	-19 -20 -21	1 1/2	15 21 33		18/18	13:33:20 13:57:15			
-	D	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 388-8578	CLIE		4						

PROJE	CT NAM	ΛΕ:	10	Dril		Hol	e N	10. 216 PAGE 3 OF 2				
		D/FINISHED:		DRILLER								
	D BY:	FACE ELEVATION.	-	DRILL								
		FACE ELEVATION: DOCATION:		HOLE I	AAIS R T	YPE.	•					
DOKL	IOLL L				HAMMER TYPE: SAMPLES							
рертн (гт)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	DEPTH (FT)	SAMPLE NO. DEPTH			RECOVERY (%)					
-		畄	DEPTH	DR	28	R	REMARKS					
-22 -23 -24 -25 -26 -27 -28 -30 -31 -32 -33		VERY HARD; DUSTY CUTTINUS	-22 -23 -24		*			NOMIN FOR RESID				
24	- 10							LYCE SHATCHING TO OPEN HOLE HAMEN				
25								OPEN HOLE HAMEN				
-26	f.	Ir	-26-									
-2/-			-27									
-28			-28-				-					
29		,	-29-					N) SPT				
-30	eriji Lite		-30 <u>-</u>					7				
-31_			-31-					e 2				
-32			-32			, ,						
-33 <u>-</u> -34			-33- -34-					N Marine A				
			35					Y				
-35	ý.	BOH @ 35'	-36-			7	y .					
-36 -37 -38		SB-216 A PIEZO 41 SCREEN 25-35	-		-							
-3/	BU	36" SAND 73-35"	-37 <u>-</u>					A*				
-38		3	-38-			Į.	,					
29		PIEZO #2 SCREEN 10-15	-39									
-40-	1 4	801 @ STICKUP 41"	-40- -									
-40 -41 -42		18.03 STICKUP 41"	41	3								
-42-	4	1.25	-42-		1	Ш						
	5	1215 APPLES WAY BELGRADE, MONTANA 59714	CLIE	NT: RESS:								
212	TECH	VIVEER (406) 388-8578 (NICAL SERVICES, INC.	PHO	NE NUM	BEI	R:						

MW-201 T 11/2/12

LO NOT LOGGED, WE'NT TO TREATMENT PLANT TO GET SUPPLIES WHILE LYLE DRILLED.

LD MB' WEST OF MW-201B

LP 2" PUC MONITORING WELL

DRILLED 24

SCREEN 14-24

SAND 12 - 24

BENT 0-12'

STICKUP = 39" = MP.

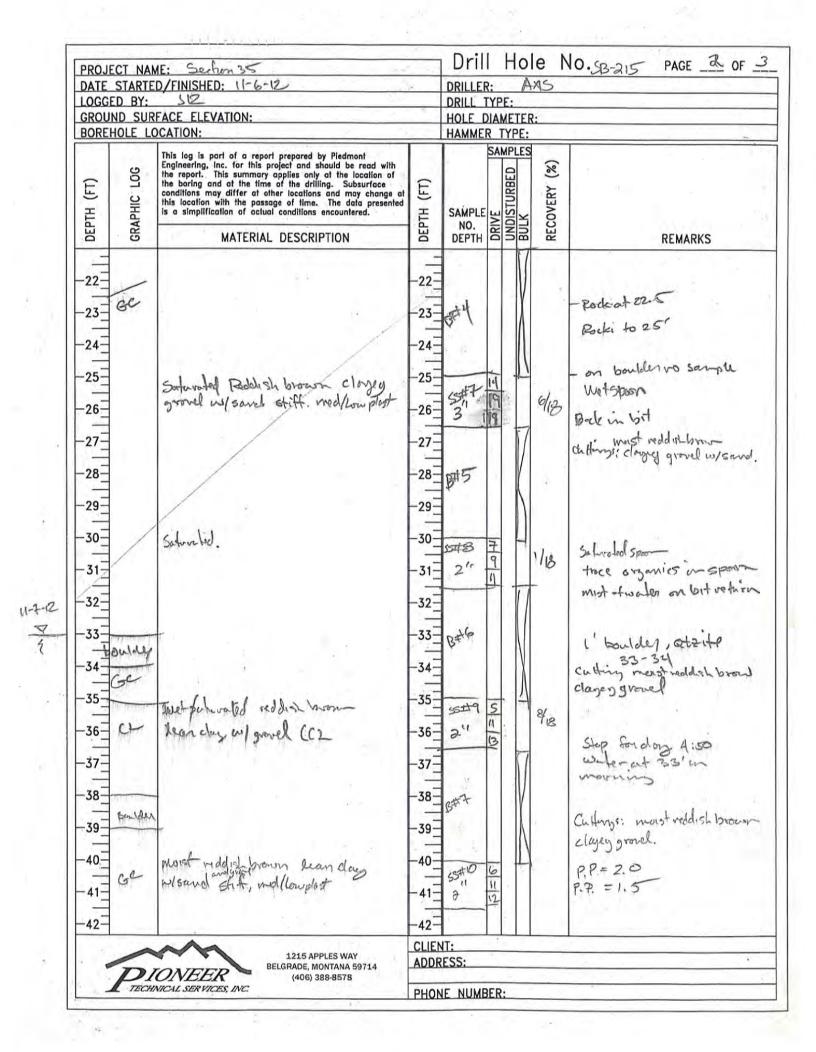
GW = 12.88" FROM MP

OJECT	NAME: Section 35		Drill	Но	le 1	NO. 213 PAGE OF .						
	RTED/FINISHED: 11-5-12		DRILLER: Axis									
GGED I	X: JE		DRILL T			>.¥.						
	SURFACE ELEVATION:		HOLE DIAMETER:									
REHOLI	LOCATION:		HAMMER TYPE: 144 Ando									
oo ondra	conditions may differ at other locations and may change at	ОЕРТН (FT)	SAMPLE NO.	UNDISTURBED AWS	The second second	REMARKS						
- 01			3"	0		KEMAKKS						
	Dry whitch put silty sandy grown (sm) Low plast Stiff.	- 1 - 2 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3	35#2 35#2 21	121016	18/18							
- ch	Morest reddish brown lean clongry	-4-	<u>इन्स्</u>	5	147	Cultures are dusty						
		- 6 -	3"	4	14/18	3.20.10.70.						
	moist reddish brown lean close w/ sand and gravel. st. ff. med plast small sand loser at 7.75%, a 14" wide	- 7 <u>-</u> - 8 <u>-</u> - 9 <u>-</u>	2"	100	14/18	P.P. 2.5						
	moist reddish brown lean close w/s revel stift, nedplost on worst reddish brown bean down w/s road (Ch), Stift med, plost.	-10 -11 -12	55#b	X	7/75							
Se		-14	B#1		ì							
3/0/5/0	and sand alsered, now ext	-15 <u>-</u> -16 <u>-</u> -17-	3 2	7	16/8	cosble for oprox						
2000		-18 -19	27 1	4	15/10	P.P. 3.2 P.P. 3.0 Dushy cuttures						
		-20 -21		0	%	couple/boulder at 19/ puton openhas hammen						
	1215 APPLES WAY BELGRADE, MONTANA 59714	The second secon	CLIENT: ADDRESS:									

ROJECT NA	ME: Sochin 35		Drill Hole No. SB-213 PAGE 2 OF 3							
ATE START	ED/FINISHED: 11-5-12		DRILLER	R:	AXI					
OGGED BY:			DRILL			7				
OREHOLE L	RFACE ELEVATION:		HOLE I			_				
OKEHOLE L	AND ADDRESS OF MANAGEMENT AND ADDRESS OF THE PARTY OF THE		I	-	IPLES					
DEPTH (FT) GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		IRBED	RECOVERY (%)	va.stene			
	MATERIAL DESCRIPTION	ä	DEPTH	ō	22	8	REMARKS			
22- 22- 23- 24- 25-		-22 -23 -24 -25					havese boulders. openhole. Cuttings come up I"dia wy reddish lean elay stuck to it.			
22- 23- 24- 25- 26- 27- 28- 29-	moist reddish brown clayery growel up	-26 -27 -27 -28 -29					cultings one bits of clay sand and lean cloy W chips up to 11/2" dia Drill states it will bed . Shouth to get sasing thru. should consider open hole the rest.			
30 CL 31 32 33 33 34 34	Mast yellowish brown lean clay w/srovel. / unvite seconday. Soil. Similato, 208 sust before bedrock	-30 -31 -32 -33 -34	2"	12 12 12 12		r	Does't appear to be weathered vock, look 1,6 till, me trix is day sail granules of uccanises are. Ilite Cuting Change to Parple Moroum Vocambies of 35			
35 36 37 37 38	moist purplish brown, lean clay w	-35 -36 -37 -38	2"	[E/=/6/17]			11-6-12 water at			
-39 cH -40 -41 -42 - 42 - 42 - 42 - 42 - 42 - 42 -	Saturded yellowish brown fet clog up grovel, organics; medium. grovels me n'12 dia Moist perple/gross grand w/clay (oc) werthe volcomis w/argellow chips	-39 -40 -41 -42 -CLIE	ST#2 SHIA	1100	L	8/8	close ore emoint, prope and spenish white, weather ash stone of arguille of its			
	1215 APPLES WAY BELGRADE, MONTANA 59714		RESS:							
P	ONEER (406) 388-8578		Mary A. T.			3				
IL TEC	CHNICAL SERVICES, INC.	PHO	NE NUM	BER	:					

	Drill Hole No. SB-213 PAGE 3 OF 3						
ED/FINISHED: 16-5-12		DRILLER: AXU					
		DRILL TYPE:					
		HOLE DIAMETER: HAMMER TYPE:					
NAME OF THE PARTY	T	SAMPLES					
Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change of this location with the passage of time. The data presente is a simplification of actual conditions encountered.	ОЕРТН (ГТ)	SAMPLE ONIVE BULK REMARKS RECOVERY (%) REMARKS					
	_	- Marine and Art Ar					
End Ade 45'	-43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58 -60 -61	Cutting from hole in STIT 3. had happush Sample than chaeged Casing to stude to blow out w/air Lest 6" stiff. PREPO 46-46 Screen 46-37 Sand - maybourly 37-34.5 benton to					
	-62 -63						
~~	CLIEN	INT:					
IONEER BELGRADE, MONTANA 59714 (406) 388-8578		RESS:					
	RFACE ELEVATION: OCATION: This log is part of a report prepared by Piedmant Engineering, Inc. for this project and should be read with the report. This summary applies only of the location of the boring and at the time of the drilling. Subsurface conditions may differ of other locations and may change of this location with the passage of time. The data presente is a simplification of actual conditions encountered. MATERIAL DESCRIPTION ATERIAL DESCRIPTION 1215 APPLES WAY BELGRADE, MONTANA 59714	RFACE ELEVATION: OCATION: This log is part of a report prepared by Piedmont Engineering, inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered. MATERIAL DESCRIPTION A3. A4. A4. A5. A6. A7. A8. A9. SIMPLIFICATION A1. A1. A2. A3. A4. A4. A5. A6. A7. A8. A9. A9. BELORADA ASSAGE ALERA ADD. A1. BELORADA SISTAR ADD. ADD. A1. BELORADA SISTAR ADD. ADD. A1. ADD.					

DDO IECT NA	ROJECT NAME: Section 55					Drill Hole No. SB-215 PAGE 1 OF 3							
DATE STARTE	D/FINISHED: 11-6-12	- 1	DRILLER		Ax								
LOGGED BY:	76		DRILL 1			DK							
	RFACE ELEVATION:		HOLE D	IAME	TER		1/2						
BOREHOLE L	OCATION:		HAMME	YT S	PE:	An	to 140						
I (FT) :	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	(FT)		TURBED AWAS		/ERY (%)							
DEPTH (I	MATERIAL DESCRIPTION	DEPTH	SAMPLE NO. DEPTH	DRIVE	BULK	RECOVERY	REMARKS						
-1 - 5 - 6 - 7 - 8 10 11	organic Soil, must, roots purkish red dry sandy cloy (Sc) w/ground stiff, med/Low, plost. moist redolph brown pourly graded from w/clay. Very Stiff med plostic clay	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	55#1 35#2 25#2 27	M K1923 1		17/18	Dusty Cuthings, Spoon very hard for retriew Cuthings moist redolish brown powrly grounded grovel wilcloss or closes gravel - drilled coloses four plosts fines Dusty. Cuthings moist monodal sta						
-12- -13- -14- -15- -16- -5C -17- -18- -19- -20- -21-	Marst Edding soud all grovel (SC) medium, Low plast Most wit redd in british dayey sand (SC) wedium, Low dast 1215 APPLES WAY BELGRADE, MONTANA 59714	-12_ -13_ -14_ -15_ -16_ -17_ -18_ -19_ -20_ -21_ CLIEI ADDE	3545 S46	220	560	5/18	spoon is wet pp 2. a PP 2.5 PP 2.5						
PIECE	PIONEER (406) 388-8578 PHO				Jo.								



OJECT NAME: Sechion 35	1	Dril		Ho	le l	NO.53-215 PAGE 3 OF 3
TE STARTED/FINISHED: 11-6-12	E.	DRILLE		Ax	19	
GGED BY:	1	DRILL	41.11		DIK	
OUND SURFACE ELEVATION:		HOLE			S: 4,1	2
REHOLE LOCATION:		HAMME	-		310 71	
This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	D ЕРТН (FT)	SAMPLE NO. DEPTH		NDISTURBED TO		
MATERIAL DESCRIPTION	8	DEPTH	O	2 8	. 2	REMARKS
Moist realitiesh brown classy ground Be very shiff much play	14.	B#8				Cuttings closer grovel most reddist brown. drilling coldoles and cl
Moist realchast brown clayly grand Ge very stiff much play.	-46 -47	55th	16 34		0/18	Third B.L. togsal too
	-48 -49					duillingonz
GC. Very Stiff, hed/burstest	-50 -51 -52	55#8 3"	13 20 23			went to get look and good from with
글이 많은 [화장] 이 그리고	-53 -54					
End Hale	-55 -56 -57	31	12/2/6			P.P. 3.5 P.P. 3.5 P.P. 3.0 End hote
	-58 -59					
	-61 -62				*	
	-63		12		160	The state of the s
	CLIEN.	T:			14.15	
1215 APPLES WAY	ADDRE		100	1 1	4-5-1	A PART OF THE PART
DIONEER (406) 388-8578				N.	614	Control of the Contro
					A 5 TH	

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PPO IFOT A	IAME: Sechin 35		Drill Ho	le N	0.53-212 PAGE 1 OF 3						
DATE STAP	TED/FINISHED: (1-7-12	7.1	DRILLER: Axis								
OGGED BY			DRILL TYPE:								
GROUND S	URFACE ELEVATION:		HOLE DIAMETE	R:	147						
	LOCATION:		HAMMER TYPE:								
DEPTH (FT) GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	DEPTH (FT)	DRIVE UNDISTURBED UNDISTURBED BULK	.RY (%)	REMARKS						
NY ALIENSE			A THE RESERVE OF THE PARTY OF T	100	REMARKS						
-1 5C -2 -3 -4 - 6C -5 -6 -7 -8 -	Dry pratishabets clayers and (s)	1=	S#1 5 12 12 13 12 12 12 12 12 12 12 12 12 12 12 12 12	7/18 1/18	Duoty _						
- 9 <u>=</u>	OC. very stiff lowplost ares. Dry pinkishwhite cloyey growth wisand (CC) very stiff, lowplostic fires.	5 - 6 - 7 - 8 - 9 - 9 - 9	31 (4) (5) (6) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7	9/8 1/4	Soundshike rock						
-10 -11 -12	sond very stiff, med post. moist/wet brown/red claser closer groveley sand very stiff. Low/	=	311 12 23 5547 11 21 12	18/18	Rocks dung drive						
-13 -14 -15	moral reddish brown cloyeggroved - wery of ft, med llowplast	-15	8#2 8#2 8		Cathings clary growel boulder 21.0' din at 13.5-14.5						
-16 -17 -18 -19		-16 -17 -18 -19	3" 8		open tole						
-20 -21	Moist purde grang gloryng gronel St. f. laupled.	-20 -21-	\$5#17 14 2" 17		Maybe usconics.						
T.	1215 APPLES WAY BELGRADE, MONTANA 59714 (406) 338-8578			LIENT: DDRESS:							
- 1		LHON	NE NUMBER:								

ROJE	CT NAM	ME: Sedien 35		Drill	1	loh	e N	10.88-212 PAGE 100 OF =			
DATE STARTED/FINISHED: 11-7-12					DRILLER: AXIS						
OGGED BY: JR					DRILL TYPE: ODEX						
ROUND SURFACE ELEVATION: OREHOLE LOCATION:					HOLE DIAMETER: HAMMER TYPE:						
OKLI	TOLL L	TO VICE A CONTRACT OF THE PARTY	T	SAMPLES							
DEPTH (FT)	GRAPHIC LOG	This log is part of a report prepared by Pledmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH		BULK	RECOVERY (%)				
_		MATERIAL DESCRIPTION	8	DEPTH	o:	5 8	22	REMARKS			
22 23 223 224 225 226 227 228 229 2331 2331 2331	186		-22			$\ $		Cuting growlsw/clong			
3=	Arg.		-23	BHY				Purple.			
4=			-24	朗 罗	4	\backslash	Y	hale collapsed.			
5=		Aura mark 1 C 1 1	-25	-	# ()	17	Ý.				
26		dyry, yellow tons Frontwesh a up list	-26-			V		slow for pound			
=		+	27		r W	1		blow out, too big to blow for pound B#5 (Carred molini)			
Έ.			-27					tord, freetined arguility			
28=			-28	13#6		Λ		Hard, Proctured argillets			
29-			-29-			$M \perp$					
=			70			$l \mid \mid \mid$					
		Dry yellowton grovel fractived	-30-								
31=		ansilleti.	-31			Ш					
52=		17.2	-32-			W					
-		14 =	77			1/1					
33			-33-	十五		M					
34=			-34			IX.					
35=			-35-	1		1					
_			I -			$ \rangle $		Duty aiting			
36=			-36-	3		IVI		209 24 4015			
37=			-37					*			
38			-38-	B#8				•			
_			-								
39=		4.0	-39-								
40=			-40	-	-		-				
41-			41-								
		0.14									
42-			-42-								
			CLIENT: ADDRESS:								

PROJECT NAME: Section 35					Drill Hole No. 212 PAGE 3 OF 3						
DATE STARTED/FINISHED:					DRILLER:						
OGGE	DRILL TYPE: HOLE DIAMETER: HAMMER TYPE: SAMPLES										
ROUN											
OREH											
ОЕРТН (FT)	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ОЕРТН (FT)	SAMPLE NO. DEPTH	_	_	RECOVERY (%)		DE	MARKS	
Δ.	ို မှ	MATERIAL DESCRIPTION		DEPIH			-		KL	MAKKS	
-43 -44 -45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55 -56 -57 -58		More competent angulat Cultible 50' Screen 50-45 Sound 50-255 22 Bent 28-15 Screen 15-5 Sound 5-0 Bent 5-0	-57 -58 -59	(SH) (O							
-60- -61- -62-			-60 -61 -62								
-63-			-63					-			1
		1215 APPLES WAY BELGRADE, MONTANA 59714	7 100 100 100	ENT: DRESS:							

OUND		10	PROJECT NAME: Schon 35 DATE STARTED/FINISHED: 11-3-12 OGGED BY: JR									
	CHD						DRILLER: AXIS					
REHOLI	ROUND SURFACE ELEVATION: OREHOLE LOCATION:					HOLE DIAMETER:						
	F. LC	DCATION:	HAMMER TYPE:									
	GRAPHIC LOG	This log is part of a report prepared by Piedmont Engineering, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	DEPTH (FT)	SAMPLE NO.	VOISTURBED AND STATE OF STATE	RECOVERY (%)						
- 2	5	MATERIAL DESCRIPTION	8 -	DEPTH 2	556	82	REMARKS					
	,	TILL	- 1 = - 2 = - 3 = - 4 = - 5 = - 5	pst) (:					
			- 6 7 8 10 11 12 - 12 - 12 - 12 12 12 12 12 - 12 12 - 12 12 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 -	15#2 15#3								
		Screen 15-10 Blanke 10-0 Blank 15-49 5 Sand 15-49 5	-13_ -14_ -15_ -16_ -17_ -18_ -19_									
1-		Dev.	-20 -21		44							
		~~	CLIEN	IT:								
No. of Lot		1215 APPLES WAY BELGRADE, MONTANA 59714		DDRESS:								
PIONEER (406) 388-8578												

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PHOTO DOCUMENTATION

APPENDIX B.1

PHOTO DOCUMENTATION - TEST PIT PHOTOS



Picture # - 1
Description - S35TP-101. Looking Northeast

Date - October 5, 2012 Project - Section 35 Repository Design Investigation



Picture # - 2
Description - S35TP-101. Final Excavated Depth at 17.2'

Date - October 5, 2012 Project - Section 35 Repository Design Investigation





Picture # - 3
Description - S35TP-102. Looking West

Date - October 2, 2012 Project - Section 35 Repository Design Investigation



Picture # - 4
Description - S35TP-102. Final Excavated Depth at 16'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation





Picture # - 5 Date - October 2, 2012

Description - S35TP-102. Glacial Till Excavated from 0' to 11' Project - Section 35 Repository Design Investigation



Picture # - 6 Date - October 2, 2012

Description - S35TP-102. Tuff Bedrock Excavated at 13.5' Project - Section 35 Repository Design Investigation





Picture # - 7
Description - S35TP-103. Looking Northwest

Date - October 5, 2012 Project - Section 35 Repository Design Investigation



Picture # - 8
Description - S35TP-103. Glacial Till from 0' to 5'

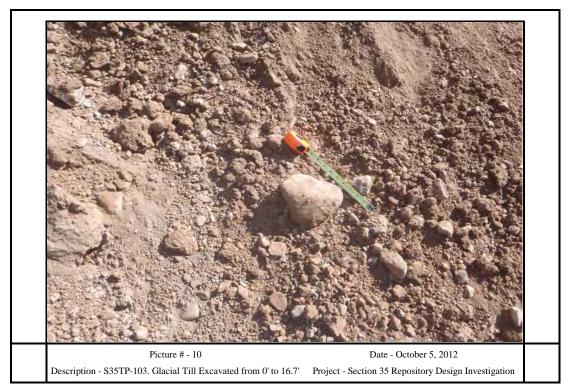
Date - October 5, 2012 Project - Section 35 Repository Design Investigation





Picture # - 9
Description - S35TP-103. Final Excavated Depth at 16.7'

Date - October 5, 2012 Project - Section 35 Repository Design Investigation

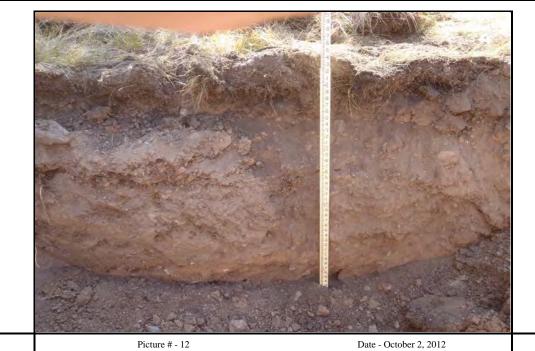






Description - S35TP-104. Looking Northeast

Date - October 2, 2012 Project - Section 35 Repository Design Investigation



 $\label{eq:picture # - 12} Picture \# - 12$ Description - S35TP-104. Glacial Till From 0' to 4.5'

Project - Section 35 Repository Design Investigation





Picture # - 13
Description - S35TP-104. Final Excavated Depth at 17'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation



Picture # - 14 Date - October 2, 2012

Description - S35TP-104. Glacial Till Excavated from 0' to 17' Project - Section 35 Repository Design Investigation





Description - S35TP-105. Glacial Till from 0' to 4'

Project - Section 35 Repository Design Investigation



Picture # - 16
Description - S35TP-105. Final Excavated Depth at 17.5'

Date - October 3, 2012 Project - Section 35 Repository Design Investigation





Picture # - 17 Date - October 3, 2012

Description - S35TP-105. Glacial Till Excavated from 0' to 16.5' Project - Section 35 Repository Design Investigation



Picture # - 18 Description - S35TP-105. Pockets of Wet Gravelly Sand Excavated from 16.5' to 17.5'

Date - October 3, 2012 Project - Section 35 Repository Design Investigation





Picture # - 19
Description - S35TP-106. Looking Southeast

Date - October 4, 2012 Project - Section 35 Repository Design Investigation



Picture # - 20
Description - S35TP-106. Final Excavated Depth at 18.2'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation





Description - S35TP-107. Looking South

Project - Section 35 Repository Design Investigation







Picture # - 23

Description - S35TP-107. Final Excavated Depth at 16'

Project - Section 35 Repository Design Investigation



Picture # - 24

Description - S35TP-107. Looking South After Backfilling

Date - October 3, 2012 Project - Section 35 Repository Design Investigation





Picture # - 25
Description - S35TP-108. Glacial Till from 0' to 16.1'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation



Picture # - 26
Description - S35TP-108. Final Excavated Depth at 16.1'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation





Picture # - 27 Description - S35TP-108. Interbedded Cobbles and Boulders from 0' to 16.1'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation



Picture # - 28 Description - S35TP-108. Iron Staining on Interbedded Cobble at 15'

Date - October 2, 2012 Project - Section 35 Repository Design Investigation





Picture # - 29
Description - S35TP-109. Looking West

Project - Section 35 Repository Design Investigation







Picture # - 31
Description - S35TP-109. Final Excavated Depth at 17.6'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation



Picture # - 32 Date - October 4, 2012

Description - S35TP-109. Excavated Glacial Till from 0' to 17.6' Project - Section 35 Repository Design Investigation





 $\label{eq:picture #-33} Pescription - S35TP-110. Glacial Till from 0' to 4.5'$

Date - October 5, 2012 Project - Section 35 Repository Design Investigation



Description - S35TP-110. Final Excavated Depth at 17.5'

Project - Section 35 Repository Design Investigation











Picture # - 37
Description - S35TP-111. Final Excavation Depth at 18.7'. Water
Flowing out of Sand and Gravel Layer from 16' to 17'

Date - October 3, 2012 Project - Section 35 Repository Design Investigation



Picture # - 38 Description - S35TP-111. Excavated Wet Sand and Gravel from $$16^{\circ}$$ to 17°

Project - Section 35 Repository Design Investigation





Picture # - 39
Description - S35TP-112. Looking East

Project - Section 35 Repository Design Investigation







Picture # - 41
Description - S35TP-112. Final Excavated Depth at 16.5'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation



Picture # - 42 Description - S35TP-112. Excavated Sand and Gravel from 0' to 16.5'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation





Description - S35TP-112. Silt Layer from 7' to 9'

Project - Section 35 Repository Design Investigation







 $\label{eq:picture #-45} Picture \#-45$ Description - S35TP-113. Sand and Gravel from 1.2' to 4'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation



Picture # - 46
Description - S35TP-113. Final Excavated Depth at 17'

Date - October 4, 2012 Project - Section 35 Repository Design Investigation





Description - S35TP-113. Sand from 7' to 10'

Project - Section 35 Repository Design Investigation





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\mathbf{A}	\mathbf{r}	\mathbf{r}	\vdash	N		ΙX	к	•

PHOTO DOCUMENTATION - SOIL BORING PHOTOS



Picture # - 1
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 2
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 3
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 4
Description - S35MW-201B

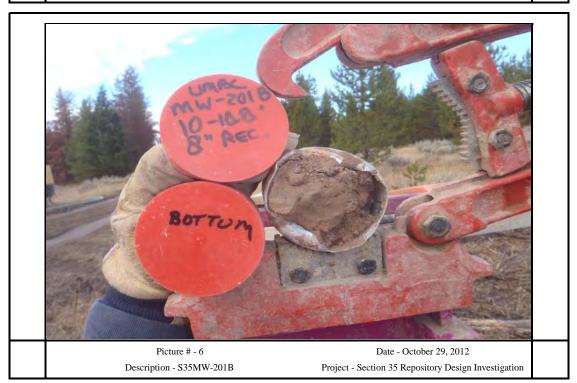
Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 5
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation







Picture # - 7
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 8
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 9
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 10
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 11
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 12
Description - S35MW-201B

Project - Section 35 Repository Design Investigation





Picture # - 13
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 14
Description - S35MW-201B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 15
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 16
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 17
Description - S35MW-203B

Project - Section 35 Repository Design Investigation



Picture # - 18
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 19
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 21
Description - S35MW-203B

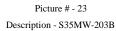
Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 22 Description - S35MW-203B Date - October 29, 2012 Project - Section 35 Repository Design Investigation







Date - October 29, 2012 Project - Section 35 Repository Design Investigation







Picture # - 25
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 26
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 27
Description - S35MW-203B

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 28 Description - S35SB-207 Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 29 Description - S35SB-207

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 30 Description - S35SB-207

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 31 Description - S35SB-207

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 32 Description - S35SB-207

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 33 Description - S35SB-207

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 34
Description - S35SB-207

Date - October 29, 2012

Project - Section 35 Repository Design Investigation





Picture # - 35
Description - S35SB-207

Project - Section 35 Repository Design Investigation



Picture # - 36
Description - S35SB-207

Project - Section 35 Repository Design Investigation





Picture # - 37
Description - S35SB-207

Project - Section 35 Repository Design Investigation

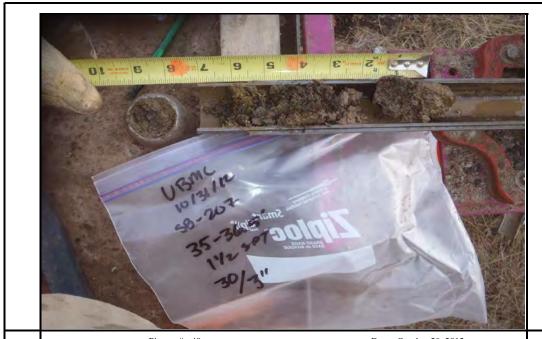






Picture # - 39 Description - S35SB-207

Project - Section 35 Repository Design Investigation



Picture # - 40 Description - S35SB-207 Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 41
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 42 Description - S35SB-216

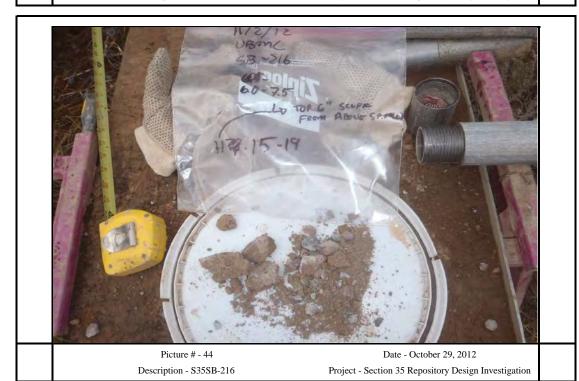
Project - Section 35 Repository Design Investigation





Picture # - 43
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



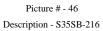




Picture # - 45
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Project - Section 35 Repository Design Investigation





Picture # - 47
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 48
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 49
Description - S35SB-216

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 50 Description - S35SB-217

Project - Section 35 Repository Design Investigation





Picture # - 51
Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 52 Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 53
Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 54 Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 55
Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 56
Description - S35SB-217

Date - October 29, 2012

Project - Section 35 Repository Design Investigation





Picture # - 57
Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 58
Description - S35SB-217

Date - October 29, 2012 Project - Section 35 Repository Design Investigation





Picture # - 59 Description - S35SB-217

Project - Section 35 Repository Design Investigation



Picture # - 60 Description - S35SB-217





Picture # - 61
Description - S35SB-217

Project - Section 35 Repository Design Investigation



Picture # - 62
Description - S35SB-206D soil boring location





Picture # - 63
Description - S35SB-206D, Depth 72' bgs

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 64
Description - S35SB-206D, Depth 72' bgs





Picture # - 65 Date - October 29, 2012

Description - View of site from Northwest, across Blackfoot River Project - Section 35 Repository Design Investigation



Picture # - 66 Date - October 29, 2012

Description - View of site from Northwest, across Blackfoot River Project - Section 35 Repository Design Investigation





Picture # - 67 Date - October 29, 2012

Description -View of site from Northwest, across Blackfoot River Project - Section 35 Repository Design Investigation



Picture # - 68 Date - October 29, 2012

Description - View of Site from Northwest, across Blackfoot River Project - Section 35 Repository Design Investigation





Picture # - 69 Description - Tuff unit, exposed northwest of site along Blackfoot River cutbank

Date - October 29, 2012 Project - Section 35 Repository Design Investigation



Picture # - 70
Description - Tuff unit, exposed northwest of site along Blackfoot
River cutbank



APPENDIX C

GEOTECHNICAL LABORATORY DATA

APPENDIX C.1

GEOTECHNICAL LABORATORY DATA - TEST PIT GEOTECHNICAL DATA



Phone (406)457-8252 Fax (406)442-1158 www.pioneer-technical.com

Moisture Analysis - AASHTO T265; ASTM D2216

Project Name: UBMC Section 35 Design Investigation Project Number: 10180

Lab No:	13324	13325	13326	13327	13328	13329	13330	13332	13333	13335
BH or Loc:	S35TP-101	S35TP-101	S35TP-101	S35TP-101	S35TP-101	S35TP-101	S35TP-102	S35TP-102	S35TP-102	S35TP-103
Depth:	0.0-0.7	0.7-1.7	2.5-3.5	8.2-9.2	17.0-17.2	8.2-9.2	0.0-0.7	9.0-10.0	13.0-13.5	0.0-1.4
Date Tested:										
Wet Wt, & Pan (g):	2599.4	290.5	1897.1	1867.4	933.5	1606.5	294.0	1553.4	1760.3	260.
Dry Wt, & Pan (g):	2471.4	263.4	1719.8	1635.4	842.7	1374.5	274.8	1401.3	1502.0	246.
Loss of Moisture	128.0	27.1	177.3	232.0	90.8	232.0	19.2	152.1	258.3	14.
Wt. of Pan (g):	193.0	32.4	196.1	193.6	182.7	195.2	34.0	381.7	391.0	25.
Wt. of Dry Soil (g):	2278.4	231.0	1523.7	1441.8	660.0	1179.3	240.8	1019.6	1111.0	220.
M. Content (%):	6	12	12	16	14	20	8	15	23	
. ,										
Lab No:	13336	13337	13338	13342	13344	13345	13350	13351	13353	13354
Lab No: BH or Loc:	13336 S35TP-103	13337 S35TP-103					13350 S35TP-106	13351 S35TP-106	13353 S35TP-107	13354 S35TP-107
Lab No:	13336	13337	13338 S35TP-103	13342 S35TP-104	13344 S35TP-105	13345 S35TP-105	13350	13351	13353	13354
Lab No: BH or Loc: Depth: Date Tested:	13336 S35TP-103 4.5-5.5	13337 S35TP-103 8.5-9.5	13338 S35TP-103 16.7-17.7	13342 S35TP-104	13344 S35TP-105 3.0-4.0	13345 S35TP-105 8.0-9.0	13350 S35TP-106	13351 S35TP-106	13353 S35TP-107 1.7-5.2	13354 S35TP-10 9.0-10.0
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	13336 S35TP-103 4.5-5.5	13337 S35TP-103 8.5-9.5	13338 S35TP-103 16.7-17.7	13342 S35TP-104 15.0-17.0	13344 S35TP-105 3.0-4.0	13345 S35TP-105 8.0-9.0	13350 S35TP-106 8.4-9.4	13351 S35TP-106 17.2-18.2	13353 S35TP-107 1.7-5.2	13354 S35TP-10 9.0-10.0
Lab No: BH or Loc: Depth: Date Tested:	13336 S35TP-103 4.5-5.5 2619.0 2461.7	13337 S35TP-103 8.5-9.5 2619.6 2417.7	13338 S35TP-103 16.7-17.7 2744.1 2515.8	13342 S35TP-104 15.0-17.0 2705.3	13344 S35TP-105 3.0-4.0	13345 S35TP-105 8.0-9.0	13350 S35TP-106 8.4-9.4	13351 S35TP-106 17.2-18.2	13353 S35TP-107 1.7-5.2	13354 S35TP-10 9.0-10.0 3088 2925
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	13336 S35TP-103 4.5-5.5 2619.0 2461.7 157.3	13337 S35TP-103 8.5-9.5 2619.6 2417.7	13338 S35TP-103 16.7-17.7 2744.1 2515.8	13342 S35TP-104 15.0-17.0 2705.3 2432.2	13344 S35TP-105 3.0-4.0 2084.7 1964.6 120.1	13345 S35TP-105 8.0-9.0 1526.0 1428.8 97.2	13350 S35TP-106 8.4-9.4 1043.9 982.6	13351 S35TP-106 17.2-18.2 1658.6 1516.5	13353 S35TP-107 1.7-5.2 2434.8 2200.8	13354 S35TP-10 9.0-10.0 3088 2925 162
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	13336 S35TP-103 4.5-5.5 2619.0 2461.7 157.3 381.7	13337 S35TP-103 8.5-9.5 2619.6 2417.7 201.9 377.0	13338 S35TP-103 16.7-17.7 2744.1 2515.8 228.3	13342 S35TP-104 15.0-17.0 2705.3 2432.2 273.1	13344 S35TP-105 3.0-4.0 2084.7 1964.6 120.1 383.3	13345 S35TP-105 8.0-9.0 1526.0 1428.8 97.2 392.0	13350 S35TP-106 8.4-9.4 1043.9 982.6 61.3	13351 S35TP-106 17.2-18.2 1658.6 1516.5 142.1	13353 S35TP-107 1.7-5.2 2434.8 2200.8 234.0	13354 S35TP-107 9.0-10.0 3088. 2925. 162.



Phone (406)457-8252 Fax (406)442-1158 www.pioneer-technical.com

Moisture Analysis - AASHTO T265; ASTM D2216

 Project Name:
 UBMC Section 35 Design Investigation
 Project Number:
 10180

Lab No:	13355	13362	13364	13366	13367	13368	13370	13376	13377	13379
BH or Loc:	S35TP-107	S35TP-109	S35TP-109	S35TP-110	S35TP-110	S35TP-110	S35TP-111	S35TP-112	S35TP-112	S35TP-112
Depth:	15.0-16.0	3.6-4.6	16.6-17.6	4.0-5.0	9.0-10.0	16.5-17.5	1.0-4.7	2.0-4.5	6.8-8.8	15.0-16.0
Date Tested:										
Wet Wt, & Pan (g):	1793.8	1883.2	2219.3	2224.6	2920.0	1815.3	1811.2	1997.3	313.6	3285.0
Dry Wt, & Pan (g):	1621.8	1745.3	2017.7	2094.9	2722.8	1626.6	1708.6	1936.6	256.0	3111.5
Loss of Moisture	172.0	137.9	201.6	129.7	197.2	188.7	102.6	60.7	57.6	173.5
Wt. of Pan (g):	35.2	195.8	189.9	192.9	192.0	197.0	188.5	306.7	27.9	391.0
Wt. of Dry Soil (g):	1586.6	1549.5	1827.8	1902.0	2530.8	1429.6	1520.1	1629.9	228.1	2720.5
	44	_	44	7	0	40	_	4)E	,
M. Content (%):	11	9	11	7	8	13	7	4	25	6
M. Content (%):	11	<u> </u>	11	1	8	13	1	4	25	
M. Content (%):	11	9	11	1	8	13	1	4	25	
M. Content (%):		13334	13341	13363	13350	13371	13381	13339	13343	13347
. , ,	13384							-		13347
Lab No:	13384	13334	13341	13363	13350	13371	13381	13339	13343	13347
Lab No: BH or Loc:	13384 S35TP-113 16.0-17.0	13334 S35TP-102	13341 S35TP-104	13363 S35TP-109	13350 S35TP-106	13371 S35TP-111	13381 S35TP-113	13339 S35TP-104	13343 S35TP-105	13347 S35TP-105
Lab No: BH or Loc: Depth:	13384 S35TP-113 16.0-17.0	13334 S35TP-102	13341 S35TP-104	13363 S35TP-109	13350 S35TP-106	13371 S35TP-111	13381 S35TP-113	13339 S35TP-104	13343 S35TP-105	13347 S35TP-105
Lab No: BH or Loc: Depth:	13384 S35TP-113 16.0-17.0	13334 S35TP-102 15.0-16.0	13341 S35TP-104 7.0-10.0	13363 S35TP-109	13350 S35TP-106 8.4-9.4	13371 S35TP-111 10.5-11.5	13381 S35TP-113 1.5-3.5	13339 S35TP-104	13343 S35TP-105 0.0-1.7	13347 S35TP-105 16.5-17.0
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	13384 S35TP-113 16.0-17.0 2543.5 2313.5	13334 S35TP-102 15.0-16.0	13341 S35TP-104 7.0-10.0	13363 S35TP-109 7.3-8.3	13350 S35TP-106 8.4-9.4	13371 S35TP-111 10.5-11.5	13381 S35TP-113 1.5-3.5	13339 S35TP-104 0.0-1.0	13343 S35TP-105 0.0-1.7	13347 S35TP-105 16.5-17.0
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	13384 S35TP-113 16.0-17.0 2543.5 2313.5	13334 S35TP-102 15.0-16.0 978.3 879.8	13341 S35TP-104 7.0-10.0 812.9 756.0	13363 S35TP-109 7.3-8.3	13350 S35TP-106 8.4-9.4 1043.9 952.6	13371 S35TP-111 10.5-11.5 819.3 763.1	13381 S35TP-113 1.5-3.5	13339 S35TP-104 0.0-1.0	13343 S35TP-105 0.0-1.7	13347 S35TP-105 16.5-17.0 154.7 140.3
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture Wt. of Pan (g):	13384 S35TP-113 16.0-17.0 2543.5 2313.5 230.0 384.2	13334 S35TP-102 15.0-16.0 978.3 879.8 98.5	13341 S35TP-104 7.0-10.0 812.9 756.0 56.9	13363 S35TP-109 7.3-8.3 762.0 702.5	13350 S35TP-106 8.4-9.4 1043.9 952.6 91.3	13371 S35TP-111 10.5-11.5 819.3 763.1 56.2	13381 S35TP-113 1.5-3.5 881.9 861.8 20.1 197.9	13339 S35TP-104 0.0-1.0 186.8 175.4 11.4 34.1	13343 S35TP-105 0.0-1.7 288.9 274.6	13347 S35TP-105 16.5-17.0 154.7 140.3
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	13384 S35TP-113 16.0-17.0 2543.5 2313.5 230.0 384.2	978.3 879.8 98.5 376.9	13341 S35TP-104 7.0-10.0 812.9 756.0 56.9 189.5	13363 S35TP-109 7.3-8.3 762.0 702.5 59.5	13350 S35TP-106 8.4-9.4 1043.9 952.6 91.3	13371 S35TP-111 10.5-11.5 819.3 763.1 56.2	13381 S35TP-113 1.5-3.5 881.9 861.8 20.1	13339 S35TP-104 0.0-1.0 186.8 175.4 11.4 34.1	13343 S35TP-105 0.0-1.7 288.9 274.6 14.3	13347 S35TP-105 16.5-17.0 154.7 140.3 14.4 22.9



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Moisture Analysis - AASHTO T265; ASTM D2216

 Project Name:
 UBMC Section 35 Design Investigation
 Project Number:
 10180

Lab No:	13346	13348	13352	13356	13360	13361	13365	13369	13372	13373
BH or Loc:	S35TP-105	S35TP-106	S35TP-107	S35TP-108	S35TP-108	S35TP-109	S35TP-110	S35TP-111	S35TP-111	S35TP-11
Depth:	17.0-17.5	0.0-2.9	0.0-1.7	0.0-2.1	16.0-17.0	0.0-1.3	0.0-1.3	0.0-1.0	16.5-17.0	18.0-18.7
Date Tested:										
\\\\\\.	204.6	070.5	000.0	040.5	400.0	4.40.0	000 5	205.7	4747	200
Wet Wt, & Pan (g):				248.5					174.7	336
Dry Wt, & Pan (g):		263.0		221.8			190.0	252.5	158.1	296
Loss of Moisture				26.7	23.6			73.2	16.6	40
Wt. of Pan (g):			33.6	25.0			27.0	24.7	24.6	
Wt. of Dry Soil (g):	244.8	238.2	231.9	196.8	130.4	110.7	163.0	227.8	133.5	270
			_			_				
M. Content (%):	19	7	8	14	18	5	8	32	12	
. ,							8	32	12	1
Lab No:	13374	13375	13378	13380	13382	13383	8	32	12	1
Lab No: BH or Loc:	13374 S35TP-111	13375 S35TP-112	13378 S35TP-112		13382 S35TP-113	13383 S35TP-113	8	32	12	1
Lab No:	13374 S35TP-111 16.0-16.5	13375	13378	13380 S35TP-113	13382	13383	8	32	12	1
Lab No: BH or Loc: Depth: Date Tested:	13374 S35TP-111 16.0-16.5	13375 S35TP-112 0.0-2.0	13378 S35TP-112 16.0-16.5	13380 S35TP-113 0.0-1.2	13382 S35TP-113 8.0-9.0	13383 S35TP-113 10.0-12.0	8	32	12	
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	13374 S35TP-111 16.0-16.5	13375 S35TP-112 0.0-2.0	13378 S35TP-112 16.0-16.5	13380 S35TP-113 0.0-1.2	13382 S35TP-113 8.0-9.0	13383 S35TP-113 10.0-12.0	8	32	12	
Lab No: BH or Loc: Depth: Date Tested:	13374 S35TP-111 16.0-16.5 251.9 224.4	13375 S35TP-112 0.0-2.0 156.3 145.5	13378 S35TP-112 16.0-16.5 144.8 130.1	13380 S35TP-113 0.0-1.2	13382 S35TP-113 8.0-9.0	13383 S35TP-113 10.0-12.0 337.2 273.6	8	32	12	
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	13374 S35TP-111 16.0-16.5 251.9 224.4 27.6	13375 S35TP-112 0.0-2.0 156.3 145.5 10.8	13378 S35TP-112 16.0-16.5 144.8 130.1	13380 S35TP-113 0.0-1.2 179.4 170.3	13382 S35TP-113 8.0-9.0 345.9 302.1 43.8	13383 S35TP-113 10.0-12.0 337.2 273.6 63.5	8	32	12	
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	251.9 224.4 27.6 27.6	13375 S35TP-112 0.0-2.0 156.3 145.5 10.8 23.1	13378 S35TP-112 16.0-16.5 144.8 130.1 14.6 13.4	13380 S35TP-113 0.0-1.2 179.4 170.3 9.0	13382 S35TP-113 8.0-9.0 345.9 302.1 43.8 33.9	13383 S35TP-113 10.0-12.0 337.2 273.6 63.5	8	32	12	



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Moisture Analysis - AASHTO T265; ASTM D2216

 Project Name:
 UBMC Section 35 Design Investigation
 Project Number:
 10180

	S35CS-02	S35CS-03	S35CS-01	S35BGT-02		S35BGT-03		S35BGT-01		
Lab No:	13365,		13375,							
	13369,	13339,	13324,							
	13343,	13352,	13325,	13366, 13367	7, 13370,	13340, 1334 ²	1, 13353,	13326, 1332	7, 13381,	
	13356	13330	13380	13371, 13344	4, 13358	13354, 1333°	1	13384		
								•		
Vet Wt, & Pan (g):	624.4	837.6	1012.4	645.0		1087.6		1342.7		
Ory Wt, & Pan (g):	569.7	772.7	961.2	604.7		1028.1		1267.0		
Loss of Moisture	54.7	64.9	51.2	40.3		59.5		75.7		
Wt. of Pan (g):	193.2	195.5	304.1	196.2		193.0		197.6		
Vt. of Dry Soil (g):	376.5	577.2	657.1	408.5		835.1		1069.4		
M. Content (%):	15	11	8	10	-	7	-	7		



Specific Gravity of Soils

Specific Gravity of (-) #10 Fraction

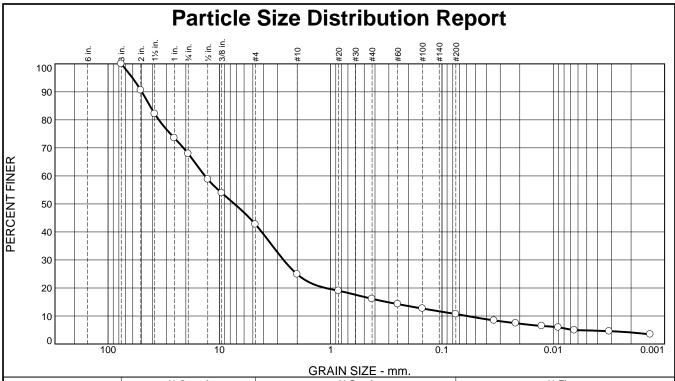
Project UBMC Section 35 Design Investigation

Client: Montana DEQ

Date: 1/14/2013

Tested By: LS

Sample I.D.	Depth (ft)	Specific Gravity
S35-BGT-01 Composite	Various	2.68
S35-BGT-02 Composite	Various	2.68
S35-BGT-03 Composite	Various	2.69
S35-CS-01 Composite	Various	2.65
S35-CS-02 Composite	Various	2.53
S35-CS-03 Composite	Various	2.57



П		010 (III 01=1 11IIII								
	0/ - 211	% G	ravel		% Sand	i	% Fines			
	% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
	0	32	25	18	9	5	6	5		

	TEST RE	ESULTS	
Opening	Percent	Spec.*	Pass?
Size	Finer	(Percent)	(X=Fail)
3	100		
2	91		
1.5	82		
1	74		
.75	68		
.5	59		
.375	54		
#4	43		
#10	25		
#20	19		
#40	16		
#60	14		
#100	13		
#200	11		
0.0340 mm.	8.4		
0.0218 mm.	7.4		
0.0127 mm.	6.5		
0.0090 mm.	6.0		
0.0065 mm.	4.9		
0.0031 mm.	4.5		
0.0013 mm.	3.4		

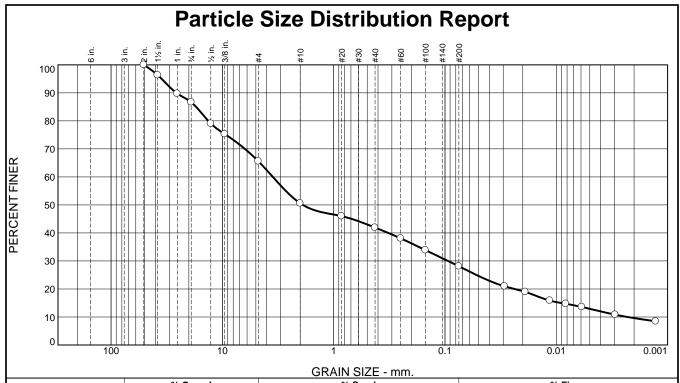
	Material Descripti	<u>on</u>
Atter	berg Limits (ASTM LL=	<u>D 4318)</u> Pl=
PL=	LL=	PI=
	Classification	(0.0 4.4.0)
USCS (D 2487)=	AASHTO	(M 145)=
	Coefficients	
D₉₀= 49.7123 D₅₀= 7.3113	D₈₅= 42.0769	D₆₀= 13.4676 D₁₅= 0.3124
D ₁₀ = 7.3113 D ₁₀ = 0.0595	D_{30} = 2.6500 C_{11} = 226.50	C _c = 8.77
	Remarks	
	Remarks	
Date Received:	Date T	ested:
Tested By:		
Checked By:		
· –		
Title: _		

(no specification provided)

Location: S35BGT-01 (Composite: 13326, 13327, 13381, 13384, 13376, 13379)

Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714 Ph. 406-388-8578 - Fax 406-388-8579 **Client:** Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



	% +3"		% Gravel				% Sand	d	% Fines	
			Coarse	arse Fine		se	Medium	Fine	Silt	Clay
	0		13	21	15		9	14	15	13
		т	EST RESUL	TS				Mate	erial Description	
	Opening	Perc		Spec.*	Pass?			Mate	enai bescription	
	Size	Fin	er (F	Percent)	(X=Fail)					
	2	100)							
	1.5	96	5					Atterberg	Limits (ASTM D 4318)	

Opening	rercent	Spec.	rassi
Size	Finer	(Percent)	(X=Fail)
2	100		
1.5	96		
1	90		
.75	87		
.5	79		
.375	75		
#4	66		
#10	51		
#20	46		
#40	42		
#60	38		
#100	34		
#200	28		
0.0292 mm.	21		
0.0190 mm.	19		
0.0114 mm.	16		
0.0082 mm.	15		
0.0059 mm.	14		
0.0030 mm.	11		
0.0013 mm.	8.5		
1		I	I

PL=	LL=	PI=
USCS (D 2487)=	Classificatio AASHT	<u>n</u> O (M 145)=
D₉₀= 25.9611 D₅₀= 1.8940 D₁₀= 0.0023	Coefficients D ₈₅ = 17.2113 D ₃₀ = 0.0940 C _u = 1539.92	D ₆₀ = 3.5219 D ₁₅ = 0.0090 C _c = 1.10
	Remarks	
Date Received:	Date	e Tested:
Tested By:		
Checked By: _		
Title: _		

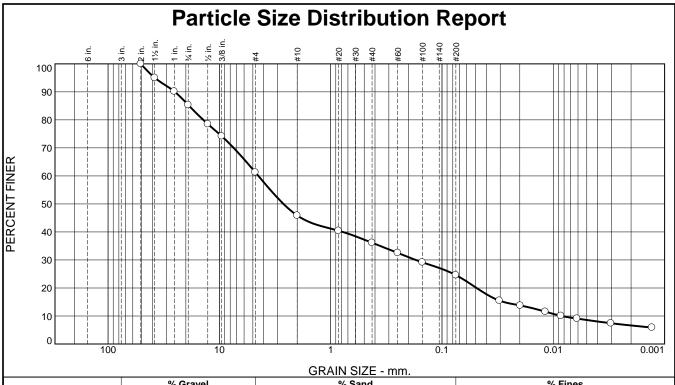
(no specification provided)

Location: S35BGT-02 (Composite: 13366, 13367, 13370, 13371, 13344, 13358) **Date Sampled:**

Pioneer Technical Services, Inc.

1215 Apple's Way - Belgrade, MT 59714

Client: Montana Department of Environmental Quality
Project: UBMC Section 35 Design Investigation



0/ .2"	% Gravel			% Sand		% Fines	
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	15	24	15	10	11	16	9

	TEST RE	SULTS	
Opening	Percent	Spec.*	Pass?
Size	Finer	(Percent)	(X=Fail)
2	100		
1.5	95		
1	90		
.75	85		
.5	79		
.375	74		
#4	61		
#10	46		
#20	40		
#40	36		
#60	33		
#100	29		
#200	25		
0.0304 mm.	15		
0.0198 mm.	14		
0.0118 mm.	12		
0.0085 mm.	10		
0.0061 mm.	9.1		
0.0030 mm.	7.4		
0.0013 mm.	5.9		

Material Description						
Atter	berg Limits (ASTI	M D 4318) PI=				
PL=	LL=	PI=				
USCS (D 2487)=	Classification AASHTO	<u>1</u>) (M 145)=				
D ₉₀ = 25.1126 D ₅₀ = 2.6566 D ₁₀ = 0.0084	Coefficients D ₈₅ = 18.6968 D ₃₀ = 0.1719 C _u = 530.98	D₆₀= 4.4631 D₁₅= 0.0279 C_c= 0.79				
	Remarks					
Date Received:	Date	Tested:				
Tested By:						
Checked By:						
Title:						

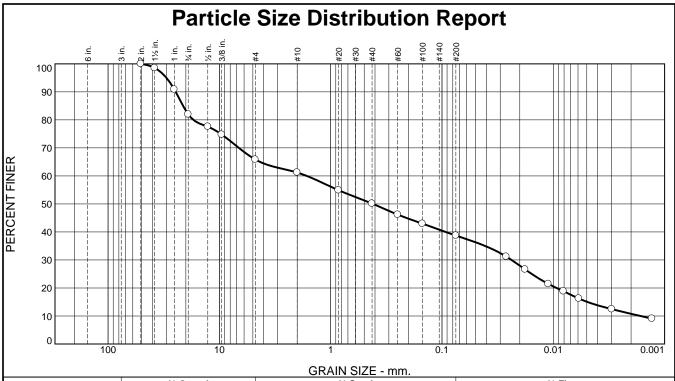
* (no specification provided)

Location: S35BGT-03 (Composite: 13331, 13340, 13341, 13353, 13354)

Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714 Ph. 406-388-8578 - Fax 406-388-8579 **Client:** Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Troject: Obivic Section 33 Design investigation



	0/ - 211	% G	ravel	% Sand		% Fines		
	% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0	18	16	5	11	11	24	15

TEST RESULTS								
Opening	Percent	Spec.*	Pass?					
Size	Finer	(Percent)	(X=Fail)					
2	100							
1.5	99							
1	91							
.75	82							
.5	78							
.375	75							
#4	66							
#10	61							
#20	55							
#40	50							
#60	46							
#100	43							
#200	39							
0.0264 mm.	31							
0.0179 mm.	27							
0.0111 mm.	21							
0.0081 mm.	19							
0.0059 mm.	16							
0.0030 mm.	12							
0.0013 mm.	9.1							

Material Description						
Atter PL=	rberg Limits (AST LL=	PI=				
USCS (D 2487)=	Classification AASHTC	<u>n</u> D (M 145)=				
D ₉₀ = 24.6757 D ₅₀ = 0.4176 D ₁₀ = 0.0016	Coefficients D ₈₅ = 21.1931 D ₃₀ = 0.0237 C _u = 996.71 Remarks	D ₆₀ = 1.6396 D ₁₅ = 0.0049 C _c = 0.21				
Date Received: Tested By: Checked By: Title:	Date	Tested:				

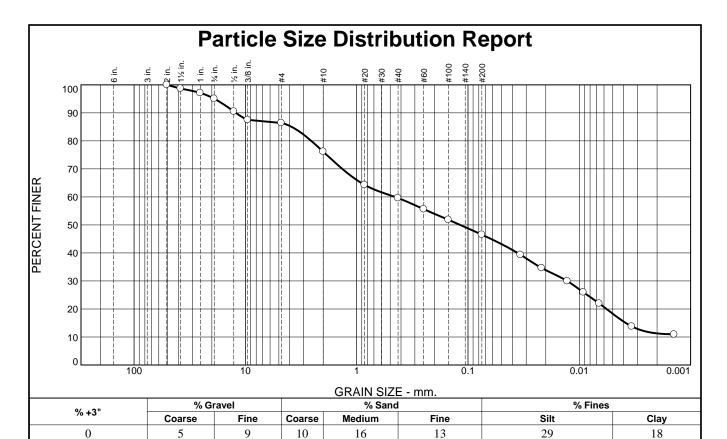
(no specification provided)

Location: S35CS-01 (Composite: 13324, 13325, 13380, 13375)

Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714 Ph. 406-388-8578 - Fax 406-388-8579 **Client:** Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Troject: Obivic Section 33 Design investigation



TEST RESULTS							
Opening	Percent	Spec.*	Pass?				
Size	Finer	(Percent)	(X=Fail)				
2	100						
1.5	99						
1	97						
.75	95						
.5	91						
.375	87						
#4	86						
#10	76						
#20	64						
#40	60						
#60	56						
#100	52						
#200	47						
0.0338 mm.	39						
0.0218 mm.	35						
0.0128 mm.	30						
0.0092 mm.	26						
0.0066 mm.	22						
0.0034 mm.	14						
0.0014 mm.	11						

	•	<u>.</u>
	Material Descript	<u>ion</u>
Atte	berg Limits (ASTN	/I D 4318)
PL=	LL=	PI=
USCS (D 2487)=	Classification AASHTO	
D ₉₀ = 12.1748 D ₅₀ = 0.1174 D ₁₀ =	Coefficients D ₈₅ = 3.8345 D ₃₀ = 0.0129 C _u =	D ₆₀ = 0.4536 D ₁₅ = 0.0038 C _c =
	Remarks	
Date Received: Tested By:	Date ⁻	Tested:
Checked By:		
Title: _		

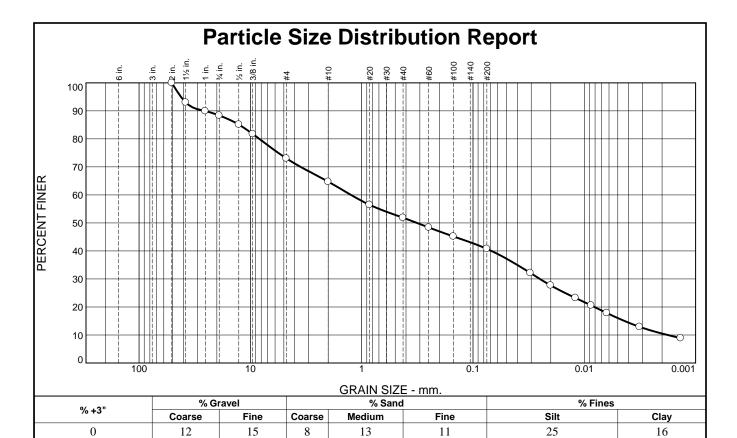
* (no specification provided)

Location: S35CS-02 (Composite: 13365, 13369, 13343, 13356)

Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714 Ph. 406-388-8578 - Fax 406-388-8579 **Client:** Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Troject: Obivic Section 33 Design investigation



TEST RESULTS						
Opening	Percent	Spec.*	Pass?			
Size	Finer	(Percent)	(X=Fail)			
2	100					
1.5	93					
1	90					
.75	88					
.5	85					
.375	82					
#4	73					
#10	65					
#20	56					
#40	52					
#60	48					
#100	45					
#200	41					
0.0306 mm.	32					
0.0201 mm.	28					
0.0120 mm.	23					
0.0087 mm.	21					
0.0063 mm.	18					
0.0032 mm.	13					
0.0014 mm.	8.9					

Material Description Atterberg Limits (ASTM D 4318) PL= **Classification** USCS (D 2487)= AASHTO (M 145)= Coefficients **D₉₀=** 25.7595 **D₅₀=** 0.3187 **D₁₀=** 0.0018 D₈₅= 12.5687 D₃₀= 0.0251 C_u= 700.83 D₆₀= 1.2483 D₁₅= 0.0044 C_c= 0.28 Remarks **Date Tested: Date Received:** Tested By: Checked By: Title:

* (no specification provided)

Location: S35CS-03 (Composite: 13339, 13352, 13330)

Date Sampled:

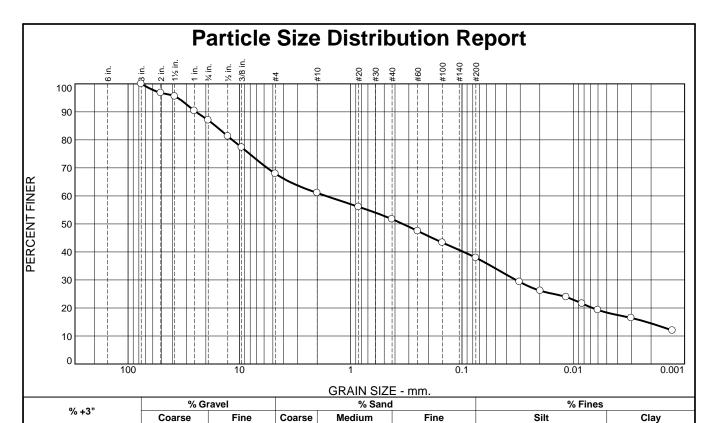
Pioneer Technical Services, Inc.

1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation



		Coar	se	Fine	•	Coarse	Medium	Fine	Silt	Clay
0		13	3	19		7	9	14	20	18
TEST RESULTS					Mat	erial Description				
Opening	Perc	ent	Spe	c.*	Pa	ass?	clayey g	gravel with sand		
Size	Fin	er	(Perc	ent)	(X=	₌Fail)				
3	100	0								
2	9′	7						Atterberg	Limits (ASTM D 4318)	
1.5	90	6					PL= 15		L= 26 PI= 11	l
1	90	-						,	Classification	
.75	8′						HISCS (D 2487)= GC	Classification AASHTO (M 145)=	A-6(1)
.5	8	1					0303 (2401 j= OC	AA31110 (W 143)=	A-0(1)

Date Received:
Tested By:
Checked By:
Title:

(no	specification	provided	

77

68

61

56

52

47

43

38

29

26

24

22

19

16

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.375

#4

#10

#20

#40

#60 #100

#200

0.0305 mm.

0.0198 mm.

0.0116 mm.

0.0084 mm.

0.0060 mm.

0.0030 mm.

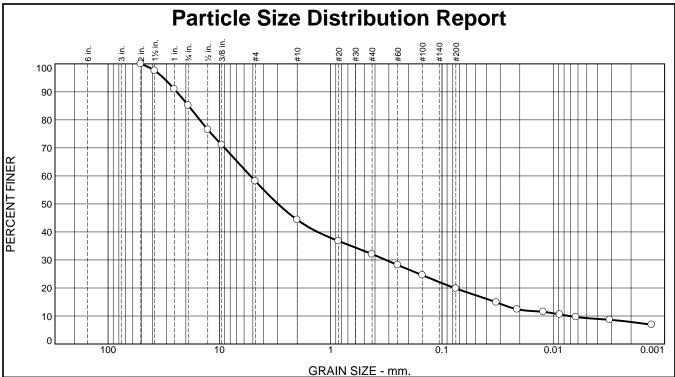
0.0013 mm.

Location: S35TP-104		Date Sampled:
Sample Number: 13341	Depth: 7-10'	Date Gampiour

Pioneer Technical Services, Inc.

1215 Apple's Way - Belgrade, MT 59714

Client: Montana Department of Environmental Quality
Project: UBMC Section 35 Design Investigation



0/ - 2	% Gravel		% Sand			% Fines	
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	15	27	14	12	12	11	9

	TEST RE	SULTS			
Opening	Percent	Spec.*	Pass?		
Size	Finer	(Percent)	(X=Fail)		
2	100				
1.5	98				
1	91				
.75	85				
.5	77				
.375	71				
#4	58				
#10	44				
#20	37				
#40	32				
#60	28				
#100	25				
#200	20				
0.0325 mm.	15				
0.0211 mm.	12				
0.0123 mm.	11				
0.0088 mm.	11				
0.0063 mm.	9.6				
0.0031 mm.	8.6				
0.0013 mm.	6.9				

	Material Description
clayey gravel with	sand
	erberg Limits (ASTM D 4318)
PL= 14	LL= 23 PI= 9
USCS (D 2487)=	GC Classification (M 145)= A-2-4(0)
- 241622	Coefficients
D₉₀= 24.1633 D₅₀= 2.9741	D₈₅= 18.8922
D ₁₀ = 0.0072	C _u = 728.14 C _c = 2.68
	Remarks
Date Received: Tested By:	Date Tested:
Checked By:	

(no specification provided)

Location: S35TP-106	
Sample Number: 13350	Depth: 8.4-9.4

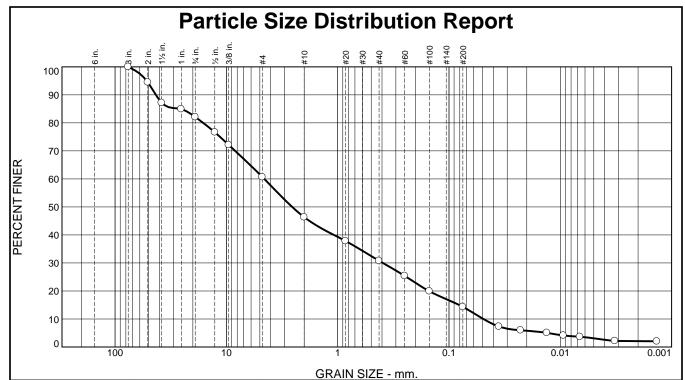
Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579

Date Sampled:

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Title:



0/ - 0!!	% G	ravel	% Sand			% Fines		
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0	18	21	15	15	17	11	3	

		TEST RE	SULTS			
Openi	ng	Percent	Spec.*	Pass?		
Size	•	Finer	(Percent)	(X=Fail)		
3		100				
2		94				
1.5		87				
1		85				
.75		82				
.5		77				
.375	5	72				
#4		61				
#10		46				
#20		38				
#40		31				
#60		25				
#100)	20				
#200)	14				
0.0356	mm.	7.3				
0.0227	mm.	6.0				
0.0132	mm.	5.1				
0.0094	mm.	4.1				
0.0067	mm.	3.7				
0.0032	mm.	2.2				
0.0014	mm.	2.0				

	<u>Material</u>	Descri	ptior
silty sand with grave	el		

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV

Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b

Coefficients

D₉₀= 43.0002 **D₅₀=** 2.5638 **D₁₀=** 0.0491 **D₆₀=** 4.5687 **D₁₅=** 0.0810 **C_c=** 0.69 D₈₅= 25.9447 D₃₀= 0.3928 C_u= 93.03

Remarks

Date Received:	Date Tested:
Tested By:	
Checked By:	
Title:	

(no specification provided)

Location: S35TP-107 Sample Number: 13354

Depth: 9-10'

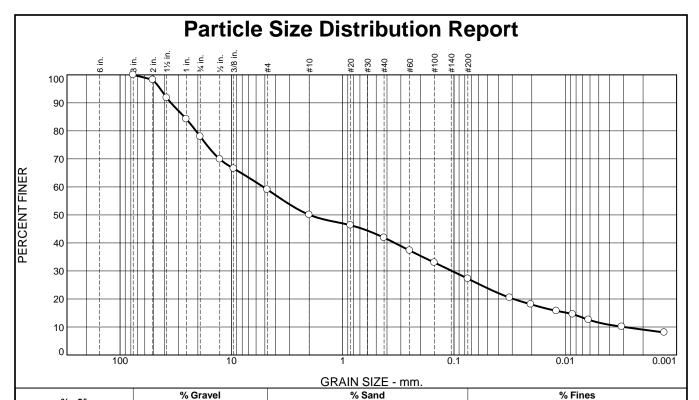
Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation



% +3 "	70 0.0.0				/ · · · · · · · · · · · · · · · · · · ·		70.100		
% +3"		Coarse	Fine	e Co	arse	Medium	Fine	Silt	Clay
0		22	19		9	8	15	15	12
	Т	EST RESU	JLTS				Mate	rial Description	
Opening	Perc	ent	Spec.*	Pass'	?	clayey g	ravel with sand	That Boothpalon	
Size	Fin	er	(Percent)	(X=Fai	I)				
3	10	0							
2	9	8					Atterberg	Limits (ASTM D 4318)	
1.5	9:	2				PL= 15		= 23 PI= 8	
1	8	4					_		

USCS (D 2487)= GC Classification AASHTO (M 145)= A-2-4(0)

Coefficients

 D90= 34.9288
 D85= 26.4592
 D60= 5.1690

 D50= 1.9820
 D30= 0.1043
 D15= 0.0095

 D10= 0.0030
 Cu= 1740.01
 Cc= 0.71

Date Received: Tested By:	Date Tested:
Checked By:	
Title:	

Remarks

-				G
		specification		
	(no	specification	provided	

78

70

67

59

50

46

42

37

33

27

20

18

16

15

13

10

8.1

.75

.5

.375

#4

#10 #20

#40

#60 #100

#200

0.0316 mm.

0.0204 mm.

0.0120 mm.

0.0086 mm.

0.0062 mm.

0.0031 mm.

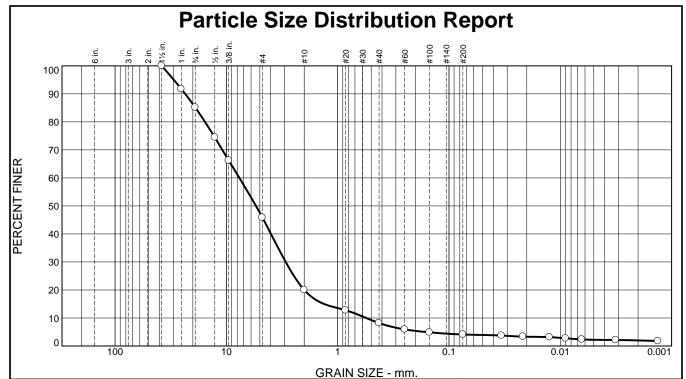
0.0013 mm.

Location: S35TP-111	Danish 10.5.11.5	Date Sampled:
Sample Number: 13371	Denth: 10 5-11 5	•

Pioneer Technical Services, Inc.

1215 Apple's Way - Belgrade, MT 59714

Client: Montana Department of Environmental Quality Project: UBMC Section 35 Design Investigation



	0/ - 211	% G	ravel	% Sand			% Fines		
	% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
	0	15	39	26	12	4	2	2	

well-graded gravel with sand

	TEST RE	TEST RESULTS									
Opening	Percent	Spec.*	Pass?								
Size	Finer	(Percent)	(X=Fail)								
1.5	100										
1	92										
.75	85										
.5	74										
.375	66										
#4	46										
#10	20										
#20	13										
#40	8										
#60	6										
#100	5										
#200	4.1										
0.0338 mm.	3.7										
0.0216 mm.	3.3										
0.0125 mm.	3.2										
0.0090 mm.	2.8										
0.0064 mm.	2.4										
0.0032 mm.	2.2										
0.0013 mm.	1.8										

Atte	rberg Limits (AST LL= NV	TM D 4318) PI= NP						
Classification USCS (D 2487)= GW AASHTO (M 145)= A-1-a								
D ₉₀ = 23.4397 D ₅₀ = 5.4224 D ₁₀ = 0.5542	Coefficients D ₈₅ = 18.9234 D ₃₀ = 2.9321 C _u = 13.79	D ₆₀ = 7.6422 D ₁₅ = 1.3257 C _c = 2.03						
	Remarks							
Date Received:	Date	e Tested:						

Material Description

(no specification provided)

Location: S35TP-113	
Sample Number: 13381	De

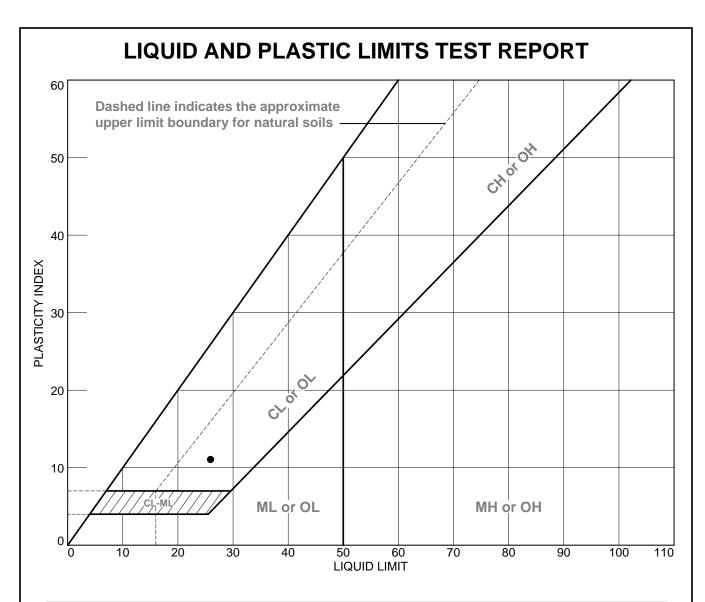
Depth: 1.5-3.5

Date Sampled:

Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714 Ph. 406-388-8578 - Fax 406-388-8579 **Client:** Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

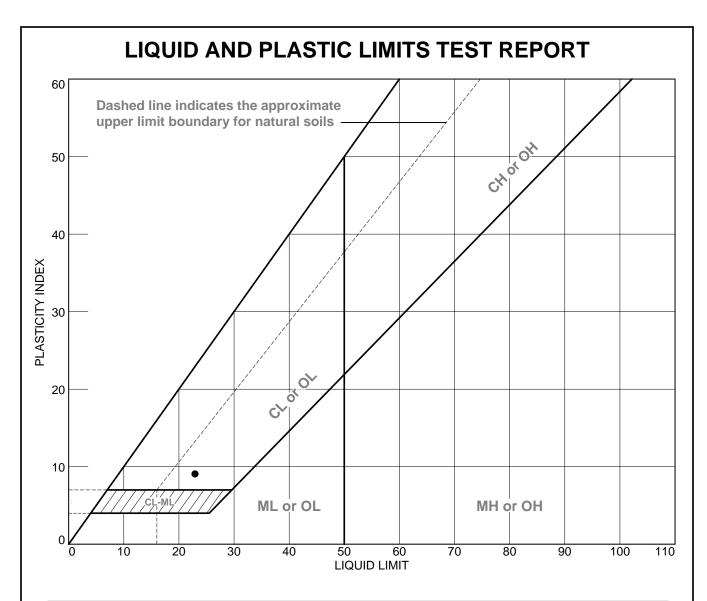
Tested By: _ Checked By:

Title:



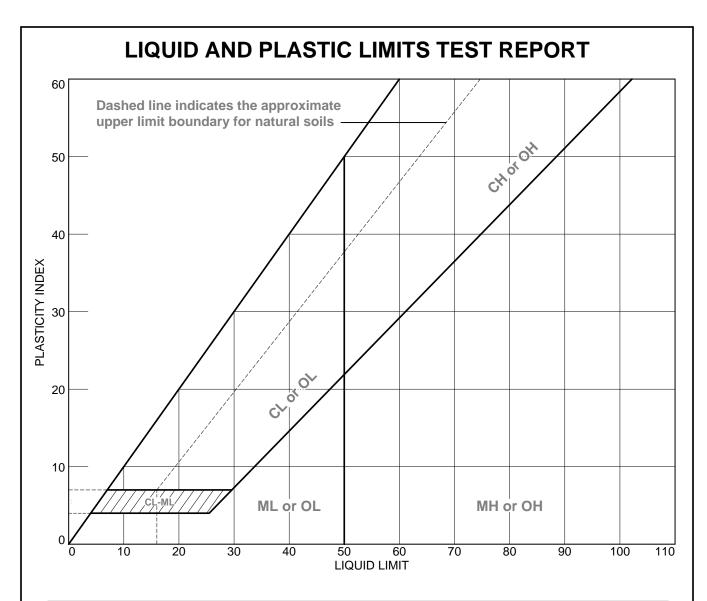
	SOIL DATA										
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS			
•	S35TP-104	13341	7-10'		15	26	11	GC			

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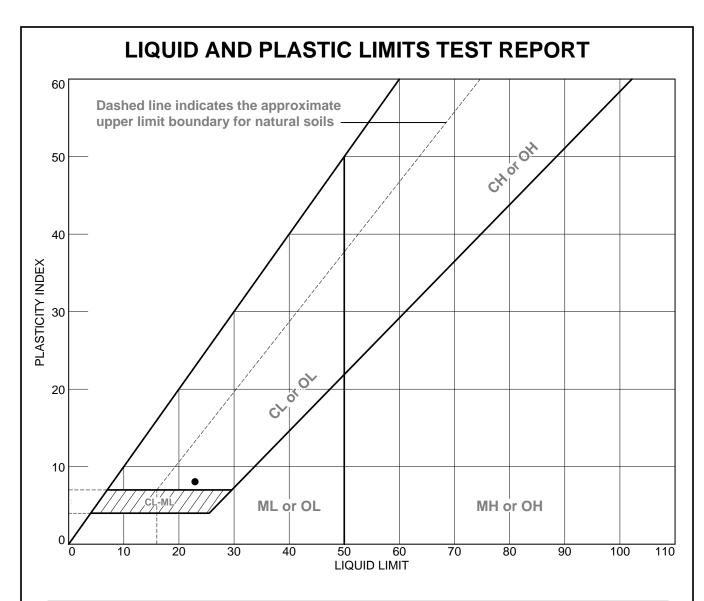
	SOIL DATA										
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs			
•	S35TP-106	13350	8.4-9.4'		14	23	9	GC			

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



	SOIL DATA										
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs			
•	S35TP-107	13354	9-10'		NP	NV	NP	SM			

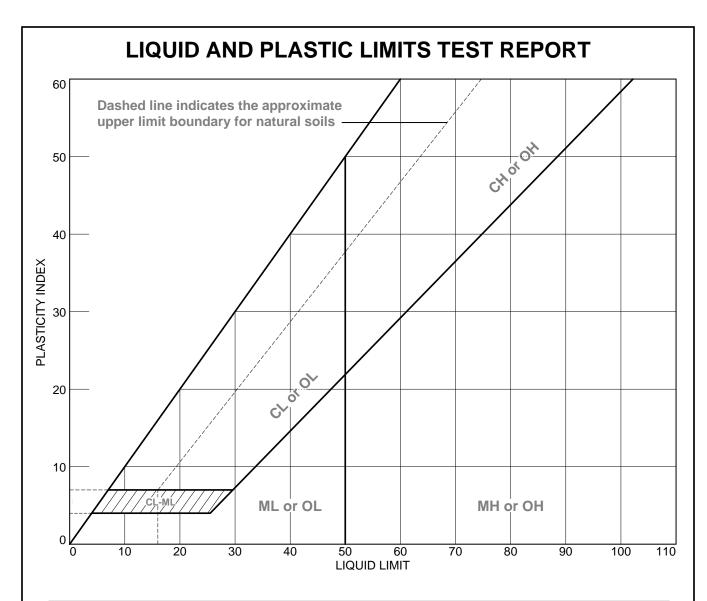
Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



	SOIL DATA										
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS			
•	S35TP-111	13371	10.5-11.5		15	23	8	GC			

Client: Montana Department of Environmental Quality

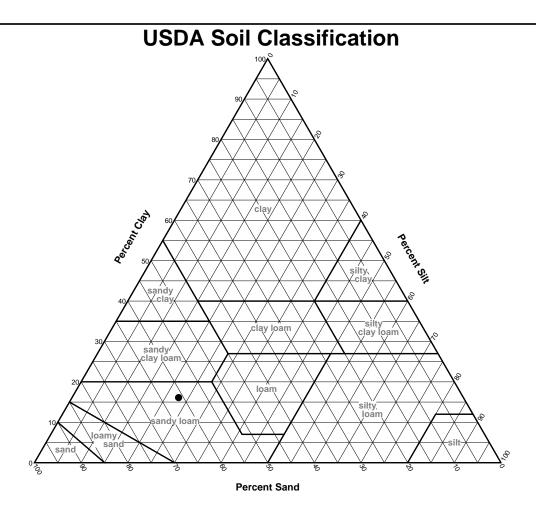
Project: UBMC Section 35 Design Investigation



	SOIL DATA										
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs			
•	S35TP-113	13381	1.5-3.5		NP	NV	NP	GW			

Client: Montana Department of Environmental Quality

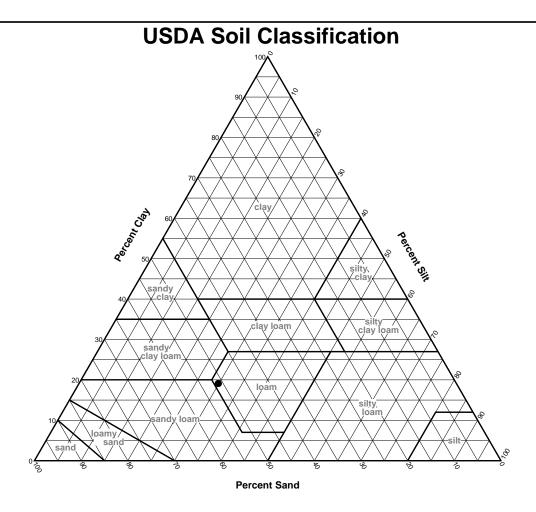
Project: UBMC Section 35 Design Investigation



	SOIL DATA											
	Source	Percentages From Material Passing a #10 Sieve			Classification							
ш		No.		Sand	Silt	Clay	Classification					
	S35BGT-01			61	22	16	Sandy loam					

Client: Montana Department of Environmental Quality

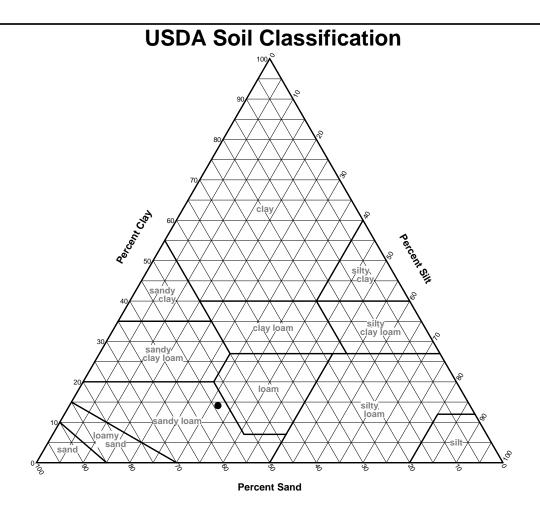
Project: UBMC Section 35 Design Investigation



				SOIL D	ATA						
	Source	Source Sample Depth Percentages From Material Passing a #10 Sieve									
	Source	No.		Sand	Silt	Clay	Classification				
•	S35BGT-02			51	30	19	Loam				

Client: Montana Department of Environmental Quality

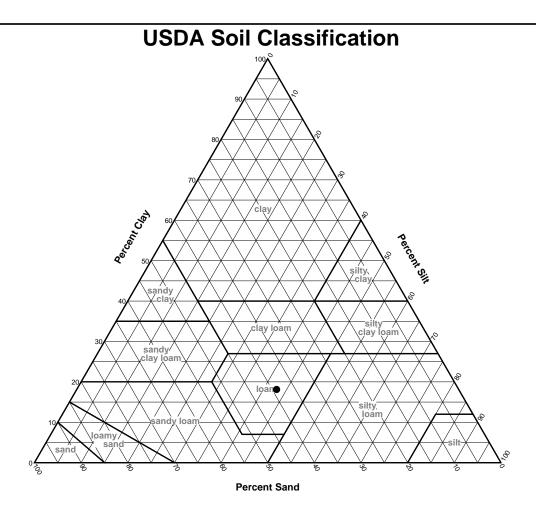
Project: UBMC Section 35 Design Investigation



				SOIL D	ATA		
	Source	Percentages From Material Passing a #10 Sieve			Classification		
	Jource	No.		Sand	Silt	Clay	Classification
	S35BGT-03			54	31	14	Sandy loam
H							
\vdash							
H							

Client: Montana Department of Environmental Quality

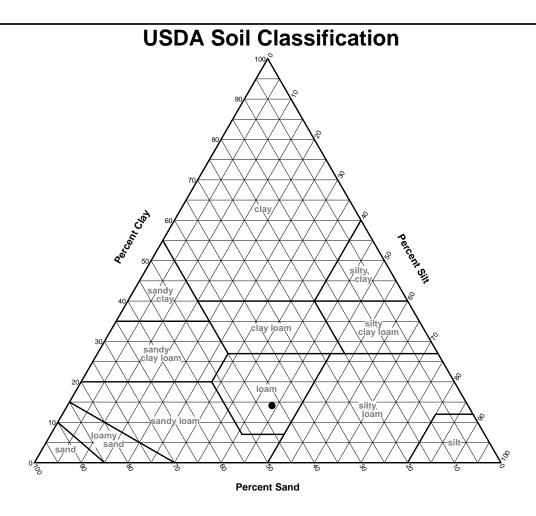
Project: UBMC Section 35 Design Investigation



				SOIL D	ATA		
	Source	Percentages From Material Passing a #10 Sieve			Classification		
	Jource	No.		Sand	Silt	Clay	Classification
	S35CS-01			39	43	18	Loam
L							

Client: Montana Department of Environmental Quality

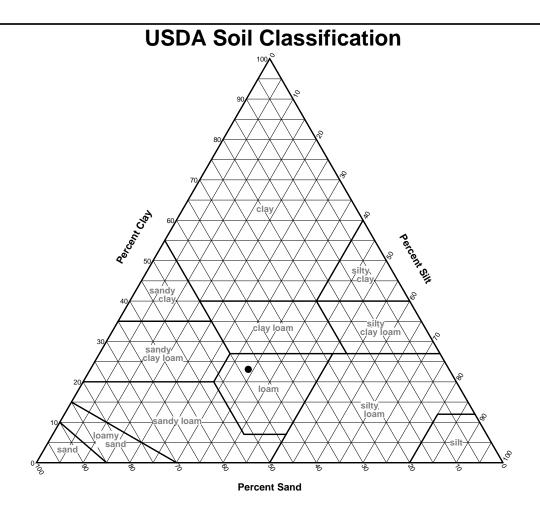
Project: UBMC Section 35 Design Investigation



SOIL DATA										
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification				
Source			Sand	Silt	Clay	Classification				
S35CS-02			42	43	14	Loam				

Client: Montana Department of Environmental Quality

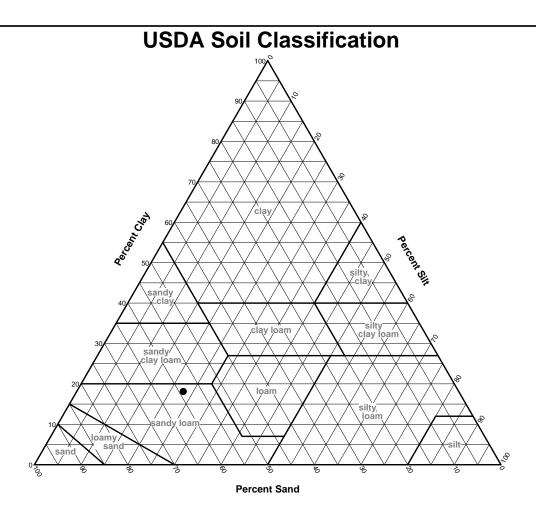
Project: UBMC Section 35 Design Investigation



	SOIL DATA										
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification				
Ш	Jource			Sand	Silt	Clay	Classification				
	S35TP-104	13341	7-10'	43	34	23	Loam				

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

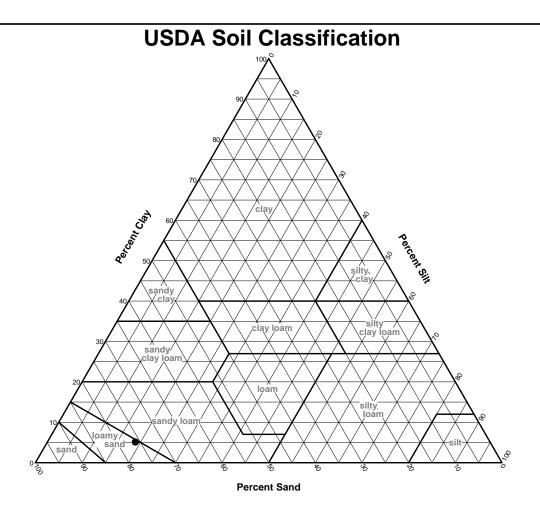


				SOIL D	ATA		
П	Source	Sample	Depth		rom Material Pass	ing a #10 Sieve	Classification
	Jource	No.		Sand	Silt	Clay	Classification
	S35TP-106	13350	8.4-9.4'	59	23	18	Sandy loam
H							

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Project No.: 10180 Figure

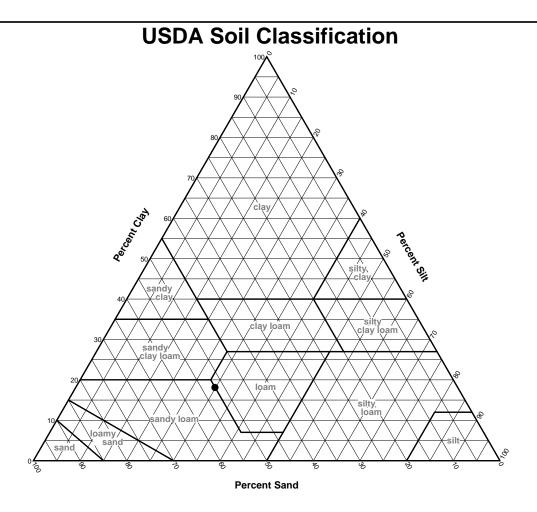


				SOIL DA	ATA		
	Source	Sample	Depth	 	rom Material Passi	ng a #10 Sieve	Classification
Ш		No.		Sand	Silt	Clay	Classification
	S35TP-107	13354	9-10'	76	19	5	Loamy sand
H							

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Project No.: 10180 Figure

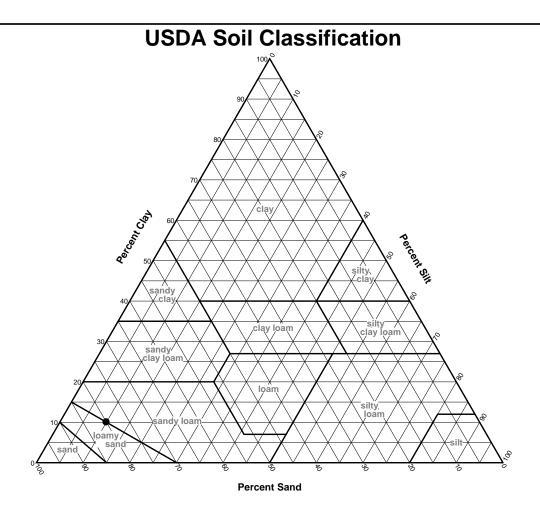


			SOIL D	ATA		
Source	Sample	Depth		From Material Pass		Classification
Oource	No.		Sand	Silt	Clay	Glassification
S35TP-111	13371	10.5-11.5	52	30	18	Sandy loam

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Project No.: 10180 Figure



			SOIL DA	ATA		
Source	Sample	Depth		rom Material Passi	ng a #10 Sieve	Classification
Source	No.		Sand	Silt	Clay	Classification
S35TP-113	13381	1.5-3.5	80	10	10	Sandy loam

Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Project No.: 10180 Figure



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Company Na	me: P	Pioneer Technical Services	Project Nar	ne: UBMC	Repositor	У										
Report Mail	Addre	ess:	Project Cor	tact Name,	Phone, Fa	x, En	nail:								X 133 X 133 X 133 X 133 X 133 X 133	
Invoice Addr	ess:		Invoice Con	ntact and Ph	one:									Pu	rchas	se Order:
Project Name: UBMC Repository				ED	Comments:	puno	pund									
		Sample Identification	Collection		ample Type	foisture Content	tterberg Limits	radation	roctor (STD, M	Vienal Clace	Isuai Ciass	SEE ATTACHED	Material Description	Vormal Tunrar	USH Turnaro	Pioneer
Client ID	1.5	(Name, Location, Interval, etc.)	Date	Time	32		1 1-1	9	А	1		S	Waterial Description	X	H	Lab No. 13324
	1	33 11 101 (0 0.7)			SOLE	1				1						
	2. 3	S35 TP-101 (0.7-1.7')			SOIL									X	Date/Tin	13325
	3. S	335 TP-101 (2.5-3.5°)			SOIL	X	Ī			7	K			X		13326
	4. :	S35 TP-101 (8.2-9.2')			SOIL	X				3	X			X		13327
	5. 8	335 TP-101 (17-17.2')			SOIL	X				7	X			X		13328
	6.	S35 TP-101 (8.2- 9.2')			SOIL	X				2	X			X		13329
		Relinquished by:	Date/Time	:	Shippe	d by:	1					Re	ceived by:	10	181	12 3:00
MUST	be	Relinquished by:	Date/Time		Shippe	d by:						Re	ceived by:			ime:



Page 2 of 1

Company Na	me: P	Pioneer Technical Services	Project Nar	ne: UBMC	Repositor	У									
Report Mail	Addre	ess:	Project Cor	ntact Name,	Phone, Fa	ix, En	nail:							133 133 133 133 133 133	
Invoice Addr	ess:		Invoice Con	ntact and Ph	one:								Pt	ircha	se Order;
					Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Visual Class	SEE ATTACHED	Comments:	mal Tunraround	X X X Normal Tunraround RUSH Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	San	Mois	Atte	Grad	Proc	Vis	SEE	Material Description	Nor	RU	Pioneer Lab No.
	1. S	335 TP-102 (0-0.7')			SOIL			Ī					X		13330
	2. 1	\$35 TP-102 (0.7-3.7')			SOIL					X			X		13331
	3. S	335 TP-102 (9.0-10.0')			SOIL	X				X			X		13332
	4.	S35 TP-102 (13-13.5')			SOIL	X		Ī		X			X		13333
	5. S	335 TP-102 (15-16')			SOIL	,		ī		X			X		13334
	6.	\$35 TP-103 (0-1.4')			SOIL		i						X	1	13335
Custod		Relinquished by:	Date/Time	;	Shipped	d by:			1 1		Rec	eived by:	10	18	12 3:60
MUST Signed	be	Relinquished by:	Date/Time		Shipped	d by:					Red	eived by:	D	ate/T	ime:



Page 3 of 1

Company Na	me: P	ioneer Technical Services	Project Nar	ne: UBMC	Repositor	У										
Report Mail	Addre	SS:	Project Con	tact Name,	Phone, Fa	x, En	nail:									
Invoice Addr	ess:		Invoice Con	ntact and Ph	one:									Pu	rcha	se Order:
					ų.	nt	89		(OD)		20	HED .	Comments:	round	puno	
CI: + ID	Ì	Sample Identification	Collection	Collection	Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED	Material Description	Normal Tunraround	RUSH Turnaround	Pioneer
Client ID	1. S	(Name, Location, Interval, etc.) 35 TP-103 (4.5-5.5')	Date	Time	SOIL	X	A	0	P	H	X	00	Waterial Description	X	H	Lab No. 13336
	2. 5	535 TP-103 (8.5-9.5')			SOIL	X					X			X		13337
	3. S	35 TP-103 (16.7-17.7')			SOIL	X					X			X		13338
	4. 5	S35 TP-104 (0-1.0')			SOIL									X	X X	13339
	5. S	35 TP-104 (I-4.5')			SOIL						X			X		13340
	6. 5	335 TP-104 (7-10°)			SOIL		X	X		X				X		13341
Custod		Relinquished by:	Date/Time	:	Shipped	d by:						Re	cocived by:		ate/T	
MUST Signed	be	Relinquished by:	Date/Time		Shipped	d by:						Re	eccived by:		ate/Ti	



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Company Na	ame: I	Pioneer Technical Services	Project Nar	ne: UBMC	Repositor	ry									
Report Mail	Addro	ess:	Project Con	ntact Name,	Phone, Fa	ax, En	nail:						X 133 X 133 X 133 X 133		
Invoice Addr	ress:		Invoice Con	ntact and Ph	one:								Pu	ircha	se Order:
												Comments:			
					Sample Type	Moisture Content	Atterberg Limits	ation	Proctor (STD, MOD)	Visual Class	ATTACHED		nal Tunraround	H Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Sarr	Mois	Atter	Gradation	Proct	Visi	SEE	Material Description	Norr	RUS	Pioneer Lab No.
	1. 5	635 TP-104 (15-17')			SOIL	X				X			X	M	13342
1	2.	S35 TP-105 (0-1.7')			SOIL								X		13343
	3. 5	S35 TP-105 (3-4')			SOIL	X			i	X			X		13344
	4.	\$35 TP-105 (8-9')			SOIL	X				X			X		13345
	5, 5	535 TP-105 (17-17.5°)			SOIL	Ī							X	T	13346
	6.	S35 TP-105 (16.5-17.0°)			SOIL								X	11	13347
Custod		Relinquished by:	Date/Time	i.	Shipped	d by:					Re	ceived by:		nte/Ti	me: 12 31.60
MUST I	be	Relinquished by:	Date/Time	1	Shipped	d by:					Re	ceived by:		nte/Ti	



Page of M

Company Na	me: Pioneer Technical Services	Project Nar	ne: UBMC	Repositor	ry										
Report Mail	Address:	Project Cor	ntact Name,	Phone, Fa	ax, En	nail:									
Invoice Addr	ess:	Invoice Co	ntact and Ph	one:									Pu	rcha	se Order:
				Sample Type	Moisture Content	Atterberg Limits	ation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED	Comments:	Normal Tunraround	RUSH Turnaround	
Client ID	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Sam	Moist	Atter	Gradation	Proct	Hydr	Visu	SEE	Material Description	Nor	RUS	Pioneer Lab No.
	1. S35 TP-106 (0-2.9°)			SOIL									X		13348
	2. S35 TP-106 (3.6-4.6')			SOIL						X			X	II	13349
	3. S35 TP-106 (8.4-9.4°)			SOIL	X	X	X		X				X		13350
	4. S35 TP-106 (17.2-18.2')			SOIL	X			1		X			X	Date/Ti	13351
	5.														
	6.				li										
Custod		Date/Time		Shippe	d by:						Re	sceived by:		1	me:
MUST I	Relinquished by:	Date/Time		Shippe	d by:						Re	eceived by:			



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Company Nam	ne: Pioneer T	echnical Services	Project Nar	ne: UBMC	Reposito	ry										
Report Mail Ad	ddress:		Project Cor	tact Name,	Phone, Fa	ax, En	nail:									
Invoice Addres	ss:		Invoice Con	ntact and Ph	one:									Pi	ırcha	se Order:
	y				Sample Type	Moisture Content	Atterberg Limits	oo	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED	Comments:	Normal Tunraround	RUSH Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Samp	Moistu	Atterbe	Gradation	Proctor	Hydre	Visua	SEE A	Material Description	Norma	RUSH	Pioneer Lab No.
	1. S35TP - 10				soil					ľ				X	li	13352
	2 S35TP - 10	07 1.7-5.2'			soil	X					X			X	F	13353
	3 S35TP - 10	9.0-10.0			soil	X	X	X		X				X		13354
	4 S35TP – 10	07 15-16°			soil	X					X			X	Ť	13355
	5 S35TP-108	0-2.1'			soil									X		13356
	6 S35TP-108	2.1-4.7'			soil			X X				13357				
Custody Record	7	uished by:	Date/Time	:	Shippe	d by;						Rec	rejved by:	1	ate/T	
MUST be Signed	e Relinq	uished by:	Date/Time		Shippe	d by:						Rec	eived by:	D	ate/T	ime:



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Company Na	me: P	ioneer Technical Services	Project Nan	ne: UBMC	Reposito	ry										
Report Mail A	Addre	ess:	Project Con	tact Name,	Phone, Fa	ax, En	nail:									
Invoice Addr	ess:		Invoice Cor	ntact and Ph	one:									Pu	irchas	se Order:
													Comments:			
					Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED		Normal Tunraround	RUSH Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Sam	Mois	Atter	Grad	Proct	Hyc	Visi	SEE	Material Description	Non	RUS	Pioneer Lab No.
	1 S.	35TP-108 8.5-9.5'		•	soil						X		:	X		13358
	2 S	35TP-108 15-16*			soil						X	T		X		13359
	3 S	35TP-108 15-16' (saturated)			soil									X		13360
	4 S	35TP-109 0-1.3°			soil			f						X		13361
	5 S.	35TP-109 3.6-4.6°			soil	X					X			X		13362
	6 S	35TP-109 7.3-8.3			soil	X					X			X		13363
Custod	-	Relinquished by:	Date/Time		Shippe	d by:						R	ecoived by:	Da	ate/Ti	me: 300
MUST I	be	Relinquished by:	Date/Time	Ü	Shippe	d by:						R	eceived by:		ate/Ti	



Page of M

Company Name	: Pioneer Technical Services	Project Nar	ne: UBMC	Reposito	ry										
Report Mail Add	dress:	Project Cor	ntact Name,	Phone, Fa	ax, En	nail:									
Invoice Address		Invoice Con	ntact and Ph	one:									Pu	ircha	se Order:
)D)			Q	Comments:	pun	pur	
		Y	I consider	Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED		Normal Tunraround	RUSH Turnaround	
Client ID	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time		Mo	Atte	Gra	Pro	Hy	Vi	SE	Material Description	No	RC	Pioneer Lab No.
1	S35TP-109 16.6-17.6'			soil	X					X			x		13364
2	S35TP-110 0-1.3*			soil									x		13365
3	S35TP-110 4-5'			soil	х					X			x		13366
4	S35TP-110 9-10'			soil	x					X			x		13367
5	S35TP-110 16.5-17.5			soil	X				Ī	х			х		13368
6	S35TP-111 0-1'			soil	Ħ								х		13369
Custody Record	Relinquished by:	Date/Time		Shippe	d by:						Re	celived by:	10	ate/Ti	12 300
MUST be Signed	Relinquished by:	Date/Time		Shippe	d by:						Ro	oceived by:	Da	ate/Ti	me:



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Company Nar	ne: Pioneer Technical Services	Project Nan	ne: UBMC	Reposito	ry										
Report Mail A	ddress:	Project Con	tact Name,	Phone, Fa	ax, En	nail:									
Invoice Addre	ess:	Invoice Con	ntact and Ph	one:									Pu	ırcha	se Order;
				Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED	Comments:	Normal Tunraround	RUSH Turnaround	
Client ID	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	San	Mois	Atter	Grad	Proc	Hyc	Vis	SEE	Material Description	Nor	RUS	Pioneer Lab No.
	1 S35TP-111 1-4.7'			Soil	X					X					13370
	2 S35TP-111 10.5-11.5'			Soil	х	x	x		X						13371
	3 S35TP-111 16.5-17.0°			Soil											13372
	4 S35TP-111 18.0-18.7'			Soil											13373
	5 S35TP-111 16.0-16.5°			Soil											13374
	6 S35TP-112 0-2°			Soil											13375
Custody Record		Date/Time	r.	Shippe	d by:						Rec	reived by:	D	ate/Ti	ime:
MUST b	Relinquished by:	Date/Time		Shippe	d by:						Rec	peived by:	D	ate/Ti	



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Company Na	me: P	ioneer Technical Services	Project Nan	ne: UBMC	Repositor	ry										
Report Mail A	Addre	PSS:	Project Con	tact Name,	Phone, Fa	ax, En	nail:									
Invoice Addre	ess:		Invoice Cor	ntact and Ph	one:									Pu	irchas	se Order:
													Comments:			
					Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	Visual Class	SEE ATTACHED		Normal Tunraround	RUSH Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	San	Mois	Atter	Grad	Proc	Hyc	Vis	SEE	Material Description	Nor	RUS	Pioneer Lab No.
-	1 S	35TP-112 2-4.5'			Soil	X					X			X		13376
	2 S	35TP-112 9.8-8.8°			Soil									X		13377
	3 S	35TP-112 16-16.5°			Soil									X		13378
	4 S	35TP-112 15-16'			Soil	X				7-1	X			X		13379
	5 S.	35TP-113 1-1.2'			Soil									X		13380
	6 S.	35TP-113 1.5-3.5°			Soil	X	X	X	X	X				X		13381
Custod	-	Relinquished by:	Date/Time		Shippe	d by:						Rec	peived by:		ate/Ti	ime: 300
MUST I	be	Relinquished by:	Date/Time		Shippe	d by:						Rec	eived by:	D	ate/Ti	ime:



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Company Na	me: P	ioneer Technical Services	Project Nar	ne: UBMC	Repositor	ry											
Report Mail	Addre	ess:	Project Con	ntact Name,	Phone, Fa	ax, En	nail:										
Invoice Addr	ress:		Invoice Co	ntact and Ph	one:										Pu	ırcha	se Order:
					Sample Type	Moisture Content	Atterberg Limits	ıtion	Proctor (STD, MOD)	Hydrometer	Visual Class	GEE ATTACHED		Comments:	Normal Tunraround	RUSH Turnaround	
Client ID		Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Sam	Moist	Atterb	Gradation	Procte	Hyd	Visu	GEE	SEE	Material Description	Norm	RUS	Pioneer Lab No.
	1 S.	35TP-113 8-9'			Soil			Ī		Ī					X		13382
	2 S	35TP-113 10-12°			Soil	Ħ									x		13383
	3 S:	35TP-113 16-17"			Soil	х					x				x		13384
																Ī	
Custod	•	Relinquished by:	Date/Time	2	Shippe	d by:						F	Reco	eived by:	10	18	ime: 12 300
MUST I Signed	be	Relinquished by:	Date/Time		Shippe	d by:						F	Reco	eived by:	Da	ate/T	ime:



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Company Na	me: Pioneer Technical Services	1	Project Nar	ne: UBMC	Repositor	У									
Report Mail	Address:		Project Cor	ntact Name, I	Phone, Fa	x, En	nail:								
Invoice Addr	ess:		Invoice Con	ntact and Pho	one:								Pu	rcha	se Order:
					0	-			(QO)		ED	Comments:	puno	puno	
				Collection	Sample Type	Moisture Content	Atterberg Limits	Gradation	Proctor (STD, MOD)	Hydrometer	E ATTACHED		Normal Tunraround	RUSH Turnaround	Pioneer
Client ID	Sample Ident (Name, Location, In	nterval, etc.)	Collection Date	Time	100	Mo	Att	Gre	Pro		SEE.	Material Description	ž	RI	Lab No.
	1 S35-BGT-01: 13326, 13327, 13379	13381, 13384, 13376,			Soil	х				X					afe afe
	2 \$35-BGT-02: 13366, 13367, 13358	13370, 13371, 13344,			Soil	x				X					**
	3 S35-BGT-03: 13340, 13341,	13353, 13354, 13331			Soil	x				X					a)e a)e
	4 S35-CS-01: 13324, 13325, 13	380, 13375			Soil	х			= 1	X					* #
	5 \$35-CS-01: 13365, 13369, 13	343, 13356			Soil	x				X					એક એક
	6 S35-CS-01: 13339, 13352, 13	330			Soil	x				X					**
Custod			Date/Time		Shippe	d by:					Rec	reived by:	10	and the same of the	12 300
MUST 1	be Relinquished by:		Date/Time	to .	Shippe	d by:			· ·		Red	seived by:	Da	ate/T	me:

^{**}All samples are composite samples of listed sample numbers.

APPENDIX C.2

GEOTECHNICAL LABORATORY DATA - SOIL BORING GEOTECHNICAL DATA



Phone (406)457-8252 Fax (406)442-1158 www.pioneer-technical.com

Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B	S35MW-201B
Depth:	0.0-1.5	1.5-3.0	5.0-6.5	6.5-8.0	10.8-12.3	15.0-16.5	16.5-18.0	20.0-21.5	21.5-23.0	25.0-26.5
Date Tested:										
Wet Wt, & Pan (g):	196.8	96.6	112.2	200.2	134.7	345.0	128.1	299.1	108.2	253.0
Dry Wt, & Pan (g):		88.3	102.5	174.7	119.7	313.3	120.0	281.4	89.8	
Loss of Moisture		8.4	9.6	25.5	15.0	31.7	8.1	17.6	18.4	23.
Wt. of Pan (g):	27.1	16.0	15.8	26.9	15.9	33.8	16.0	27.4	11.7	32.0
M(((D O !) ()	152.9	72.3	86.8	147.8	103.8	279.5	104.0	254.1	78.1	197.8
Wt. of Dry Soil (g):	102.0									
Wt. of Dry Soil (g):		12	11	17	14	11	8	7	24	12
• ,•,		12	11	17	14	11	8	7	24	12
M. Content (%):		12	11	17	14	11	8	7	24	12
M. Content (%):	11									
M. Content (%): Lab No: BH or Loc:	11 S35MW-201B	S35MW-201B	\$35MW-202B	S35MW-202B	\$35MW-202B	\$35MW-202B	S35MW-202B	\$35MW-202B	\$35MW-202B	S35MW-202E
M. Content (%): Lab No: BH or Loc: Depth:	11									
M. Content (%): Lab No: BH or Loc:	11 S35MW-201B	S35MW-201B	\$35MW-202B	S35MW-202B	\$35MW-202B	\$35MW-202B	S35MW-202B	\$35MW-202B	\$35MW-202B	S35MW-202E
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	\$35MW-201B 26.5-28.0	S35MW-201B 30.0-31.5	S35MW-202B 0.0-1.5	S35MW-202B 1.5-3.0	S35MW-202B 5.0-6.5	S35MW-202B 6.5-8.0	\$35MW-202B 8.5-9.5	S35MW-202B 10.0-11.5	S35MW-202B 11.5-13.0	S35MW-202E 15.0-16.5
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35MW-201B 26.5-28.0	\$35MW-201B 30.0-31.5	\$35MW-202B 0.0-1.5	S35MW-202B 1.5-3.0	\$35MW-202B 5.0-6.5	\$35MW-202B 6.5-8.0	\$35MW-202B 8.5-9.5	\$35MW-202B 10.0-11.5	S35MW-202B 11.5-13.0 81.1	\$35MW-202E 15.0-16.5
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	\$35MW-201B 26.5-28.0 210.0 191.1	\$35MW-201B 30.0-31.5 115.8 102.1	S35MW-202B 0.0-1.5	S35MW-202B 1.5-3.0	\$35MW-202B 5.0-6.5 258.0 239.7	\$35MW-202B 6.5-8.0 70.0 64.8	\$35MW-202B 8.5-9.5	S35MW-202B 10.0-11.5	S35MW-202B 11.5-13.0	\$35MW-202E 15.0-16.5 231.6 212.7
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35MW-201B 26.5-28.0 210.0 191.1 18.9	\$35MW-201B 30.0-31.5 115.8 102.1 13.7	\$35MW-202B 0.0-1.5 263.2 243.4 19.7	\$35MW-202B 1.5-3.0 110.7 105.6	\$35MW-202B 5.0-6.5 258.0 239.7 18.3	\$35MW-202B 6.5-8.0 70.0 64.8 5.2	\$35MW-202B 8.5-9.5 232.5 212.2 20.4	\$35MW-202B 10.0-11.5 182.3 162.7	\$35MW-202B 11.5-13.0 81.1 75.0	\$35MW-202E 15.0-16.5 231.8 212.7 19.3
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35MW-201B 26.5-28.0 210.0 191.1 18.9 24.9	\$35MW-201B 30.0-31.5 115.8 102.1 13.7	\$35MW-202B 0.0-1.5 263.2 243.4 19.7 33.7	\$35MW-202B 1.5-3.0 110.7 105.6 5.0	\$35MW-202B 5.0-6.5 258.0 239.7 18.3	\$35MW-202B 6.5-8.0 70.0 64.8 5.2 15.8	\$35MW-202B 8.5-9.5 232.5 212.2 20.4 34.0	\$35MW-202B 10.0-11.5 182.3 162.7 19.7	\$35MW-202B 11.5-13.0 81.1 75.0 6.1	\$35MW-202B 15.0-16.5 231.8 212.7



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-202B	S35MW-203B	S35MW-203
Depth:	16.5-18.0	20.0-21.0	21.0-21.5	21.5-23.0	25.0-26.5	26.5-27.25	27.25-27.5	40.0-41.5	0.0-0.5	0.5-1.5
Date Tested:										
_										
Wet Wt, & Pan (g):	91.5	318.4	171.0	85.3	197.4	74.1	68.3	94.9	67.5	102
Dry Wt, & Pan (g):	84.3	292.7	153.1	77.7	179.5	67.5	64.0	81.1	56.1	98
Loss of Moisture	7.3	25.7	18.0	7.7	17.8	6.6	4.3	13.8	11.4	3
Wt. of Pan (g):	15.6		24.5			16.1	16.0	15.7	11.7	15
	68.7	267.6	128.5	61.9	147.0	51.4	48.0	65.4	44.4	82
Wt. of Dry Soil (g):	00.7	20110								
Wt. of Dry Soil (g): M. Content (%):	11		14	12	12	13	9	21	26	
• (•/				12	12	13	9	21	26	
• (•/				12	12	13	9	21	26	
• (•/				12	12	13	9	21	26	
M. Content (%):				12 S35MW-203B	12 S35MW-203B	13 S35MW-203B	9 S35MW-203B	21 S35MW-203B	26 S35MW-203B	
M. Content (%):	11	10	14							S35MW-203
M. Content (%): Lab No: BH or Loc:	11 S35MW-203B	10 S35MW-203B	14 S35MW-203B	S35MW-203B	\$35MW-203B	\$35MW-203B	S35MW-203B	S35MW-203B	S35MW-203B	S35MW-203
Lab No: BH or Loc: Depth: Date Tested:	S35MW-203B 1.5-3.0	S35MW-203B 5.0-6.5	S35MW-203B 6.5-8.0	S35MW-203B 10.0-11.5	S35MW-203B 15.0-16.5	S35MW-203B 16.5-18.0	\$35MW-203B 20.8-22.3	S35MW-203B 25.0-26.5	S35MW-203B 26.5-28.0	\$35MW-203
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35MW-203B 1.5-3.0	\$35MW-203B 5.0-6.5	\$35MW-203B 6.5-8.0	S35MW-203B 10.0-11.5	S35MW-203B 15.0-16.5	S35MW-203B 16.5-18.0 89.2	\$35MW-203B 20.8-22.3	\$35MW-203B 25.0-26.5	\$35MW-203B 26.5-28.0	\$35MW-203 30.0-30.7
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35MW-203B 1.5-3.0 104.3 100.1	\$35MW-203B 5.0-6.5 129.3 126.6	\$35MW-203B 6.5-8.0 78.2 75.1	\$35MW-203B 10.0-11.5 237.5 217.2	\$35MW-203B 15.0-16.5 120.0 114.0	\$35MW-203B 16.5-18.0 89.2 85.3	\$35MW-203B 20.8-22.3 274.4 248.1	\$35MW-203B 25.0-26.5 276.3 247.5	\$35MW-203B 26.5-28.0 89.3 79.1	\$35MW-203 30.0-30.7
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Loss of Moisture	\$35MW-203B 1.5-3.0 104.3 100.1 4.2	\$35MW-203B 5.0-6.5 129.3 126.6 2.7	\$35MW-203B 6.5-8.0 78.2 75.1 3.1	\$35MW-203B 10.0-11.5 237.5 217.2 20.2	\$35MW-203B 15.0-16.5 120.0 114.0 6.0	\$35MW-203B 16.5-18.0 89.2 85.3 3.9	\$35MW-203B 20.8-22.3 274.4 248.1 26.4	\$35MW-203B 25.0-26.5 276.3 247.5 28.9	\$35MW-203B 26.5-28.0 89.3 79.1 10.2	\$35MW-203 30.0-30.7 92 80 12
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Loss of Moisture Wt. of Pan (g):	\$35MW-203B 1.5-3.0 104.3 100.1 4.2 16.0	\$35MW-203B 5.0-6.5 129.3 126.6 2.7 16.1	\$35MW-203B 6.5-8.0 78.2 75.1 3.1 12.2	\$35MW-203B 10.0-11.5 237.5 217.2 20.2 25.0	\$35MW-203B 15.0-16.5 120.0 114.0 6.0 16.3	\$35MW-203B 16.5-18.0 89.2 85.3 3.9 15.9	\$35MW-203B 20.8-22.3 274.4 248.1 26.4 25.1	\$35MW-203B 25.0-26.5 276.3 247.5 28.9 25.0	\$35MW-203B 26.5-28.0 89.3 79.1 10.2 15.8	\$35MW-203 30.0-30.7 92 80 12
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Loss of Moisture	\$35MW-203B 1.5-3.0 104.3 100.1 4.2	\$35MW-203B 5.0-6.5 129.3 126.6 2.7 16.1	\$35MW-203B 6.5-8.0 78.2 75.1 3.1 12.2	\$35MW-203B 10.0-11.5 237.5 217.2 20.2 25.0	\$35MW-203B 15.0-16.5 120.0 114.0 6.0 16.3	\$35MW-203B 16.5-18.0 89.2 85.3 3.9	\$35MW-203B 20.8-22.3 274.4 248.1 26.4 25.1	\$35MW-203B 25.0-26.5 276.3 247.5 28.9	\$35MW-203B 26.5-28.0 89.3 79.1 10.2 15.8	\$35MW-203 30.0-30.7 92 80 12 15 64



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204B	S35SB-204E
Depth:	0.0-0.75	0.75-1.5	1.5-3.0	5.0-6.5	6.5-8.0	10.0-11.5	11.5-13.0	21.5-23.0	25.0-26.5	30.0-30.5
Date Tested:										
,										
Wet Wt, & Pan (g):	119.4						78.2	75.2	325.1	184
Dry Wt, & Pan (g):	112.0	91.7	93.5	225.8	68.6	165.3	71.7	68.7	268.8	159
Loss of Moisture	7.4	5.4	5.4	13.5	6.0	17.0	6.5	6.5	56.3	24
Wt. of Pan (g):	23.0		15.5		14.5		16.4	14.1	33.9	23
	89.0	75.6	78.0	201.1	54.1	140.2	55.3	54.6	234.9	136
Wt. of Dry Soil (g):	05.0									
Wt. of Dry Soil (g): M. Content (%):		7	7	7	11	12	12	12	24	1
, , ,			7	7	11	12	12	12	24	1
, , ,			7	7	11	12	12	12	24	1
, , ,			7	7	11	12	12	12	24	1
M. Content (%):			7 S35SB-206B	7 S35SB-206B	11 S35SB-206B	12 S35SB-206B	12 S35SB-206B	12 S35SB-206B	24 S35SB-206B	
M. Content (%): Lab No:	8	7	-							S35SB-206B
M. Content (%): Lab No: BH or Loc:	\$35SB-206B 0.0-0.5	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	\$35\$B-206B	\$35\$B-206B	S35SB-206B	S35SB-206E
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	\$35\$B-206B 0.0-0.5	S35SB-206B 0.5-1.5	\$35\$B-206B 1.5-3.0	\$35\$B-206B 5.0-5.5	\$35\$B-206B 5.5-6.5	\$35\$B-206B 6.5-8.0	S35SB-206B 10.0-11.5	S35SB-206B 11.5-13.0	\$35\$B-206B 16.5-18.0	\$35\$B-206I 20.0-21.5
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35SB-206B 0.0-0.5	S35SB-206B 0.5-1.5	\$35\$B-206B 1.5-3.0	\$35\$B-206B 5.0-5.5 273.4	\$35\$B-206B 5.5-6.5	\$35\$B-206B 6.5-8.0	S35SB-206B 10.0-11.5 96.0	S35SB-206B 11.5-13.0 94.3	S35SB-206B 16.5-18.0 88.6	\$35\$B-206I 20.0-21.5
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35SB-206B 0.0-0.5 83.6 78.3	\$35\$B-206B 0.5-1.5 186.3 174.4	S35SB-206B 1.5-3.0 103.5 99.8	\$35\$B-206B 5.0-5.5 273.4 256.3	\$35\$B-206B 5.5-6.5 238.4 221.8	\$35\$B-206B 6.5-8.0 97.9 93.2	\$35\$B-206B 10.0-11.5 96.0 87.5	\$35\$B-206B 11.5-13.0 94.3 86.1	S35SB-206B 16.5-18.0 88.6 80.4	\$35\$B-206l 20.0-21.5 190 171
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35SB-206B 0.0-0.5 83.6 78.3 5.4	\$35\$B-206B 0.5-1.5 186.3 174.4 11.9	\$35\$B-206B 1.5-3.0 103.5 99.8 3.8	\$35\$B-206B 5.0-5.5 273.4 256.3 17.1	\$35\$B-206B 5.5-6.5 238.4 221.8 16.6	\$35\$B-206B 6.5-8.0 97.9 93.2 4.7	\$35\$B-206B 10.0-11.5 96.0 87.5 8.4	\$35\$B-206B 11.5-13.0 94.3 86.1 8.2	\$35\$B-206B 16.5-18.0 88.6 80.4 8.3	\$35\$B-206E 20.0-21.5 190 171 19
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture Wt. of Pan (g):	\$35SB-206B 0.0-0.5 83.6 78.3 5.4 15.9	\$35\$B-206B 0.5-1.5 186.3 174.4 11.9 25.0	\$35\$B-206B 1.5-3.0 103.5 99.8 3.8 16.1	\$35\$B-206B 5.0-5.5 273.4 256.3 17.1 34.0	\$35\$B-206B 5.5-6.5 238.4 221.8 16.6 23.2	\$35\$B-206B 6.5-8.0 97.9 93.2 4.7 15.7	\$35\$B-206B 10.0-11.5 96.0 87.5 8.4 15.8	\$35\$B-206B 11.5-13.0 94.3 86.1 8.2 16.1	\$35\$B-206B 16.5-18.0 88.6 80.4 8.3 15.8	\$35\$B-206i 20.0-21.5 190 171 19 32
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35SB-206B 0.0-0.5 83.6 78.3 5.4	\$35\$B-206B 0.5-1.5 186.3 174.4 11.9 25.0	\$35\$B-206B 1.5-3.0 103.5 99.8 3.8 16.1	\$35\$B-206B 5.0-5.5 273.4 256.3 17.1	\$35\$B-206B 5.5-6.5 238.4 221.8 16.6	\$35\$B-206B 6.5-8.0 97.9 93.2 4.7	\$35\$B-206B 10.0-11.5 96.0 87.5 8.4	\$35\$B-206B 11.5-13.0 94.3 86.1 8.2	\$35\$B-206B 16.5-18.0 88.6 80.4 8.3	171. 19. 32.



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	S35SB-206B	S35MW-207	S35MW-207	S35MW-20
Depth:	21.5-23.0	25.0-26.5	26.5-28.0	30.0-31.5	35.0-36.5	40.0-41.5	45.0-45.9	0.0-1.5	1.5-3.0	5.0-6.5
Date Tested:										
Wet Wt, & Pan (g):	203.0		106.8	88.6		103.1	102.2	169.2	110.6	
Dry Wt, & Pan (g):	175.9	240.5	86.3	73.9		88.6	93.2	152.6	107.3	279
Loss of Moisture	27.1	40.5	20.6	14.7	9.8		9.1	16.6	3.3	1
Wt. of Pan (g):	34.1	24.7	14.5	15.8	15.6	15.6	15.6	22.9	15.9	3
	111	215.9	71.8	58.1	63.7	72.9	77.6	129.7	91.4	24
Wt. of Dry Soil (g):	141.8	210.9	7 110							
Wt. of Dry Soil (g): M. Content (%):	141.8 19		29	25	15		12	13	4	
, ,,,,					15		12	13	4	
, ,,,,					15		12	13	4	
, ,,,,					15		12	13	4	
M. Content (%):					15 \$35MW-207		12 S35SB-208B	13 S35SB-208B	\$35SB-208B	\$35\$B-20
M. Content (%):	19	19	29	25		20				
M. Content (%): Lab No: BH or Loc:	19 S35MW-207	19 S35MW-207	29 S35MW-207	25 S35MW-207	S35MW-207	20 S35MW-207	\$35\$B-208B	\$35\$B-208B	S35SB-208B	
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	S35MW-207 6.5-8.0	19 S35MW-207	29 S35MW-207	25 S35MW-207	S35MW-207	20 S35MW-207	\$35\$B-208B	\$35\$B-208B	S35SB-208B	
M. Content (%): Lab No: BH or Loc: Depth:	19 S35MW-207	19 S35MW-207	S35MW-207 11.5-13.0	25 S35MW-207	\$35MW-207 30.0-31.0	\$35MW-207 35.0-35.25	\$35\$B-208B	\$35\$B-208B	S35SB-208B	15.3-16
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	S35MW-207 6.5-8.0	S35MW-207 10.0-11.5	S35MW-207 11.5-13.0	S35MW-207 15.0-15.5	\$35MW-207 30.0-31.0	\$35MW-207 35.0-35.25	\$35\$B-208B 5.0-6.5	\$35\$B-208B 6.5-8.0	S35SB-208B 10.8-12.3	15.3-16 14
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35MW-207 6.5-8.0	\$35MW-207 10.0-11.5 311.6 288.3	\$35MW-207 11.5-13.0	\$35MW-207 15.0-15.5	\$35MW-207 30.0-31.0	\$35MW-207 35.0-35.25	\$35\$B-208B 5.0-6.5	\$35\$B-208B 6.5-8.0	\$35\$B-208B 10.8-12.3	15.3-16 14 13
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35MW-207 6.5-8.0 263.2 236.7	\$35MW-207 10.0-11.5 311.6 288.3 23.4	\$35MW-207 11.5-13.0 99.2 89.4	\$35MW-207 15.0-15.5 96.0 86.2 9.8	\$35MW-207 30.0-31.0 101.6 81.2	\$35MW-207 35.0-35.25 91.5 80.6 11.0	\$35\$B-208B 5.0-6.5 214.9 198.6	\$35\$B-208B 6.5-8.0 187.7 171.1	\$35\$B-208B 10.8-12.3 91.6 83.7	15.3-16 14 13
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35MW-207 6.5-8.0 263.2 236.7 26.5	\$35MW-207 10.0-11.5 311.6 288.3 23.4	\$35MW-207 11.5-13.0 99.2 89.4 9.8	\$35MW-207 15.0-15.5 96.0 86.2 9.8 15.8	\$35MW-207 30.0-31.0 101.6 81.2 20.4 15.8	\$35MW-207 35.0-35.25 91.5 80.6 11.0 25.1	\$35\$B-208B 5.0-6.5 214.9 198.6 16.3	\$35\$B-208B 6.5-8.0 187.7 171.1 16.7	\$35\$B-208B 10.8-12.3 91.6 83.7 8.0	\$35\$B-206 15.3-16.



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Moisture Analysis - AASHTO T265; ASTM D2216

S35SB-208B	S35SB-208B	S35SB-208B	S35SB-208B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B
20.0-20.7	20.7-22.3	30.0-31.5	31.5-33.0	0.0-1.5	1.5-3.0	5.0-6.5	6.5-8.0	10.0-10.5	10.5-11.5
118.4	105.7	267.7	89.3	232.5	146.0	208.9	101.8	323.0	241.1
110.0	96.3	241.7	78.6	214.5	137.1	187.0	93.2	308.8	218.7
8.4	9.3	26.0	10.7	18.0	8.9	21.8	8.6	14.2	22.4
27.9	15.8	25.0	16.0	25.0	23.0	27.4	16.1	34.0	34.0
82.1	80.5	216.8	62.6	189.6	114.1	159.6	77.2	274.8	184.7
10	12	12	17	10	8	14	11	5	12
S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B	S35SB-209B
11.5-13.0	15.0-16.5	16.5-16.75,	16.75-17.0	20.0-21.5	21.5-23.0	25.0-26.5	26.5-28.0	30.0-30.75	30.75-31.5
		17.0-18.0							
_									
									137.7
									119.8
									17.9
	00.0	16.1	27.9	24.7	14.5	33.9	32.6	25.0	
16.1	32.6								
16.1 78.2	230.7	67.7	76.6				170.0	147.7	22.9 96.8
	\$35\$B-208B 20.0-20.7 118.4 110.0 8.4 27.9 82.1 10 \$35\$\$B-209\$B 11.5-13.0 101.7 94.3 7.4	\$35\$\text{S35}\text{S-208B}\$ \$20.0-20.7\$ 20.7-22.3 118.4 105.7 110.0 96.3 8.4 9.3 27.9 15.8 82.1 80.5 10 12 \$35\$\text{SB-209B}\$ \$11.5-13.0 15.0-16.5 101.7 289.0 94.3 263.3 7.4 25.7	S35SB-208B S35SB-208B S35SB-208B 20.0-20.7 20.7-22.3 30.0-31.5 118.4 105.7 267.7 110.0 96.3 241.7 8.4 9.3 26.0 27.9 15.8 25.0 82.1 80.5 216.8 10 12 12 S35SB-209B S35SB-209B S35SB-209B 11.5-13.0 15.0-16.5 16.5-16.75, 17.0-18.0 101.7 289.0 91.3 94.3 263.3 83.8 7.4 25.7 7.5	S35SB-208B S35SB-208B S35SB-208B S35SB-208B 20.0-20.7 20.7-22.3 30.0-31.5 31.5-33.0 118.4 105.7 267.7 89.3 110.0 96.3 241.7 78.6 8.4 9.3 26.0 10.7 27.9 15.8 25.0 16.0 82.1 80.5 216.8 62.6 10 12 12 17 S35SB-209B S35SB-209B S35SB-209B S35SB-209B 11.5-13.0 15.0-16.5 16.5-16.75, 16.75-17.0 17.0-18.0 17.0-18.0 112.4 94.3 263.3 83.8 104.4 7.4 25.7 7.5 8.0	S35SB-208B S35SB-208B S35SB-208B S35SB-208B S35SB-209B 20.0-20.7 20.7-22.3 30.0-31.5 31.5-33.0 0.0-1.5 118.4 105.7 267.7 89.3 232.5 110.0 96.3 241.7 78.6 214.5 8.4 9.3 26.0 10.7 18.0 27.9 15.8 25.0 16.0 25.0 82.1 80.5 216.8 62.6 189.6 10 12 12 17 10 S35SB-209B S35SB-209B S35SB-209B S35SB-209B S35SB-209B 11.5-13.0 15.0-16.5 16.5-16.75, 16.75-17.0 20.0-21.5 17.0-18.0 17.0-18.0 10.7 20.0-21.5 10.7 289.0 91.3 112.4 231.1 94.3 263.3 83.8 104.4 209.1 7.4 25.7 7.5 8.0 22.0	S35SB-208B S35SB-208B S35SB-208B S35SB-209B S35SB-2	S35SB-208B S35SB-208B S35SB-208B S35SB-208B S35SB-209B S35SB-2	S35SB-208B S35SB-208B S35SB-208B S35SB-208B S35SB-208B S35SB-209B S35SB-2	S35SB-208B S35SB-208B S35SB-208B S35SB-209B S35SB-209B S35SB-209B S35SB-209B S35SB-209B S20.0-20.7 20.7-22.3 30.0-31.5 31.5-33.0 0.0-1.5 1.5-3.0 5.0-6.5 6.5-8.0 10.0-10.5



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35SB-209B	S35SB-209B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-21
Depth:	35.0-36.5	40.0-41.5	0.0-0.75	0.75-1.5	1.5-3.0	5.0-6.5	6.5-8.0	9.75-11.25	15.0-16.5	16.5-17
Mat Mt 9 Day (a):	70.0	454.7	CO 0	202.0	00.0	200.7	70.4	405.0	402.0	0
Wet Wt, & Pan (g):	79.6		69.9				79.4	105.2	183.2	8
Dry Wt, & Pan (g):				194.8	87.7	194.2	73.2	95.3	166.4	7
Loss of Moisture		31.7	12.6	8.2	3.1	15.5	6.2	9.9	16.9	
Wt. of Pan (g):	16.4	24.7	16.0	27.1	14.1	27.9	14.5	15.1	25.0	1
With at Day Cail (a)	48.2	95.3	41.3	167.7	73.7	166.4	58.7	80.2	141.4	5
Wt. of Dry Soil (g):										
M. Content (%):		33	31	5	4	9	11	12	12	
M. Content (%): Lab No:	31		-							
M. Content (%): Lab No: BH or Loc:	31 S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-210B	S35SB-211B	S35SB-211B	S35SB-21
M. Content (%): Lab No:	\$35SB-210B 17.5-18.0		-							S35SB-21
M. Content (%): Lab No: BH or Loc: Depth:	S35SB-210B 17.5-18.0	S35SB-210B	S35SB-210B 21.5-23.0	S35SB-210B	\$35\$B-210B 30.0-31.5	S35SB-210B	S35SB-210B 40.0-41.5	S35SB-211B	\$35\$B-211B 5.0-6.5	S35SB-21 9.5-11.
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	\$35\$B-210B 17.5-18.0	\$35\$B-210B 20.0-21.5	S35SB-210B 21.5-23.0	\$35\$B-210B 25.0-26.5	\$35\$B-210B 30.0-31.5	\$35\$B-210B 35.0-36.5	S35SB-210B 40.0-41.5	\$35\$B-211B 0.0-1.5	\$35\$B-211B 5.0-6.5	\$35\$B-21 9.5-11.
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35SB-210B 17.5-18.0 67.7 58.6	\$35\$B-210B 20.0-21.5	\$35\$B-210B 21.5-23.0 267.8	\$35\$B-210B 25.0-26.5	\$35\$B-210B 30.0-31.5	\$35\$B-210B 35.0-36.5	S35SB-210B 40.0-41.5	S35SB-211B 0.0-1.5	\$35\$B-211B 5.0-6.5	\$35\$B-21 9.5-11.
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35SB-210B 17.5-18.0 67.7 58.6	\$35\$B-210B 20.0-21.5 250.0 225.8 24.2	\$35\$B-210B 21.5-23.0 267.8 239.8 27.9	\$35\$B-210B 25.0-26.5 166.0 149.5	\$35\$B-210B 30.0-31.5 211.2 180.0	\$35\$B-210B 35.0-36.5 180.9 152.1 28.8	\$35\$B-210B 40.0-41.5 168.1 148.7	S35SB-211B 0.0-1.5 217.8 198.9	\$35\$B-211B 5.0-6.5 263.5 245.3	\$35\$B-21 9.5-11.
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35SB-210B 17.5-18.0 67.7 58.6 9.1 15.9	\$35\$B-210B 20.0-21.5 250.0 225.8 24.2	\$35\$B-210B 21.5-23.0 267.8 239.8 27.9	\$35\$B-210B 25.0-26.5 166.0 149.5 16.6	\$35\$B-210B 30.0-31.5 211.2 180.0 31.2	\$35\$B-210B 35.0-36.5 180.9 152.1 28.8	\$35\$B-210B 40.0-41.5 168.1 148.7 19.4	\$35\$B-211B 0.0-1.5 217.8 198.9 19.0 25.0	\$35\$B-211B 5.0-6.5 263.5 245.3 18.2 34.1	S35SB-21 9.5-11.



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35SB-211B	S35SB-211B	S35SB-212B	S35SB-212B	S35SB-212B	S35SB-212B	S35SB-212B	S35SB-212B	S35SB-212B	S35SB-212
Depth:	15.0-16.5	20.0-21.5	0.0-0.5	0.5-1.5	1.5-3.0	5.0-6.5	6.5-8.0	10.0-11.5	11.5-13.0	15.0-16.5
Wet Wt, & Pan (g):							263.2	251.5	217.8	222
Dry Wt, & Pan (g):		98.6		349.2	99.1	263.7	251.1	228.7	199.8	205
Loss of Moisture		12.7	10.4	12.2	4.9			22.8	17.9	17
Wt. of Pan (g):		13.5		33.8		25.1	27.3	24.9	24.7	23
	108.3	85.1	54.0	315.4	83.1	238.6	223.8	203.8	175.2	182
Wt. of Dry Soil (g):	100.3									
Wt. of Dry Soil (g): M. Content (%):				4	6	9	5	11	10	
, ,,,				4	6	9	5	11	10	
, ,,,				4	6	9	5	11	10	
, ,,,				4	6	9	5	11	10	
M. Content (%):				\$35SB-213B	S35SB-213B	9 S35SB-213B	\$ S35SB-213B	11 S35SB-213B	10 S35SB-213B	
M. Content (%): Lab No:	16	15	19							S35SB-213
M. Content (%): Lab No: BH or Loc:	S35SB-212B 20.0-21.5	15 S35SB-213B	19 S35SB-213B	S35SB-213B	S35SB-213B	S35SB-213B	S35SB-213B	S35SB-213B	S35SB-213B	\$35\$B-213B 30.0-31.5
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	S35SB-212B 20.0-21.5	S35SB-213B 0.0-1.0	S35SB-213B 1.0-1.5	\$35\$B-213B 1.5-3.0	\$35\$B-213B 5.0-6.5	\$35\$B-213B 6.5-8.0	S35SB-213B 10.8-12.3	S35SB-213B 15.0-16.5	\$35\$B-213B 16.5-18.0	\$35\$B-213 30.0-31.5
M. Content (%): Lab No: BH or Loc: Depth:	\$35\$B-212B 20.0-21.5	S35SB-213B 0.0-1.0	19 S35SB-213B	S35SB-213B	\$35\$B-213B 5.0-6.5	\$35\$B-213B 6.5-8.0	\$35\$B-213B 10.8-12.3	\$35\$B-213B 15.0-16.5 286.3	S35SB-213B	\$35\$B-213 30.0-31.5
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	S35SB-212B 20.0-21.5 116.2 110.8	S35SB-213B 0.0-1.0	\$35\$B-213B 1.0-1.5	\$35\$B-213B 1.5-3.0	\$35\$B-213B 5.0-6.5 330.8 312.3	\$35\$B-213B 6.5-8.0 238.1 215.8	\$35\$B-213B 10.8-12.3	S35SB-213B 15.0-16.5	\$35\$B-213B 16.5-18.0	\$35\$B-213 30.0-31.5
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	S35SB-212B 20.0-21.5 116.2 110.8	S35SB-213B 0.0-1.0	\$35\$B-213B 1.0-1.5 112.7 106.2	S35SB-213B 1.5-3.0 94.9	\$35\$B-213B 5.0-6.5 330.8 312.3	\$35\$B-213B 6.5-8.0 238.1 215.8	\$35\$B-213B 10.8-12.3	\$35\$B-213B 15.0-16.5 286.3	S35SB-213B 16.5-18.0 293.9	\$35\$B-213 30.0-31.5 280 257
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	S35SB-212B 20.0-21.5 116.2 110.8	\$35\$B-213B 0.0-1.0 88.2 76.4	\$35\$B-213B 1.0-1.5 112.7 106.2	\$35\$B-213B 1.5-3.0 94.9 90.3	\$35\$B-213B 5.0-6.5 330.8 312.3 18.5	\$35\$B-213B 6.5-8.0 238.1 215.8	\$35\$B-213B 10.8-12.3 217.9 198.8 19.1	\$35\$B-213B 15.0-16.5 286.3 260.2	\$35\$B-213B 16.5-18.0 293.9 270.2	\$35\$B-213 30.0-31.5 280 257 22
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35\$B-212B 20.0-21.5 116.2 110.8 5.4 16.0	\$35\$B-213B 0.0-1.0 88.2 76.4 11.8 16.4	S35SB-213B 1.0-1.5 112.7 106.2 6.5 15.7	\$35\$B-213B 1.5-3.0 94.9 90.3 4.6 16.0	\$35\$B-213B 5.0-6.5 330.8 312.3 18.5 33.7	\$35\$B-213B 6.5-8.0 238.1 215.8 22.3 24.9	\$35\$B-213B 10.8-12.3 217.9 198.8 19.1 32.4	\$35\$B-213B 15.0-16.5 286.3 260.2 26.1	\$35\$B-213B 16.5-18.0 293.9 270.2 23.7	S35SB-213



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:										
BH or Loc:	S35SB-213B	S35SB-213B	S35SB-213B	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-214B
Depth:	35.0-37.0	40.8-42.3	46.75-48.25	0.0-1.5	1.5-3.0	5.0-5.5	5.5-6.5	6.5-8.0	11.5-12.0	12.0-13.0
\\\at\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	070.0	200.0	250.0	200	4544	101.1	200.2	222.0	04.7	00.4
Wet Wt, & Pan (g):				263.6		164.4	200.3	232.6	84.7	66.1
Dry Wt, & Pan (g):			234.6	248.3			182.2	211.5	78.1	60.8
Loss of Moisture			25.3	15.2		15.4	18.1	21.0	6.6	5.3
Wt. of Pan (g):				32.2		24.8	27.0	25.1	15.8	12.2
Wt. of Dry Soil (g):	222.4	158.1	207.9	216.1	115.2	124.2	155.2	186.4	62.3	48.6
										4.4
M. Content (%):	13	13	12	7	5	12	12	11	11	11
M. Content (%):	13	13	12	7	5	12	12	11	11	11
M. Content (%):	13	13	12	7	5	12	12	11	11]	11
M. Content (%): Lab No:		13	12	7	5	12	12	11	11]	11
		13 S35SB-214B	12 S35SB-214B	7 S35SB-214B	\$ \$35\$B-214B	12 S35SB-215T	12 S35SB-215T	335SB-215T	S35SB-215T	11 S35SB-215T
Lab No:	S35SB-214B									
Lab No: BH or Loc:	\$35\$B-214B 20.0-21.5	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-214B	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T
Lab No: BH or Loc: Depth: Date Tested:	\$35\$B-214B 20.0-21.5	S35SB-214B	S35SB-214B	S35SB-214B	\$35\$B-214B 40.0-40.25	S35SB-215T 0.0-0.75	S35SB-215T	S35SB-215T 1.5-3.0	S35SB-215T	S35SB-215T
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35\$B-214B 20.0-21.5	S35SB-214B	\$35\$B-214B 25.0-26.5	S35SB-214B	\$35\$B-214B 40.0-40.25	S35SB-215T 0.0-0.75	S35SB-215T	\$35\$B-215T 1.5-3.0	S35SB-215T	\$35\$B-215T 15.0-16.5
Lab No: BH or Loc: Depth: Date Tested:	\$35\$B-214B 20.0-21.5	\$35\$B-214B 21.5-23.0	\$35\$B-214B 25.0-26.5	\$35\$B-214B 35.0-36.0	\$35\$B-214B 40.0-40.25	S35SB-215T 0.0-0.75	\$35\$B-215T 0.75-1.5	S35SB-215T 1.5-3.0	\$35\$B-215T 5.0-6.5	\$35\$B-215T 15.0-16.5
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35\$B-214B 20.0-21.5 326.2 297.7	\$35\$B-214B 21.5-23.0 203.4 186.7	\$35\$B-214B 25.0-26.5 116.4 106.7	\$35\$B-214B 35.0-36.0	\$35\$B-214B 40.0-40.25	S35SB-215T 0.0-0.75 88.5 75.1	S35SB-215T 0.75-1.5	\$35\$B-215T 1.5-3.0 306.2	\$35\$B-215T 5.0-6.5	\$35\$B-215T 15.0-16.5 95.9 89.2
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35\$B-214B 20.0-21.5 326.2 297.7 28.5	\$35\$B-214B 21.5-23.0 203.4 186.7	\$35\$B-214B 25.0-26.5 116.4 106.7 9.8	\$35\$B-214B 35.0-36.0 109.4 92.3	\$35\$B-214B 40.0-40.25 81.3 66.0 15.3	\$35\$B-215T 0.0-0.75 88.5 75.1 13.4	S35SB-215T 0.75-1.5 109.3 104.4	\$35\$B-215T 1.5-3.0 306.2 290.4	\$35\$B-215T 5.0-6.5 236.1 218.3 17.8	\$35\$B-215T 15.0-16.5 95.9 89.2 6.7
Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35\$B-214B 20.0-21.5 326.2 297.7 28.5 32.4	\$35\$B-214B 21.5-23.0 203.4 186.7 16.8 24.6	\$35\$B-214B 25.0-26.5 116.4 106.7 9.8	\$35\$B-214B 35.0-36.0 109.4 92.3 17.1	\$35\$B-214B 40.0-40.25 81.3 66.0 15.3 15.6	\$35\$B-215T 0.0-0.75 88.5 75.1 13.4	\$35\$B-215T 0.75-1.5 109.3 104.4 4.9	\$35\$B-215T 1.5-3.0 306.2 290.4 15.8	\$35\$B-215T 5.0-6.5 236.1 218.3 17.8	S35SB-215T



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Moisture Analysis - AASHTO T265; ASTM D2216

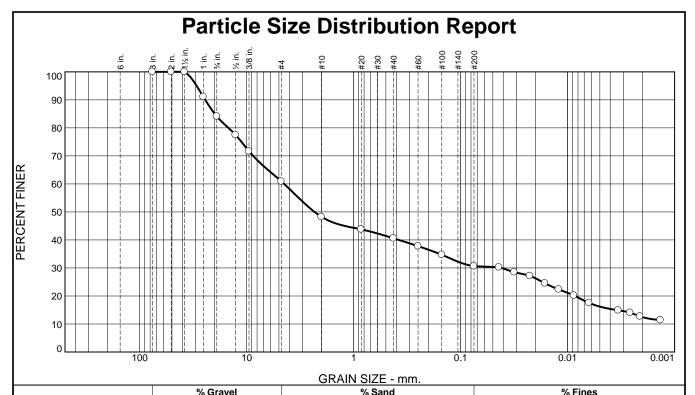
Lab No:										
BH or Loc:	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-215T	S35SB-216B	S35SB-216B	S35SB-216E
Depth:	20.0-21.5	25.0-26.5	35.0-36.5	40.0-41.5	45.0-46.5	50.0-51.5	55.0-56.5	0.0-1.5	5.0-6.5	6.5-8.0
Wet Wt, & Pan (g):	111.2	93.3	139.2	301.7	261.6	277.5	223.7	284.1	278.8	115
Dry Wt, & Pan (g):		82.5	125.5	272.4	243.8	250.7	201.3	263.3	251.8	110
Loss of Moisture				29.3	17.8	26.7	22.4	20.8	27.0	5
Wt. of Pan (g):	13.5		14.5	33.8	25.1	27.0	27.9	24.9	25.0	16
	88.0		111.0	238.6		223.7	173.4	238.4	226.8	94.
Wt. of Dry Soil (g):	00.0									
Wt. of Dry Soil (g): M. Content (%):				12	8	12	13	9	12	
, ,,,,					8	12	13	9	12	
, ,,,,					8	12	13	9	12	
, ,,,,					8	12	13	9	12	
M. Content (%):					\$35MW-217	12 S35MW-217	13 S35MW-217	9 S35MW-217	12 \$35MW-217	
M. Content (%): Lab No: BH or Loc: Depth:	S35SB-216B 10.0-11.5	15	12	12						S35MW-217
M. Content (%): Lab No: BH or Loc:	S35SB-216B 10.0-11.5	15 S35SB-216B	12 S35SB-216B	12 S35SB-216B	S35MW-217	S35MW-217	S35MW-217	S35MW-217	S35MW-217	S35MW-217
M. Content (%): Lab No: BH or Loc: Depth: Date Tested:	S35SB-216B 10.0-11.5	S35SB-216B 11.5-13.0	S35SB-216B 15.0-16.5	S35SB-216B 20.0-21.5	S35MW-217 0.0-1.5	\$35MW-217 1.5-3.0	\$35MW-217 5.0-6.5	\$35MW-217 10.0-11.5	\$35MW-217 11.5-13.0	\$35MW-217 25.9-27.4
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35\$B-216B 10.0-11.5	\$35\$B-216B 11.5-13.0	\$35\$B-216B 15.0-16.5	\$35\$B-216B 20.0-21.5	\$35MW-217 0.0-1.5	\$35MW-217 1.5-3.0	\$35MW-217 5.0-6.5 248.1	\$35MW-217 10.0-11.5 218.4	\$35MW-217 11.5-13.0 252.4	\$35MW-21 25.9-27.4 264
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35\$B-216B 10.0-11.5 227.2 199.6	\$35\$B-216B 11.5-13.0	S35SB-216B 15.0-16.5	\$35\$B-216B 20.0-21.5 221.3 201.6	\$35MW-217 0.0-1.5	\$35MW-217 1.5-3.0	\$35MW-217 5.0-6.5	\$35MW-217 10.0-11.5	\$35MW-217 11.5-13.0	\$35MW-21* 25.9-27.4 264 238
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g):	\$35\$B-216B 10.0-11.5 227.2 199.6	\$35\$B-216B 11.5-13.0	\$35\$B-216B 15.0-16.5 229.4 205.5	\$35\$B-216B 20.0-21.5	\$35MW-217 0.0-1.5	\$35MW-217 1.5-3.0	\$35MW-217 5.0-6.5 248.1	\$35MW-217 10.0-11.5 218.4	\$35MW-217 11.5-13.0 252.4	\$35MW-217 25.9-27.4 264 238
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g):	\$35\$B-216B 10.0-11.5 227.2 199.6	S35SB-216B 11.5-13.0 185.5 163.7 21.8	\$35\$B-216B 15.0-16.5 229.4 205.5	\$35\$B-216B 20.0-21.5 221.3 201.6	\$35MW-217 0.0-1.5 85.6 80.4	\$35MW-217 1.5-3.0 113.4 106.0	\$35MW-217 5.0-6.5 248.1 231.0	\$35MW-217 10.0-11.5 218.4 194.7	\$35MW-217 11.5-13.0 252.4 226.4	\$35MW-21 ¹ 25.9-27.4 264 238 25
M. Content (%): Lab No: BH or Loc: Depth: Date Tested: Wet Wt, & Pan (g): Dry Wt, & Pan (g): Loss of Moisture	\$35\$B-216B 10.0-11.5 227.2 199.6 27.5 25.6	S35SB-216B 11.5-13.0 185.5 163.7 21.8 23.1	S35SB-216B 15.0-16.5 229.4 205.5 23.9 27.8	\$35\$B-216B 20.0-21.5 221.3 201.6 19.7	\$35MW-217 0.0-1.5 85.6 80.4 5.2 16.3	\$35MW-217 1.5-3.0 113.4 106.0 7.4	\$35MW-217 5.0-6.5 248.1 231.0 17.1	\$35MW-217 10.0-11.5 218.4 194.7 23.7	\$35MW-217 11.5-13.0 252.4 226.4 26.0	\$35MW-217 25.9-27.4 264. 238. 25. 27. 210.



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Moisture Analysis - AASHTO T265; ASTM D2216

Lab No:			
BH or Loc:	S35MW-217	S35MW-217	
Depth:	30.0-31.5	35.0-36.5	
Date Tested:			
-			
Wet Wt, & Pan (g):	126.5	210.7	
Dry Wt, & Pan (g):	111.8	169.2	
Loss of Moisture	14.7	41.5	
Wt. of Pan (g):	13.4	33.6	
Wt. of Dry Soil (g):	98.4	135.5	
M. Content (%):	15	31	
•			



% +3"			/o Glave	5 1		/o Sant	4	/0 1 11163	
	% +3"		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0		16	23	13	7	10	15	16
		TEST	RESULTS				Mater	ial Description	
	Opening	Percent	Spec.*	Pass	?	clayey gra	vel with sand		
	Size	Finer	(Percent)	(X=Fa	il)				
	3	100							
	2	100					Attorbora I	imite (ASTM D 4319)	

Atterberg Limits (ASTM D 4318)
LL= 30 PI= 16 100 1.5 **PL=** 14 91 USCS (D 2487)= GC Classification AASHTO .75 .5 84 77 **AASHTO (M 145)=** A-2-6(1) .375 72 61 48 44 #10 Coefficients D₉₀= 24.4296 D₅₀= 2.3234 D₁₀= D₆₀= 4.4705 D₁₅= 0.0035 C_c= **D₈₅=** 19.9054 #40 41 D₃₀= 0.0414 C_u= #60 #100 35 #200 31 30 28 27 25 22 20 18 Remarks 0.0438 mm. 0.0315 mm. 0.0226 mm. 0.0163 mm. 0.0121 mm. 0.0087 mm. 0.0063 mm.

Date Received: Tested By:	Date Tested:
Checked By:	
Title:	

(no specification provided)

15

14

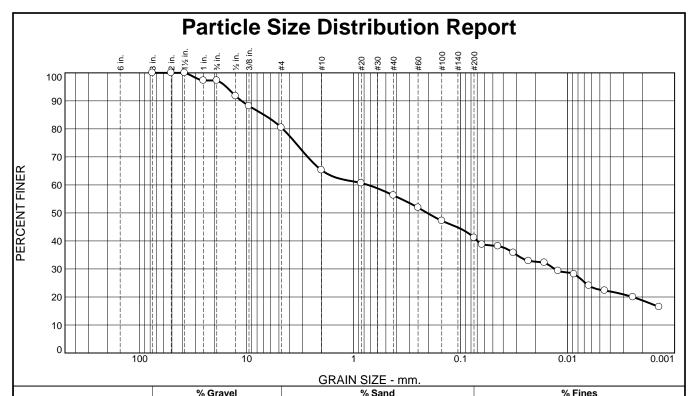
13 11

0.0034 mm.

0.0026 mm.

0.0021 mm. 0.0014 mm.

Pioneer Technical Services, Inc.	Client: Montana Department of Environmental Qual	ity
1215 Apple's Way - Belgrade, MT 59714	Project: UBMC Section 35 Design Investigation	
Ph. 406-388-8578 - Fax 406-388-8579	Project No: 10180	Figure



% +3 "			70 Glavi	-1		70 Janu			
			Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0		3	17	15	9	15	18	23
		TEST	RESULTS				Mater	ial Description	
	Opening	Percent	Spec.*	Pass		clayey san	d with gravel	•	
	Size	Finer	(Percent)	(X=Fa	il)				

Opening	Percent	Spec.*	Pass?
Size	Finer	(Percent)	(X=Fail)
3	100		
2	100		
1.5	100		
1	97		
.75	97		
.5	92		
.375	88		
#4	80		
#10	65		
#20	61		
#40	56		
#60	52		
#100	47		
#200	41		
0.0631 mm.	39		
0.0448 mm.	38		
0.0322 mm.	36		
0.0232 mm.	33		
0.0165 mm.	32		
0.0123 mm.	29		
0.0087 mm.	28		
0.0063 mm.	24		
0.0045 mm.	22		
0.0025 mm.	20		
0.0014 mm.	16		

	waterial Descrip	<u>lion</u>
clayey sand with gr	avel	
Atter	berg Limits (ASTI	
PL= 16	LL= 36	PI= 20
USCS (D 2487)=	SC Classification	<u>1</u> (M 145)= A-6(4)
D ₉₀ = 11.1947 D ₅₀ = 0.2054 D ₁₀ =	Coefficients D ₈₅ = 6.8838 D ₃₀ = 0.0132 C _u =	D ₆₀ = 0.7366 D ₁₅ = C _c =
	Remarks	
Date Received: Tested By: La		Tested:
Checked By:		
Title:		

(no specification provided)

Source of Sample: S35SB-206B Depth: 15-16.5' Date Sampled:

Pioneer Technical Services, Inc.

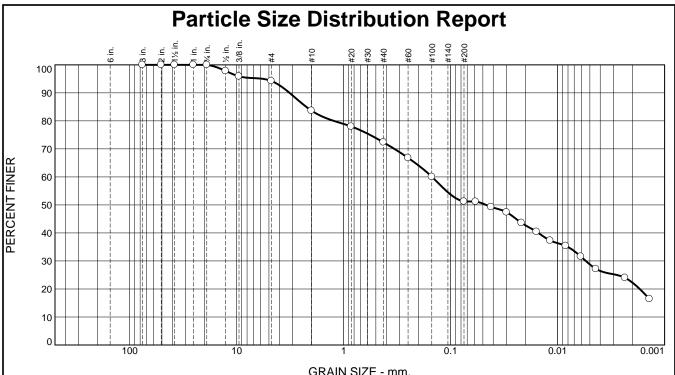
1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana Department of Environmental Quality
Project: UBMC Section 35 Design Investigation

Project No: 10180

Figure



ORAIN SIZE - IIIII.							
2/ 21	% G	ravel % Sand			% Fines		
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	6	10	12	21	22	29

	TEST R	ESULTS	
Opening	Percent	Spec.*	Pass?
Size	Finer	(Percent)	(X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.5	98		
.375	96		
#4	94		
#10	84		
#20	78		
#40	72		
#60	67		
#100	60		
#200	51		
0.0584 mm.	51		
0.0419 mm.	49		
0.0300 mm.	47		
0.0218 mm.	44		
0.0158 mm.	40		
0.0117 mm.	37		
0.0084 mm.	35		
0.0061 mm.	32		
0.0044 mm.	27		
0.0023 mm.	24		
0.0014 mm.	16		

	<u>Material</u>	Descri	ptioi
andy lean clay			

Atterberg Limits (ASTM D 4318)
LL= 48 PI= 27 **PL=** 21

 $\begin{array}{ccc} & & & \textbf{Classification} \\ \textbf{USCS (D 2487)=} & & \text{CL} & & \textbf{AASHTO (M 145)=} & \text{A-7-}6(10) \\ \end{array}$

Coefficients

D₉₀= 3.2075 D₅₀= 0.0466 D₁₀= D₈₅= 2.2393 D₃₀= 0.0055 C_u= **D₆₀=** 0.1495 D₁₅= C_C=

Remarks

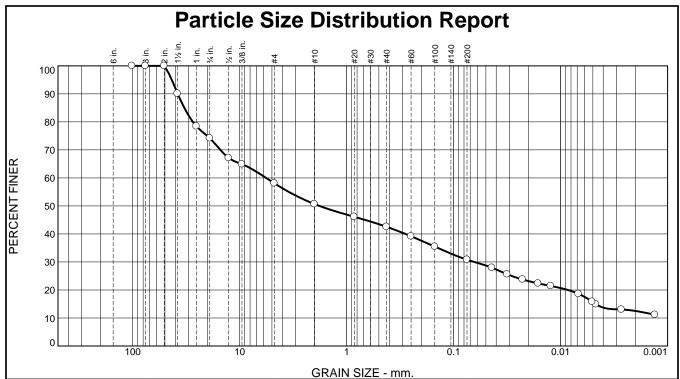
Date Received: Date Tested: Tested By: Checked By: Title:

(no specification provided)

Source of Sample: S35SB-206B **Depth:** 35-36.5 **Date Sampled:**

Client: Montana Department of Environmental Quality Pioneer Technical Services, Inc. **Project:** UBMC Section 35 Design Investigation 1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579 Project No: 10180 **Figure**



0/ - 24	% G	Gravel % Sand			% Fines		
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt Clay	
0	26	16	7	8	12	15	16

TEST RESULTS								
Opening	Percent	Spec.*	Pass?					
Size	Finer	(Percent)	(X=Fail)					
4	100							
3	100							
2	100							
1.5	90							
1	78							
3/4	74							
1/2	67							
3/8	65							
#4	58							
#10	51							
#20	46							
#40	43							
#60	39							
#100	35							
#200	31							
0.0439 mm.	28							
0.0316 mm.	26							
0.0227 mm.	24							
0.0162 mm.	22							
0.0124 mm.	21							
0.0068 mm.	19							
0.0051 mm.	16							
0.0047 mm.	15							
0.0027 mm.	13							
0.0013 mm.	11							

	Material	Descri	ptior
over grovel with	cond		_

clayey gravel with sand

Atterberg Limits (ASTM D 4318)
LL= 29 PI= 15

PL= 14

 $\begin{array}{ccc} \textbf{USCS (D 2487)=} & GC & \underline{\textbf{Classification}} \\ \textbf{AASHTO (M 145)=} & A-2-6(1) \end{array}$

Coefficients

D₉₀= 37.9812 D₅₀= 1.7985 D₁₀= D₆₀= 5.6684 D₁₅= 0.0047 C_c= D₈₅= 32.9426 D₃₀= 0.0642 C_u=

Remarks

Date Received: Date Tested:

Tested By: NG/BG

Checked By: NG

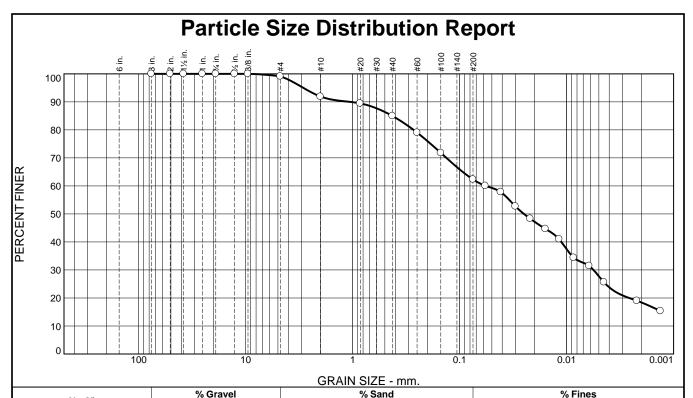
Title:

(no specification provided)

Source of Sample: S35SB-208B **Depth:** 20-20.7' **Date Sampled:**

Client: Montana Department of Environmental Quality Pioneer Technical Services, Inc. **Project:** UBMC Section 35 Design Investigation 1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579 Project No: 10180 **Figure**



0/ . 2		/0 O .u.	٥.		70 Garia 70 Tillio			•
% +3		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0		0	1	7	7	23	34	28
	TEST	RESULTS				Mater	ial Description	
Opening	Percent	Spec.*	Pass	?	sandy lean	clay	•	
Size	Finer	(Percent)	(X=Fa	il)				
2	100							

Opening	Percent	Spec.*	Pass?
Size	Finer	(Percent)	(X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.5	100		
.375	100		
#4	99		
#10	92		
#20	89		
#40	85		
#60	79		
#100	72		
#200	62		
0.0576 mm.	60		
0.0413 mm.	58		
0.0302 mm.	53		
0.0219 mm.	48		
0.0158 mm.	45		
0.0118 mm.	41		
0.0086 mm.	34		
0.0062 mm.	31		
0.0045 mm.	26		
0.0022 mm.	19		
0.0013 mm.	15		
ı	I	l	I

sandy lean clay	
PL= 12	rberg Limits (ASTM D 4318) LL= 41 PI= 29
USCS (D 2487)=	CL Classification (M 145)= A-7-6(14)
D ₉₀ = 1.0604 D ₅₀ = 0.0250 D ₁₀ =	Coefficients D ₈₅ = 0.4264 D ₆₀ = 0.0573 D ₃₀ = 0.0056 D ₁₅ = C _u = C _c =
	Remarks
Date Received: Tested By:	Date Tested:
Checked By:	
Title:	

(no specification provided)

Source of Sample: S35SB-211B Depth: 9-9.5' Date Sampled:

Pioneer Technical Services, Inc.

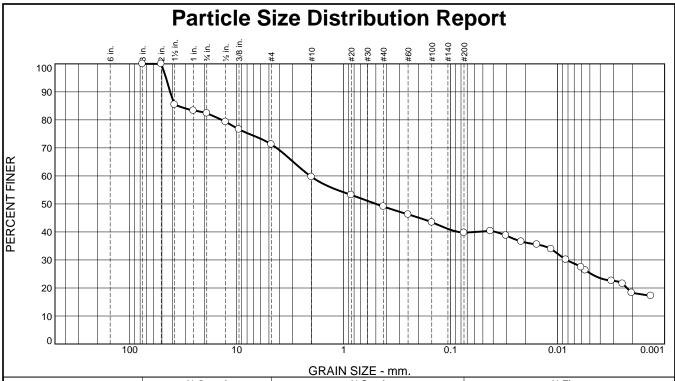
1215 Apple's Way - Belgrade, MT 59714

Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana Department of Environmental Quality
Project: UBMC Section 35 Design Investigation

Project No: 10180

Figure



9/ .3"	% G	ravel		% Sand	d	% Fines	
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	18	11	11	11	9	15	25

clayey sand with gravel

TEST RESULTS								
Opening	Percent	Spec.*	Pass?					
Size	Finer	(Percent)	(X=Fail)					
3	100							
2	100							
1.5	85							
1	83							
.75	82							
.5	79							
.375	77							
#4	71							
#10	60							
#20	53							
#40	49							
#60	46							
#100	43							
#200	40							
0.0425 mm.	40							
0.0304 mm.	39							
0.0219 mm.	37							
0.0156 mm.	36							
0.0115 mm.	34							
0.0084 mm.	30							
0.0060 mm.	27							
0.0055 mm.	26							
0.0031 mm.	23							
0.0025 mm.	22							
0.0020 mm.	18							
0.0013 mm.	17							

PL= 15	rberg Limits (AST LL= 39	TM D 4318) PI= 24
USCS (D 2487)=	SC Classification AASHT	<u>n</u> O (M 145)= A-6(4)
D ₉₀ = 41.9225 D ₅₀ = 0.4986 D ₁₀ =	Coefficients D ₈₅ = 35.5060 D ₃₀ = 0.0083 C _u =	D ₆₀ = 2.0557 D ₁₅ = C _c =
	Remarks	
Date Received:	Date	e Tested:
Tested By:		

Checked By:

Material Description

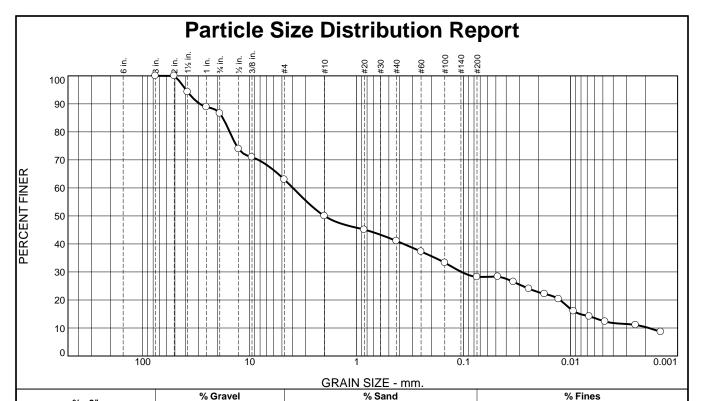
(no specification provided)

Source of Sample: S35SB-213B **Depth:** 40-40.8' Date Sampled:

Pioneer Technical Services, Inc.	Client: Montana Department of Environmental Qualit
1215 Apple's Way - Belgrade, MT 59714	Project: UBMC Section 35 Design Investigation
Ph. 406-388-8578 - Fax 406-388-8579	Project No: 10180

Project No: 10180 Figure

Title:



	% +3		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0		13	24	13	9	13	15	13
Γ		TEST	RESULTS				Materi	ial Description	
	Opening Size	Percent Finer	Spec.* (Percent)	Pass (X=Fa		clayey gra	vel with sand	•	
r	3	100	,	<u> </u>					

PL= 13

Opening	Percent	Spec.	Pass?
Size	Finer	(Percent)	(X=Fail)
3	100		
2	100		
1.5	94		
1	89		
.75	87		
.5	74		
.375	71		
#4	63		
#10	50		
#20	45		
#40	41		
#60	37		
#100	33		
#200	28		
0.0480 mm.	28		
0.0343 mm.	26		
0.0246 mm.	24		
0.0176 mm.	22		
0.0129 mm.	20		
0.0094 mm.	16		
0.0067 mm.	14		
0.0048 mm.	12		
0.0025 mm.	11		
0.0014 mm.	8.6		

USCS (D 2487)=	GC Classification AASHTO	(M 145)= A-2-6(0)
D₉₀= 29.2726 D₅₀= 2.0032 D₁₀= 0.0019	Coefficients D ₈₅ = 17.8472 D ₃₀ = 0.1047 C _u = 2123.57	D₆₀= 3.9480 D₁₅= 0.0082 C_c= 1.49
	Remarks	
Date Received:	Date -	Tested:
Tested By:		
Checked By:		
Title:		

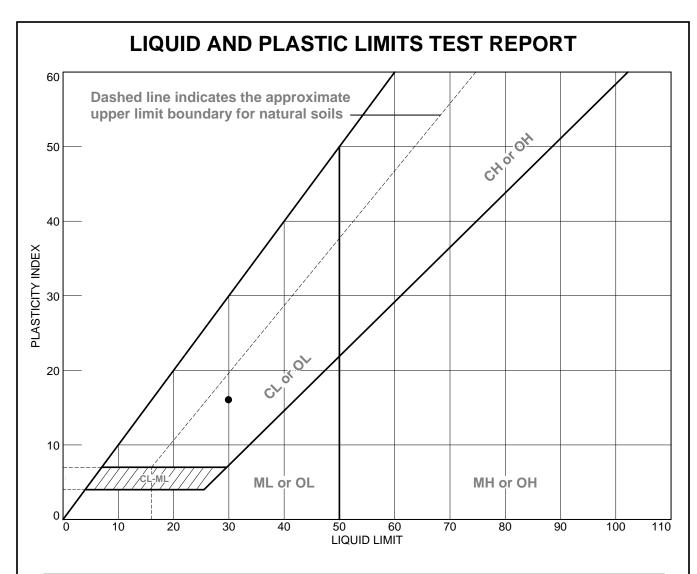
Figure

Atterberg Limits (ASTM D 4318)
LL= 26 PI= 13

(no specification provided)

Source of Sample: S35MW-217 Depth: 25-25.9' Date Sampled:

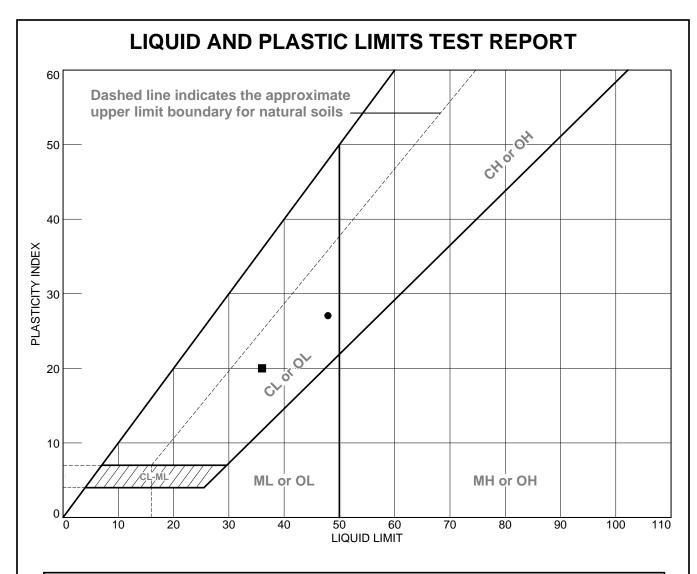
	Client: Montana Department of Environmental Qua	lity
1215 Apple's Way - Belgrade, MT 59714	Project: UBMC Section 35 Design Investigation	
Ph. 406-388-8578 - Fax 406-388-8579	Project No: 10180	Fig



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs
•	S35MW-203B		20-20.8'		14	30	16	GC

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

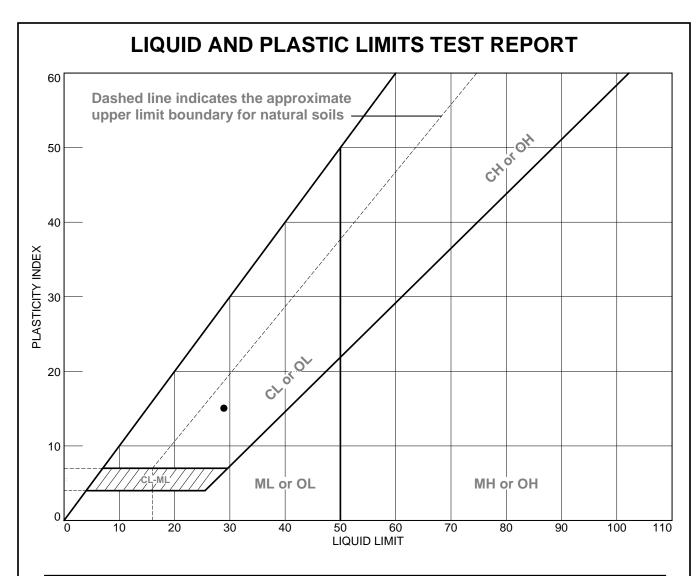
Project No.: 10180 Figure



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs
•	S35SB-206B		35-36.5		21	48	27	CL
•	S35SB-206B		15-16.5'		16	36	20	SC

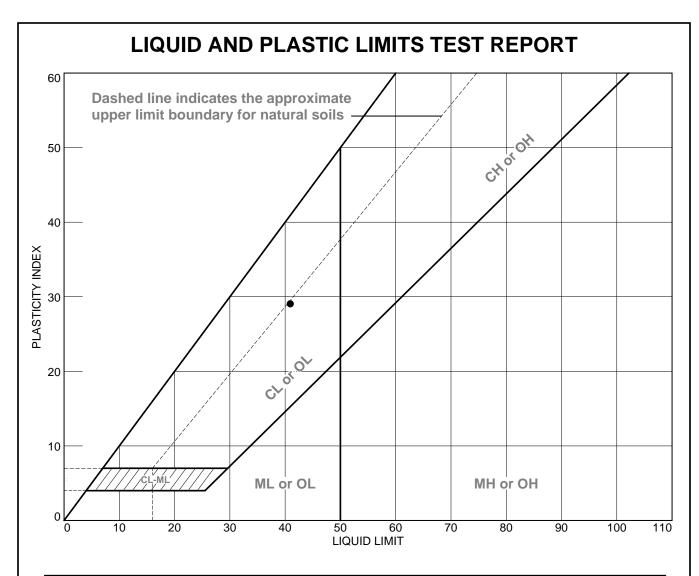
Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Project No.: 10180 Figure



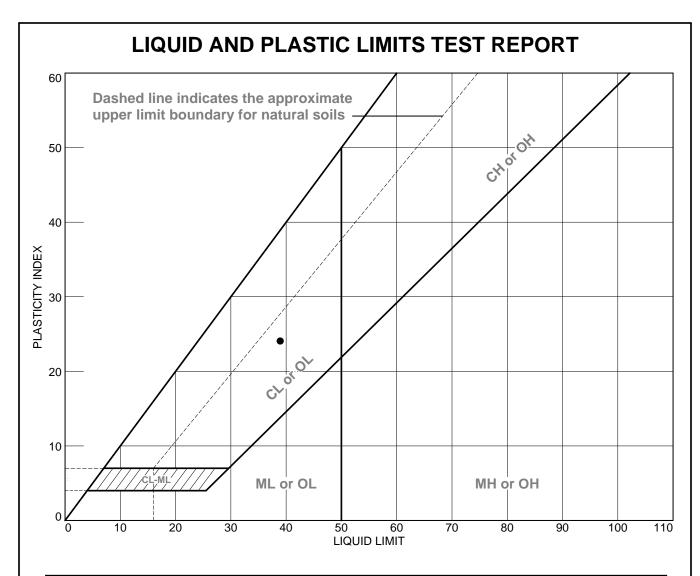
	SOIL DATA											
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs				
•	S35SB-208B		20-20.7'		14	29	15	GC				

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



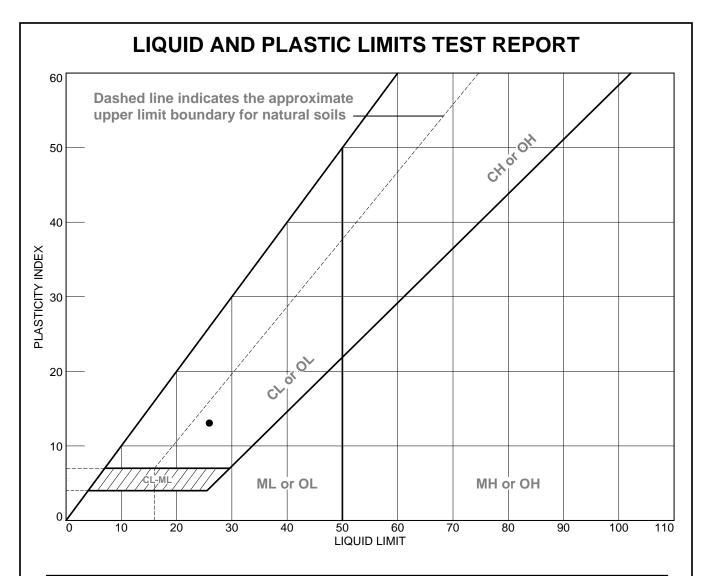
	SOIL DATA											
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs				
•	S35SB-211B		9-9.5'		12	41	29	CL				

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



				SOIL DATA	1			
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs
•	S35SB-213B		40-40.8'		15	39	24	SC

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation



	SOIL DATA											
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	uscs				
•	S35MW-217		25-25.9'		13	26	13	GC				

Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Specific Gravity of (-) #10 Fraction

Project: UBMC Section 35 Design Investigation Client: Montana DEQ

Sample ID: S35MW-203B Date: 1/14/2013

Depth of sample ID	20-20.8'			
Volume of flask	250ml			
Method of air removal	vacuum			
Weight of the flask + water + soil	394.73			
Temperature, °C	17			
Weight of the flask + water	365.25			
Evaporation dish #				
Weight of evaporation dish	112.58			
Weight of evaporation dish + dry soil	159.91			
Weight of dry soil	47.33			
alpha	1.0006			
Weight of the water	17.85			
Specific Gravity	2.65			

Specific Gravity of (-) #10 Fraction

Project: UBMC Section 35 Design Investigation Client: Montana DEQ

Sample ID: S35SB-206B Date: 12/21/2012

Tested by: NG

Depth of sample ID	16-16.5'			
Volume of flask	250ml			
Method of air removal	vacuum			
Weight of the flask + water + soil	392.4			
Temperature, °C	18			
Weight of the flask + water	362.82			
Evaporation dish #				
Weight of evaporation dish	111			
Weight of evaporation dish + dry soil	159.11			
Weight of dry soil	48.11			
alpha	1.0004			
Weight of the water	18.53			
Specific Gravity	2.60			

Specific Gravity of (-) #10 Fraction

Project: UBMC Section 35 Design Investigation Client: Montana DEQ

Sample ID: S35SB-211B Date: 1/3/2013

Depth of sample ID	9-9.5			
Volume of flask	250ml			
Method of air removal	vacuum			
Weight of the flask + water + soil	383.82			
Temperature, °C	16			
Weight of the flask + water	362.87			
Evaporation dish #				
Weight of evaporation dish	110.5			
Weight of evaporation dish + dry soil	143.82			
Weight of dry soil	33.32			
alpha	1.0007			
Weight of the water	12.37			
Specific Gravity	2.70			

Specific Gravity of (-) #10 Fraction

Project: UBMC Section 35 Design Investigation Client: Montana DEQ

Sample ID: S35SB-213B Date: 1/14/2013

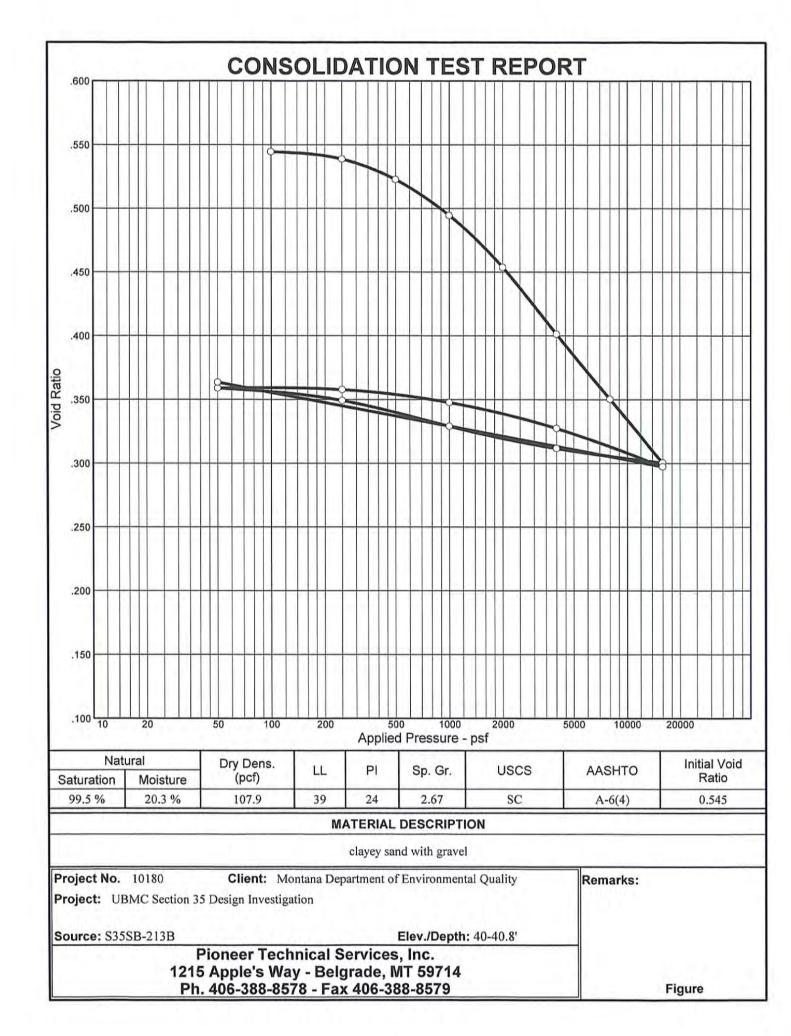
Depth of sample ID	40-40.8			
Volume of flask	250ml			
Method of air removal	vacuum			
Weight of the flask + water + soil	394.95			
Temperature, °C	17			
Weight of the flask + water	362.85			
Evaporation dish #				
Weight of evaporation dish	110.79			
Weight of evaporation dish + dry soil	162.15			
Weight of dry soil	51.36			
alpha	1.0006			
Weight of the water	19.26			
Specific Gravity	2.67			

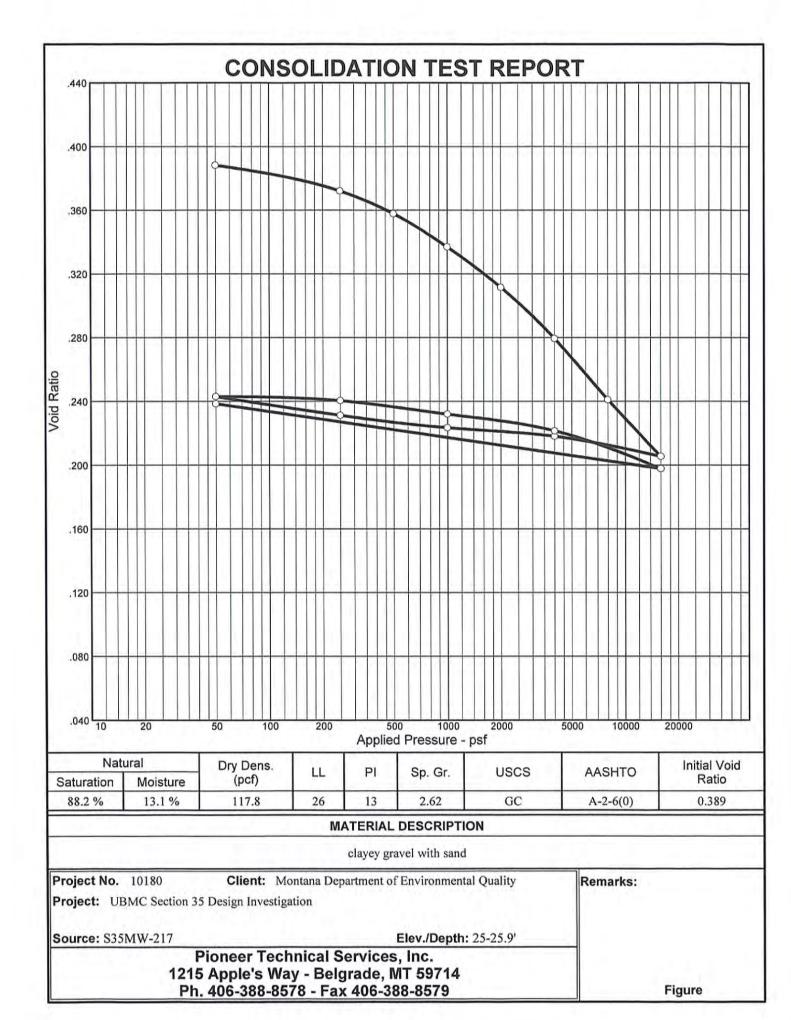
Specific Gravity of (-) #10 Fraction

Project: UBMC Section 35 Design Investigation Client: Montana DEQ

Sample ID: S35MW-217 Date: 12/21/2012

Depth of sample ID	25-25.9			
Volume of flask	250ml			
Method of air removal	vacuum			
Weight of the flask + water + soil	396.27			
Temperature, °C	18			
Weight of the flask + water	365.22			
Evaporation dish #				
Weight of evaporation dish	111.56			
Weight of evaporation dish + dry soil	161.79			
Weight of dry soil	50.23			
alpha	1.0004			
Weight of the water	19.18			
Specific Gravity	2.62			



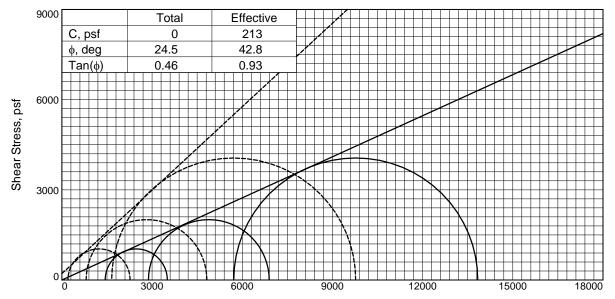


				HADBYIII IC C	ONDUCTIVIT	V EOD EI EVIDI	E-WALLED TEST S	CAMDLES			
						AD APPARATUS		SAMPLES			
	1			1	TALLING HEA	AD APPARATUS	, A3 I WI D3004				
Client:	DEQ						Project:	Section 35 Repos	iton/		
Sample Description:	SB-203B 20-	20.8'					rioject.	Section 33 Repus	itory		
Sample Description.	3D-203D 20-	20.0									
Test Specimen											
Dry Density (pcf):		132.5									
% Max. ASTM D-698:											
Specimen Length (cm):		16.055									
Specimen Diameter (cm):		7.112									
				Testing Equipment							
				Height Inlet Above Floor (04.0					
				Height Outlet Above Bend	ch (cm):	21.9					
				Area of Standpipe (cm ²):		0.912					
Ingrament	Initial	Inital	Final	Final	Time	Applied Drees	Initial	Final	Average Hudra::::-	Lludroulia	Lludrouli -
Increment Number	Initial Reading	Inital Reading	Reading	Final Reading	Time Increment	Applied Pressure Differential	Initial Head	Final Head	Average Hydraulic Gradient	Hydraulic Conductivity	Hydraulic Conductivity
inuilibei	Influent	Effluent	Influent	Effluent	morement	Dineferrial	пеаи	пеаи	Grauleni	Conductivity	at 20 C
	(cm ³)	(cm ³)	(cm ³)	(cm ³)	(min.)	(psi)	(cm)	(cm)	(cm/cm)	(cm/sec)	(cm/sec)
1	0.5	45.1	3.3	42.4	1418	(psi) 2.9	252.75	246.72	15.56	5.2E-08	5.4E-08
2	3.3	424.4	8.4	37.1	3071	2.9	665.40	235.33	28.05	1.0E-06	1.1E-06
5	8.4	37.1	10.5	34.9	1425	2.9	235.33	230.61	14.51	4.4E-08	4.5E-08
6	10.5	34.9	12.95	32.5	1429	2.9	230.61	225.30	14.20	5.0E-08	5.2E-08
9	12.95	32.5	14.75	30.7	1069	2.9	225.30	221.35	13.91	5.1E-08	5.2E-08
10	14.75	30.7	17.5	27.8	1845	2.9	221.35	215.16	13.59	4.7E-08	4.8E-08
11	17.5	19.5	27.8	25.8	1266	2.9	206.06	201.68	12.70	5.2E-08	5.2E-08
12											
13											
14											
15											
16											
17											
18											-
19	Average Hug	Ironlia Cando	ativity of Loot	Four Test Increments =				E 4E 00	am/aaa		-
20 21	Average Hyd	raulic Condu	Ctivity of Last	Four Test Increments =				5.1E-08	cm/sec		+
21											
23											
24											
25											
k =	(aL/At) In (h1	/h2)									
	-										
	<u> </u>										
	ļ										
Water Contact Defe	ro Toot			Motor Control A	fter Teet						
Water Content Befo	ie rest			Water Content A	iter rest	_					
Tare # Wet Soil + Tare (grams)	1526.10			Tare # Wet Soil + Tare (grams)	1509.60						
Dry Soil + Tare (grams)	1371.40			Dry Soil + Tare (grams)	1371.40						
Tare Weight (grams)	0.00			Tare Weight (grams)	0.00						
Water Content (%)	11.28			Water Content (%)	10.08						
	Specimen			Source	Specimen	1					
000100	Perconnecti		1	000100	Perconnen	1					

				LIVED ALILIO O	ONDUIOTIVIT	V FOR EL EVIRI	E WALLED TEST	NAMBLES			
						Y FOR FLEXIBL AD APPARATUS	E-WALLED TEST S	SAMPLES			
			I	1	FALLING HEA	AD APPAKATUS	, ASTWI D3084				
Client:	Montana DE	0					Project:	LIBMC Section 35	Design Investigation		
Sample Description:	S35SB-206E						i roject.	OBINIO OCCIION 33	Design investigation		
Test Specimen											
Dry Density (pcf):		109.8									
% Max. ASTM D-698:											
Specimen Length (cm):		15.24									
Specimen Diameter (cm):		6.173									
				Tastina Fautament							
				Testing Equipment Height Inlet Above Floor (om).						
				Height Outlet Above Bend	th (cm):	21.9					
				Area of Standpipe (cm ²):	iii (Giii).	0.899					
				nica di Gianupipe (GIII).	1	0.099					+
Increment	Initial	Inital	Final	Final	Time	Applied Pressure	Initial	Final	Average Hydraulic	Hydraulic	Hydraulic
Number	Reading	Reading	Reading	Reading	Increment	Differential	Head	Head	Gradient	Conductivity	Conductivity
	Influent	Effluent	Influent	Effluent							at 20 C
	(cm ³)	(cm ³)	(cm ³)	(cm ³)	(min.)	(psi)	(cm)	(cm)	(cm/cm)	(cm/sec)	(cm/sec)
1	0.5	24.2	1.2	23.6	1438	2.8	222.82	221.39	14.57	1.7E-08	1.7E-08
2	1.2	23.6	2	23	1445	2.6	207.33	205.80	13.55	2.0E-08	1.9E-08
5	2.05	22.9	4	21.6	3985	2.8	219.69	216.13	14.30	1.6E-08	1.6E-08
6	4	21.6	4.6	21.2	1328	2.7	209.10	208.00	13.68	1.5E-08	1.5E-08
9	4.6	21.2	5.2	20.7	1425	2.7	208.00	206.80	13.61	1.6E-08	1.5E-08
10											
11											
12											
13											
14											
15											
16 17											
18	+	+									
19											
20	Average Hyd	I Iraulic Condu	ctivity of Last	Four Test Increments =				1.6E-08	cm/sec		
21	/ tvorage rije		I Last	Cal Test Historians =				1.02 00	OTTI SCO		
23											
24											
25											
	l	L									
k =	(aL/At) In (h1	/h2)									.
	-										
					1						+
Water Content Befo	re Test			Water Content A	fter Test	1					
Tare #	1000			Tare #	1000						1
Wet Soil + Tare (grams)	920.30	1		Wet Soil + Tare (grams)	398.80						
Dry Soil + Tare (grams)	801.95			Dry Soil + Tare (grams)	357.50						1
Tare Weight (grams)	0.00			Tare Weight (grams)	111.53						
Water Content (%)	14.76			Water Content (%)	16.79						
Source	Specimen			Source	Specimen						

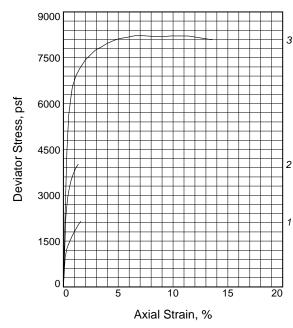
				HAUD V	III IC CONDII	CTIVITY FOR F	LEVIDI E WALLED	TEST SAMDLES			1
				HIDKA			LEXIBLE-WALLED TRATUS, ASTM D508				
					FALLIN	IG READ AFFA	KATUS, ASTIVIDSU	04			
Client:	Montana DE	Q					Project:	UBMC Section 35	Design Investigation		
Sample Descript	ion:	SB-211 9-9.5									
		Panel	#4								
Test Specimen		400.0									
Dry Density (pcf): % Max. ASTM D-		108.8									
Specimen Length		15.24									
Specimen Diame	ter (cm):	7.11									
				Testing Equipme							
				Height Inlet Abov Height Outlet Abo	e Floor (cm):	21.9					
				Area of Standpipe		0.912					
				Area or Standpipe	, (GIII).	0.312					
Increment	Initial	Inital	Final	Final	Time	Applied Pressure	Initial	Final	Average Hydraulic	Hydraulic	Hydraulic
Number	Reading	Reading	Reading	Reading	Increment	Differential	Head	Head	Gradient	Conductivity	Conductivity
	Influent	Effluent	Influent	Effluent							at 20 C
	(cm ³)	(cm ³)	(cm ³)	(cm ³)	(min.)	(psi)	(cm)	(cm)	(cm/cm)	(cm/sec)	(cm/sec)
1	1.3	45.9	23.2	24.4	170	3.1	266.81	219.25	15.95	3.4E-06	3.5E-06
5	23.2 0.5	24.4 45.6	38.9 7.7	8.7 38.3	194 68	3.0 3.0	212.22 260.33	177.80 244.44	12.80 16.56	2.7E-06 2.7E-06	2.7E-06 2.8E-06
6	9.3	37	27.5	18.7	215	3.0	241.26	201.26	14.52	2.5E-06	2.5E-06
9	27.5	18.7	40	6.2	183	3.0	201.26	173.86	12.31	2.3E-06	2.4E-06
10											
11											
12											
13 14											
15											
16											
17											
18											
19 20	Average Hye	traulia Candur	otivity of Loct	Four Test Increme	nto –			2.6E-06	cm/sec		
21	Average nyo	Taulic Conduc	LIVILY OF LASE	Tour rest increme	inis =			2.0E-00	CIII/Sec		
22											
23											
24											
25											
k -	(aL/At) In (h1	/h2)	1	1					+		+
K =	(a=/At) III (III	,)							+		
										-	
Motor Carte :	Doforo Taar			Motor Court	nt After Test						
Water Content Tare #	Beiore Lest			Water Conte Tare #	nt After Lest						+
Wet Soil + Tare	1230.60			Wet Soil + Tare	1261.60						
Dry Soil + Tare	1054.90			Dry Soil + Tare	1054.90						1
Tare Weight	0.00			Tare Weight	0.00						
Water Content	16.66			Water Content	19.59						
Source	Specimen			Source	Specimen						

				LIVED ALILIO O	ONDUGEN/I	V FOR ELEVIRI	E WALLED TEST	NAMBLEO			
						Y FOR FLEXIBL AD APPARATUS	E-WALLED TEST S	SAMPLES			
			I	1	FALLING HEA	AD APPAKATUS	, ASTWI D3084				
Client:	Montana DE	0					Project:	LIMBC Section 35	Design Investigation		
Sample Description:	S35SB-213E						i roject.	ONIDO OCCIION 33	Design investigation		
Test Specimen											
Dry Density (pcf):		111.9									
% Max. ASTM D-698:											
Specimen Length (cm):		13.97									
Specimen Diameter (cm):		7.112									
				Testing Equipment							
				Height Inlet Above Floor (cm).						
				Height Outlet Above Bend	ciii).	21.9					
				Area of Standpipe (cm ²):	, (CIII).	0.912					
				, and or oraniupipe (off).		0.812					+
Increment	Initial	Inital	Final	Final	Time	Applied Pressure	Initial	Final	Average Hydraulic	Hydraulic	Hydraulic
Number	Reading	Reading	Reading	Reading	Increment	Differential	Head	Head	Gradient	Conductivity	Conductivity
	Influent	Effluent	Influent	Effluent			2.21.2			· · · · · · · · · · · · · · · · · ·	at 20 C
	(cm ³)	(cm ³)	(cm ³)	(cm ³)	(min.)	(psi)	(cm)	(cm)	(cm/cm)	(cm/sec)	(cm/sec)
1	0.2	41	4.5	36.9	2992	3.1	262.65	253.44	18.47	3.2E-08	3.2E-08
2	4.5	36.9	6.5	35	1420	3.1	253.44	249.17	17.99	3.2E-08	3.3E-08
5	6.5	35	8.5	33.1	1427	3.1	249.17	244.89	17.68	3.2E-08	3.4E-08
6	8.5	33.1	9.85	31.7	1073	3.1	244.89	241.88	17.42	3.1E-08	3.2E-08
9	9.85	31.7	12.2	29.4	1816	3.1	241.88	236.78	17.13	3.1E-08	3.2E-08
10											
11											
12											
13											-
14 15											
16											
17											
18											
19											
20	Average Hvo	Iraulic Condu	ctivity of Last	Four Test Increments =				3.2E-08	cm/sec		
21											
23											
24											
25											
1	(al /At) ! /' 1	/h2\			1						1
K =	(aL/At) In (h1	/11 ८)	1								-
	 		1		1	1					1
Water Content Befo	re Test			Water Content A	fter Test	1					1
Tare #		Ī		Tare #		1					
Wet Soil + Tare (grams)	1189.50			Wet Soil + Tare (grams)	1138.30						
Dry Soil + Tare (grams)	994.76			Dry Soil + Tare (grams)	994.76						
Tare Weight (grams)	0.00			Tare Weight (grams)	0.00						
Water Content (%)	19.58			Water Content (%)	14.43						
Source	Specimen			Source	Specimen						



Total Normal Stress, psf ———— Effective Normal Stress, psf -----

Sample No.



		•				
3		Water Content, %	11.3	11.3	11.3	
	_	Dry Density, pcf	134.2	134.2	134.2	
	Initial	Saturation, %	128.6	128.6	128.6	
	므	Void Ratio	0.2325	0.2325	0.2325	
		Diameter, in.	2.80	2.80	2.80	
		Height, in.	6.32	6.32	6.32	
		Water Content, %	10.1	10.1	10.1	
	±.	Dry Density, pcf	134.2	134.2	134.2	
2	آو ا	Saturation, %	114.9	114.9	114.9	
	At Test	Void Ratio	0.2325	0.2325	0.2325	
	1	Diameter, in.	2.80	2.82	2.84	
		Height, in.	6.32	6.22	6.14	
1	Stra	ain rate, in./min.	0.00	0.00	0.00	
	Bad	ck Pressure, psi	71.50	72.50	73.30	
	Cel	l Pressure, psi	81.50	92.50	113.00	
	Fai	I. Stress, psf	2068	4017	8117	
	Т	otal Pore Pr., psf	11534	12514	14616	
	Ult.	Stress, psf	2145	4017	8221	
	Т	otal Pore Pr., psf	11534	12514	14501	
	$\overline{\sigma}_1$	Failure, psf	2269	4823	9773	
	$\overline{\sigma}_3$	Failure, psf	202	806	1656	

2

3

Type of Test:

CU with Pore Pressures **Sample Type:** Staged

Description: clayey gravel with sand

LL= 30 **PL=** 14 **PI=** 16

Specific Gravity= 2.65

Remarks:

Client: Montana Department of Environmental Quality

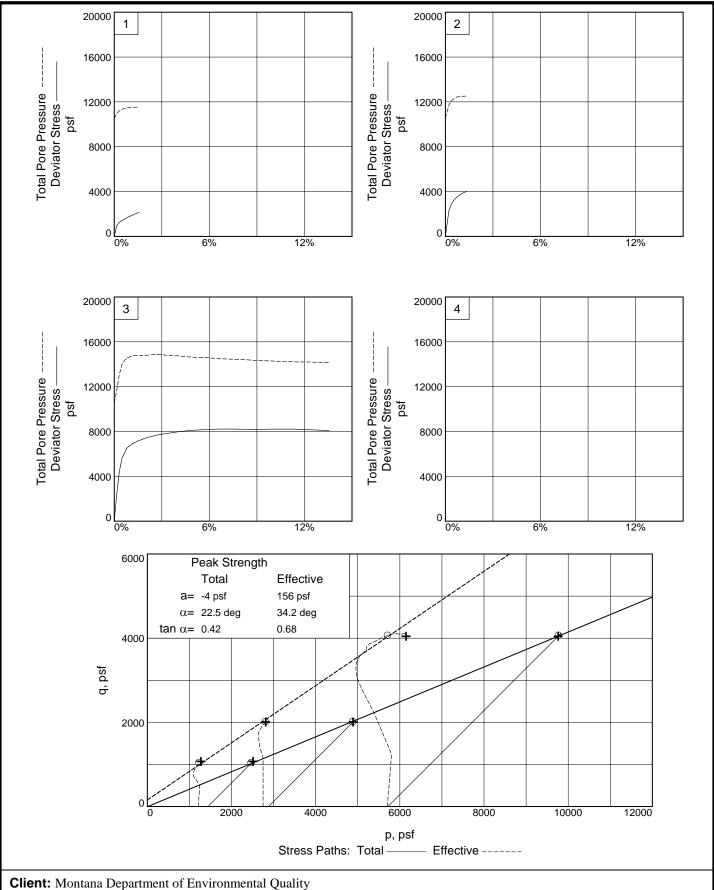
Project: UBMC Section 35 Design Investigation

Source of Sample: S35MW-203B Depth: 20-20.8'

Proj. No.: 10180 Date Sampled:

TRIAXIAL SHEAR TEST REPORT Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

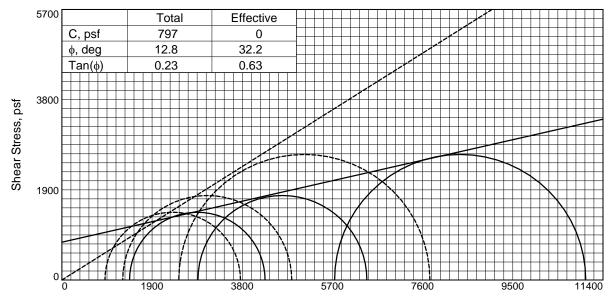
Figure ____



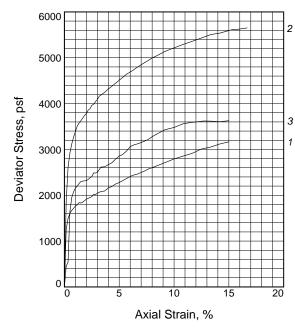
Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Source of Sample: S35MW-203B Depth: 20-20.8'
Project No.: 10180 Figure

Pioneer Technical Services, Inc.



Total Normal Stress, psf ———— Effective Normal Stress, psf -----



Tν	ре	of	Test:
	_	•	

CU with Pore Pressures

Sample Type:

Description: clayey sand with gravel

LL= 36 **PL=** 16 **PI=** 20

Specific Gravity= 2.62

Remarks:

13.3 113.5 79.0 0.4406 2.42 6.00	13.0 104.0 59.5 0.5734 2.54 6.00	14.8 109.8 79.0 0.4897 2.43 6.00	
79.0 0.4406 2.42 6.00	59.5 0.5734 2.54 6.00	79.0 0.4897 2.43 6.00	
0.4406 2.42 6.00 16.3	0.5734 2.54 6.00	0.4897 2.43 6.00	
2.42 6.00 16.3	2.54 6.00	2.43 6.00	
6.00	6.00	6.00	
16.3			
	14.2	1.0	
1125		16.8	
113.3	104.0	109.8	
96.7	64.8	89.8	
0.4406	0.5734	0.4897	
2.42	2.54	2.43	
6.00	6.00	6.00	
0.01	0.01	0.01	
69.60	70.30	94.70	
79.50	110.20	114.60	
2855	5291	3560	
10541	13406	15221	
3167	5616	3626	
10382	13118	15106	
3762	7753	4842	
907	2462	1282	
	113.5 96.7 0.4406 2.42 6.00 0.01 69.60 79.50 2855 10541 3167 10382 3762	113.5 104.0 96.7 64.8 0.4406 0.5734 2.42 2.54 6.00 6.00 0.01 0.01 69.60 70.30 79.50 110.20 2855 5291 10541 13406 3167 5616 10382 13118 3762 7753	113.5 104.0 109.8 96.7 64.8 89.8 0.4406 0.5734 0.4897 2.42 2.54 2.43 6.00 6.00 6.00 0.01 0.01 0.01 69.60 70.30 94.70 79.50 110.20 114.60 2855 5291 3560 10541 13406 15221 3167 5616 3626 10382 13118 15106 3762 7753 4842

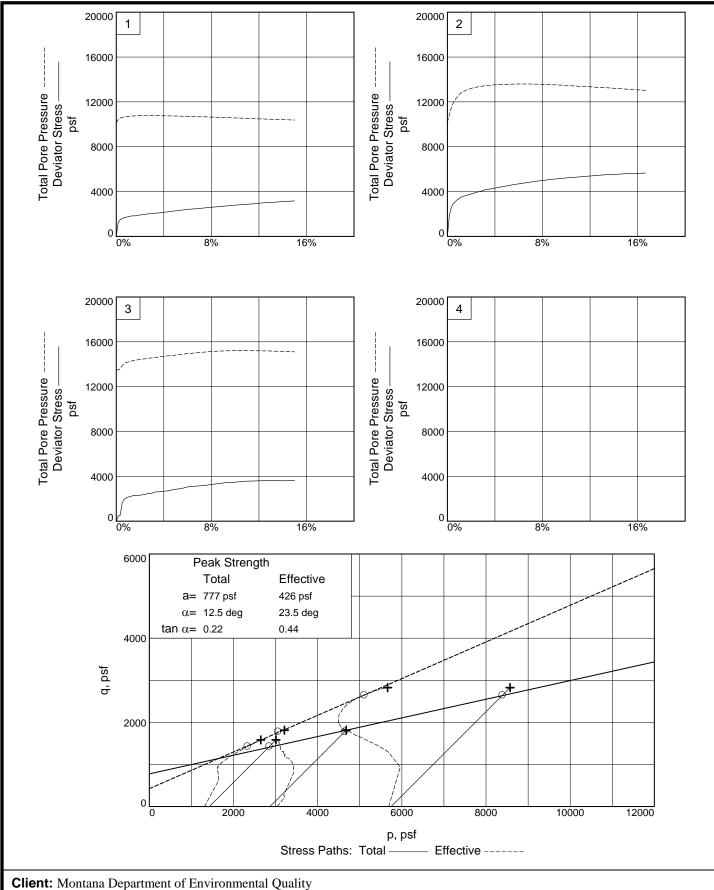
Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Proj. No.: 10180 Date Sampled:

TRIAXIAL SHEAR TEST REPORT Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

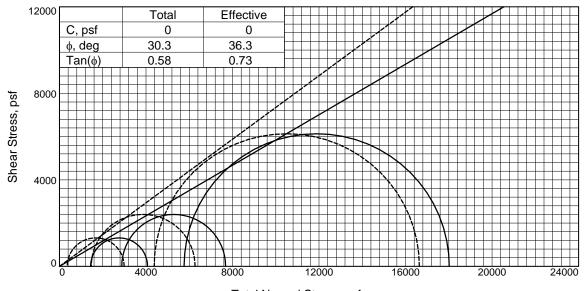
Figure _____



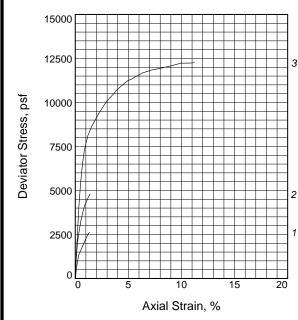
Client: Montana Department of Environmental Quality **Project:** UBMC Section 35 Design Investigation

Source of Sample: S35SB-206B Depth: 15-16.5'
Project No.: 10180 Figure __

Pioneer Technical Services, Inc.



Total Normal Stress, psf ————
Effective Normal Stress, psf ————



	Sar	mple No.	1	2	3	
		Water Content, %	16.7	16.7	16.7	
3		Dry Density, pcf	108.8	108.8	108.8	
	Initial	Saturation, %	81.8	81.8	81.8	
	Ξ	Void Ratio	0.5496	0.5496	0.5496	
		Diameter, in.	2.80	2.80	2.80	
		Height, in.	6.00	6.00	6.00	
		Water Content, %	19.6	19.6	19.6	
	 	Dry Density, pcf	108.8	108.8	108.8	
	At Test	Saturation, %	96.3	96.3	96.3	
		Void Ratio	0.5496	0.5496	0.5496	
2	_	Diameter, in.	2.80	2.82	2.84	
		Height, in.	6.00	5.92	5.84	
,	Stra	ain rate, in./min.	0.00	0.00	0.00	
'	Bad	ck Pressure, psi	69.60	72.30	72.30	
	Cel	l Pressure, psi	79.60	92.30	112.30	
	Fai	I. Stress, psf	2630	4800	12260	
	T	otal Pore Pr., psf	11102	11822	11794	
	Ult.	Stress, psf	2630	4800	12260	
	T	otal Pore Pr., psf	11102	11822	11794	
	$\overline{\sigma}_1$	Failure, psf	2990	6269	16638	
	$\overline{\sigma}_3$	Failure, psf	360	1469	4378	

Type of Test:

CU with Pore Pressures

Sample Type: Staged

Description: sandy lean clay

LL= 41 **PL=** 12 **PI=** 29

Specific Gravity= 2.7

Remarks:

Client: Montana Department of Environmental Quality

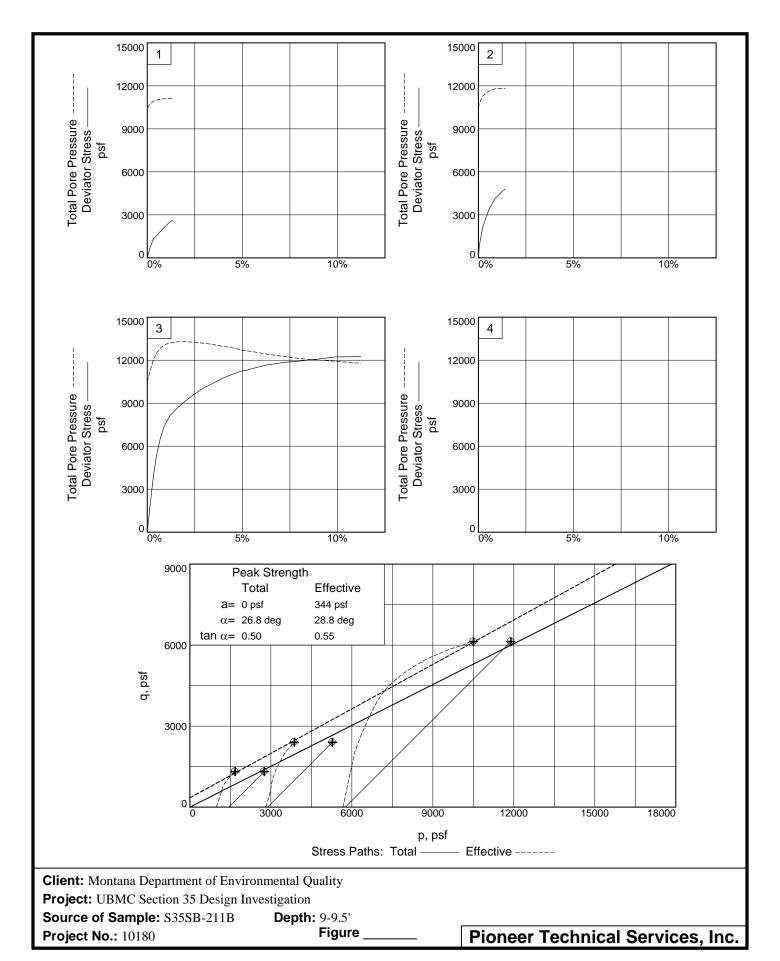
Project: UBMC Section 35 Design Investigation

Source of Sample: \$35\$B-211B **Depth:** 9-9.5'

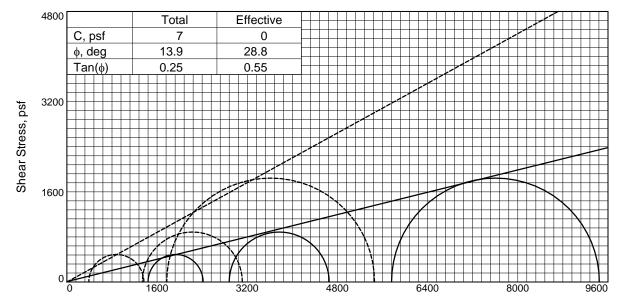
Proj. No.: 10180 Date Sampled:

TRIAXIAL SHEAR TEST REPORT Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

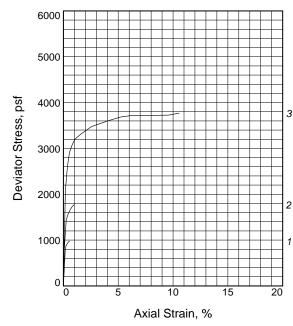
Figure



Tested By: NKG



Total Normal Stress, psf ————
Effective Normal Stress, psf ————



Type of To	est:
------------	------

CU with Pore Pressures

Sample Type:

Description: clayey sand with gravel

LL= 39 **PL=** 15 **PI=** 24

Specific Gravity= 2.67

Remarks:

	Sar	mple No.	1	2	3	
		Water Content, %	19.6	19.6	19.6	
		Dry Density, pcf	111.9	111.9	111.9	
	Initial	Saturation, %	106.8	106.8	106.8	
	<u>=</u>	Void Ratio	0.4896	0.4896	0.4896	
		Diameter, in.	2.80	2.80	2.80	
3		Height, in.	5.50	5.50	5.50	
		Water Content, %	14.4	14.4	14.4	
	;;	Dry Density, pcf	111.9	111.9	111.9	
	At Test	Saturation, %	78.7	78.7	78.7	
		Void Ratio	0.4896	0.4896	0.4896	
	`	Diameter, in.	2.80	2.81	2.82	
•		Height, in.	5.50	5.47	5.42	
	Stra	ain rate, in./min.	0.00	0.00	0.00	
1	Bad	ck Pressure, psi	70.40	73.20	72.90	
	Cel	l Pressure, psi	80.40	93.20	112.90	
	Fai	l. Stress, psf	977	1773	3687	
	ד	otal Pore Pr., psf	11189	12082	14486	
	Ult.	Stress, psf	977	1773	3769	
	ד	otal Pore Pr., psf	11189	12082	14544	
	$\overline{\sigma}_1$	Failure, psf	1366	3112	5458	
	$\overline{\sigma}_3$	Failure, psf	389	1339	1771	

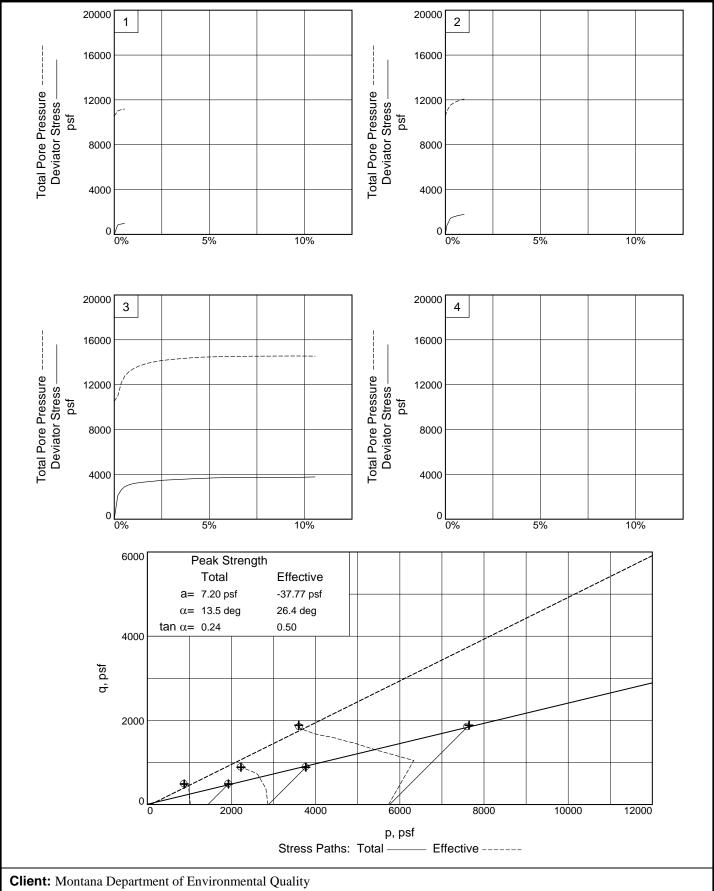
Client: Montana Department of Environmental Quality

Project: UBMC Section 35 Design Investigation

Proj. No.: 10180 Date Sampled:

TRIAXIAL SHEAR TEST REPORT Pioneer Technical Services, Inc. 1215 Apple's Way - Belgrade, MT 59714

Figure _____



Project: UBMC Section 35 Design Investigation

Source of Sample: S35SB-213B **Depth:** 40-40.8' Figure __ **Project No.: 10180**

Pioneer Technical Services, Inc.

APPENDIX D

LABORATORY ANALYTICAL DATA

ANALYTICAL SUMMARY REPORT

January 15, 2013

MT DEQ-Site Response PO Box 200901 Helena, MT 59620-0901

Workorder No.: H12120317 Quote ID: H813 - Mike Horse Repository

Project Name: UBMC Repository

Energy Laboratories Inc Helena MT received the following 11 samples for MT DEQ-Site Response on 12/19/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H12120317-001	S35-BGT-01	12/18/12 12	:00 12/19/12	Soil	Metals by ICP/ICPMS, Total Cation Exchange Capacity Cations, NHO4Ac Extractable Cations, Saturated Paste Acid/Base Potential Total Acidity Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Fertilizer Recommendation Anions by Ion Chromatography Lime Requirement, SMP Buffer Nitrate as N, CaCL2 Extract Organic Carbon/Matter Walkely Black pH, Saturated Paste Phosphorus-Olsen Digestion, Total Metals CaCl2 Hot Water Soil Extraction CEC NH4AC Soil Extraction Digestion, Mercury by CVAA Lime Percentage NaHCO3 Soil Extract NH4AC Soil Extract NH4AC Soil Extract NH4AC Soil Extract Soil Organic Matter Prep Saturated Paste Extraction Sodium Adsorption Ratio Saturation Percentage Sulfur Forms Soil Preparation
H12120317-002	S35-BGT-02	12/18/12 12	:05 12/19/12	Soil	Same As Above
H12120317-003	S35-BGT-03	12/18/12 12	:10 12/19/12	Soil	Same As Above
H12120317-004	S35-CS-01	12/18/12 12	:15 12/19/12	Soil	Same As Above
H12120317-005	S35-CS-02	12/18/12 12	:20 12/19/12	Soil	Same As Above
H12120317-006	S35-CS-03	12/18/12 12	:25 12/19/12	Soil	Same As Above
H12120317-007	13341: TP104 (7-10')	12/18/12 12	:30 12/19/12	Soil	Same As Above
H12120317-008	13350: TP106 (8.4-9.4')	12/18/12 12	:35 12/19/12	Soil	Same As Above
H12120317-009	13354: TP107 (9-10')	12/18/12 12	:40 12/19/12	Soil	Same As Above
H12120317-010	13371: TP111 (10.5-11.5)	12/18/12 12	:45 12/19/12	Soil	Same As Above
H12120317-011	13381: TP113 (1.5-3.5)	12/18/12 12	:50 12/19/12	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Report Date: 01/15/13

CLIENT: MT DEQ-Site Response

Project: UBMC Repository

Sample Delivery Group: H12120317 CASE NARRATIVE

Tests associated with analyst identified as ELI-CS were subcontracted to Energy Laboratories, 415 Graham Rd., College Station, TX, EPA Number TX01520.

TO:

MT DEQ - Site Response

ADDRESS:

LAB NO.: H12120317-001-011

DATE: 1/14/13

UBMC Repository FERTILIZER RECOMMENDATIONS

Fertilizer Suggested in Actual Pounds per Acre

FIELD	S35-BGT: 01	S35-BGT: 02	S35-BGT: 03	S35-CS:	S35-CS:	S35-CS:
CROP	Grass	Grass	Grass	Grass	Grass	Grass
PROJECTED YIELD	1T	1T	1T	1T	1T	1T
Nitrogen Total Preplant Topdress	35	35	35	35	35	35
Phosphrus (P ₂ O ₅) Broadcast Banded	30	50	30	0	0	0
Potassium (K ₂ O) Broadcast Banded	50	50	30	30	0	O
Sulphur (S) Zinc (Zn) Iron (Fe) Copper (Cu) Lime Compost	0 10T	0 10T	0 10T	0 5T	4 0 T	5 0T

COMMENTS:

For soils with < 2% organic matter, compost at 5-10 tons per acre would help with grass establishment and growth while providing a slow release nitrogen. Those with compost recommended have < 2% O.M.

PREPARED BY: Neal Fehringer, Certified Professional Agronomist, C.C.A., (406) 860-3647.

TO:

MT DEQ - Site Response

ADDRESS:

LAB NO.: H12120317-001-011

DATE: 1/14/13

UBMC Repository FERTILIZER RECOMMENDATIONS

Fertilizer Suggested in Actual Pounds per Acre

FIELD	S35-BGT: 01	S35-BGT: 02	S35-BGT: 03	S35-CS: 01	S35-CS: 02	S35-CS: 03
CROP	Grass	Grass	Grass	Grass	Grass	Grass
PROJECTED YIELD	1T	1 T	1T	1⊤	1T	1T
Nitrogen Total Preplant Topdress	35	35	35	35	35	35
Phosphrus (P ₂ O ₅) Broadcast Banded	30	50	30	0	0	0
Potassium (K ₂ O) Broadcast Banded	50	50	30	30	0	0
Sulphur (S) Zinc (Zn) Iron (Fe) Copper (Cu) Lime Compost	0 10T	0 10T	0 10T	0 5T	4 0T	5 0T

COMMENTS:

For soils with < 2% organic matter, compost at 5-10 tons per acre would help with grass establishment and growth while providing a slow release nitrogen. Those with compost recommended have < 2% O.M.

PREPARED BY: Neal Fehringer, Certified Professional Agronomist, C.C.A., (406) 860-3647.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Site Response

Project: UBMC Repository
Workorder: H12120317

Report Date: 01/15/13 **Date Received:** 12/19/12

		Analy	sis	TEA Exch Acidity	pH, SMP Buffer	Lime Requireme	Percent Sat	pH-SatPst	COND	Ca-SatPst	Mg-SatPst	Na-SatPst	SAR	SO4-SatPst
	-	Unit	S	meq/100g	s_u_	Tons/1000T	%	s_u_	mmhos/cm	meq/l	meq/l	meq/l	unitless	meq/L
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
H12120317-001	S35-BGT-01	0	0	0.95	7.6	< 1	24.0	7.2	0.4	2.83	0.94	0.36	0.3	0.9
H12120317-002	S35-BGT-02	0	0	1.4	7.6	< 1	29.8	7.1	0.3	2.45	0.66	0.20	0.2	< 0.4
H12120317-003	S35-BGT-03	0	0	2.8	7.4	< 1	32.4	6.8	0.5	4.11	1.21	0.27	0.2	< 0.4
H12120317-004	S35-CS-01	0	0	6.2	6.8	< 1	32.3	5.7	0.5	3.28	1.32	0.30	0.2	4.1
H12120317-005	S35-CS-02	0	0	9.8	6.4	4	38.8	5.7	0.3	2.41	0.81	0.20	0.2	0.4
H12120317-006	S35-CS-03	0	0	12	6.2	5	45.5	5.7	0.2	1.65	0.53	0.12	0.1	< 0.4
H12120317-007	13341: TP104 (7-10')	0	0	0.95	7.6	< 1	33.2	7.6	0.3	1.76	0.48	0.22	0.2	< 0.4
H12120317-008	13350: TP106 (8.4-9.4')	0	0	1.5	7.6	< 1	27.8	7.3	0.3	2.24	0.75	0.28	0.2	0.5
H12120317-009	13354: TP107 (9-10')	0	0	1.1	7.6	< 1	19.5	7.9	0.2	1.53	0.52	0.14	0.1	< 0.4
H12120317-010	13371: TP111 (10.5- 11.5)	0	0	0.0	7.6	< 1	29.0	7.8	0.2	1.65	0.42	0.14	0.1	< 0.4
H12120317-011	13381: TP113 (1.5-3.5)	0	0	2.9	7.5	< 1	24.6	6.8	0.4	3.04	0.79	0.20	0.1	< 0.4



H12120317

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Site Response

Project: **UBMC** Repository Workorder:

Report Date: 01/15/13 Date Received: 12/19/12

		Analy	sis	K, available	CEC	OM-WB	Neut Potential	Acid Potential	Acid/Base Potential	Sulfur, Total	Olsen Phos-Olsen	NO3	Ag-T	Al-T
	_	Unit	s	mg/kg	meq/100g	%	t/kt	t/kt	t/kt	%	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
H12120317-001	S35-BGT-01	0	0	81	9.75	< 0.2	13	< 0.3	13	< 0.01	5	< 1	< 1	8380
H12120317-002	S35-BGT-02	0	0	83	11.3	< 0.2	10	< 0.3	10	< 0.01	2	< 1	< 1	10100
H12120317-003	S35-BGT-03	0	0	132	14.2	0.3	14	< 0.3	14	< 0.01	5	< 1	< 1	11800
H12120317-004	S35-CS-01	0	0	154	16.9	1.5	9	< 0.3	9	< 0.01	18	1	1	16300
H12120317-005	S35-CS-02	0	0	223	23.0	2.8	8	< 0.3	9	< 0.01	37	< 1	< 1	16400
H12120317-006	S35-CS-03	0	0	283	27.0	4.1	10	< 0.3	10	< 0.01	18	< 1	< 1	18100
112120317-007	13341: TP104 (7-10')	0	0	109	11.6	< 0.2	23	< 0.3	23	< 0.01	2	< 1	< 1	9530
H12120317-008	13350: TP106 (8.4-9.4')	0	0	93	10.3	< 0.2	7	< 0.3	7	< 0.01	2	< 1	< 1	9620
H12120317-009	13354: TP107 (9-10')	0	0	41	4.89	< 0.2	26	< 0.3	26	< 0.01	1	< 1	3	4970
H12120317-010	13371: TP111 (10.5- 11.5)	0	0	82	9.52	< 0.2	22	< 0.3	22	< 0.01	2	< 1	< 1	8540
H12120317-011	13381: TP113 (1.5-3.5)	0	0	48	3.33	< 0.2	6	< 0.3	7	< 0.01	6	< 1	< 1	7900



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LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Site Response

UBMC Repository

Report Date: 01/15/13 Date Received: 12/19/12

Workorder: H12120317

Project:

		Analys	sis	As-T	Ba-T	Be-T	Ca-T	Cd-T	Co-T	Cr-T	Cu-T	Fe-T	K-T	Mg-T
	_	Unit	S	mg/kg										
Sample ID	Client Sample ID	Up	Low	Results										
H12120317-001	S35-BGT-01	0	0	7	166	< 1	4240	< 1	6	14	17	13600	1590	4490
H12120317-002	S35-BGT-02	0	0	6	195	< 1	3070	< 1	7	13	18	13500	2080	4440
H12120317-003	S35-BGT-03	0	0	7	191	< 1	3820	< 1	6	16	15	14500	2030	4090
H12120317-004	S35-CS-01	0	0	21	254	< 1	2300	1	6	19	113	16000	2280	3570
H12120317-005	S35-CS-02	0	0	6	315	< 1	2610	< 1	6	16	18	14600	2370	3520
H12120317-006	S35-CS-03	0	0	6	326	< 1	2950	< 1	5	17	18	14600	2970	3390
H12120317-007	13341: TP104 (7-10')	0	0	7	216	< 1	6830	< 1	7	20	17	13400	2050	4740
H12120317-008	13350: TP106 (8.4-9.4')	0	0	5	146	< 1	2240	< 1	6	12	22	13200	1870	3630
H12120317-009	13354: TP107 (9-10')	0	0	3	232	< 1	6850	< 1	5	7	13	9420	1120	4420
H12120317-010	13371: TP111 (10.5- 11.5)	0	0	5	192	< 1	6650	< 1	6	12	14	11600	1760	4330
H12120317-011	13381: TP113 (1.5-3.5)	0	0	6	132	< 1	1850	< 1	7	12	15	15100	1380	3880

Helena, MT 877-472-0711 • Billings, MT 800-735-4489 • Casper, WY 888-235-0515
Gillette, WY 866-686-7175 • Rapid City, SD 888-672-1225 • College Station, TX 888-690-2218

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Site Response

Project: UBMC Repository

H12120317

Workorder:

Report Date: 01/15/13 **Date Received:** 12/19/12

		Analysis		Mn-T	Na-T	Ni-T	Pb-T	Sb-T	Se-T	TI-T	V-T	Zn-T	Hg, Total	1/3 Bar Moisture
		Unit	S	mg/kg	wt%									
Sample ID	Client Sample ID	Up	Low	Results	Results									
H12120317-001	S35-BGT-01	0	0	350	52	14	12	< 1	< 1	< 1	13	43	< 0.50	15
H12120317-002	S35-BGT-02	0	0	400	51	15	11	< 1	< 1	< 1	11	41	< 0.50	18
112120317-003	S35-BGT-03	0	0	335	65	15	11	< 1	< 1	< 1	14	39	< 0.50	19
112120317-004	S35-CS-01	0	0	603	68	14	548	< 1	< 1	< 1	21	273	< 0.50	21
112120317-005	S35-CS-02	0	0	531	60	14	12	< 1	< 1	< 1	16	62	< 0.50	26
112120317-006	S35-CS-03	0	0	399	68	13	11	< 1	< 1	< 1	16	61	< 0.50	29
112120317-007	13341: TP104 (7-10')	0	0	341	76	17	10	< 1	< 1	< 1	14	39	< 0.50	19
H12120317-008	13350: TP106 (8.4-9.4')	0	0	328	54	13	20	< 1	< 1	< 1	11	42	< 0.50	17
H12120317-009	13354: TP107 (9-10')	0	0	293	36	8	7	< 1	< 1	< 1	10	26	< 0.50	10
112120317-010	13371: TP111 (10.5- 11.5)	0	0	308	58	11	10	< 1	< 1	< 1	11	35	< 0.50	17
112120317-011	13381: TP113 (1.5-3.5)	0	0	283	53	13	10	< 1	< 1	< 1	14	42	< 0.50	8.6

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Site Response

Project: UBMC Repository **Workorder:** H12120317

Report Date: 01/15/13 **Date Received:** 12/19/12

		Analy	sis	15 Bar Moisture
	-	Unit	S	wt%
Sample ID	Client Sample ID	Up	Low	Results
H12120317-001	S35-BGT-01	0	0	6.2
H12120317-002	S35-BGT-02	0	0	7.9
H12120317-003	S35-BGT-03	0	0	9.0
H12120317-004	S35-CS-01	0	0	9.4
H12120317-005	S35-CS-02	0	0	11
H12120317-006	S35-CS-03	0	0	12
H12120317-007	13341: TP104 (7-10')	0	0	9.6
H12120317-008	13350: TP106 (8.4-9.4')	0	0	7.5
H12120317-009	13354: TP107 (9-10')	0	0	2.9
H12120317-010	13371: TP111 (10.5- 11.5)	0	0	7.3
H12120317-011	13381: TP113 (1.5-3.5)	0	0	4.7

QA/QC Summary Report

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA12-3									Batch	: R85449
Sample ID: LCS-19107	Lab	ooratory Co	ntrol Sample			Run: SOIL	PH METER_12	21228A	12/28/	13 13:00
pH, SMP Buffer		7.56	s.u.	0.10	100	70	130			
Sample ID: H12120317-010ADU	P 2 Sai	mple Duplic	ate			Run: SOIL	PH METER_12	21228A	12/28/	12 13:00
pH, SMP Buffer		7.63	s.u.	0.10						
Lime Requirement, SMP buffer		ND 1	Γons/1000T	1.0					30	

QA/QC Summary Report

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count Resu	ılt Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA24-5						Analytic	cal Run	: FIA202-HE_	_130104A
Sample ID: ICV	Initial Calib	oration Verificat	ion Standard					01/04/	/13 09:12
Phosphorus, Olsen	5	5.0 mg/kg	1.0	100	90	110			
Sample ID: ICB	Initial Calib	oration Blank, Ir	nstrument Blank					01/04/	/13 09:16
Phosphorus, Olsen	0.02	23 mg/kg	1.0		0	0			
Method: ASA24-5								Bat	ch: 19156
Sample ID: MB-19156	Method Bla	ank			Run: FIA20	2-HE_130104A		01/04/	/13 09:18
Phosphorus, Olsen	1	.0 mg/kg	0.08						
Sample ID: LCS-19156	Laboratory	Control Sampl	е		Run: FIA20	2-HE_130104A		01/04/	/13 09:19
Phosphorus, Olsen	•	46 mg/kg	1.0	102	70	130			
Sample ID: H12120317-001AMS	Sample Ma	atrix Spike			Run: FIA20	2-HE_130104A		01/04/	/13 09:21
Phosphorus, Olsen	;	53 mg/kg	1.0	96	80	120			
Sample ID: H12120317-001AMS	D Sample Ma	atrix Spike Dup	licate		Run: FIA20	2-HE_130104A		01/04/	/13 09:22
Phosphorus, Olsen	:	53 mg/kg	1.0	96	80	120	0.3	20	
Sample ID: H12120317-010Aduj	Sample Du	uplicate			Run: FIA20	2-HE_130104A		01/04/	/13 09:35
Phosphorus, Olsen	1	.9 mg/kg	1.0				8.1	30	
Sample ID: H12120317-011AMS	Sample Ma	atrix Spike			Run: FIA20	2-HE_130104A		01/04/	/13 09:37
Phosphorus, Olsen	!	53 mg/kg	1.0	94	80	120			
Sample ID: H12120317-011AMS	Sample Ma	atrix Spike Dup	licate		Run: FIA20	2-HE_130104A		01/04/	/13 09:38
Phosphorus, Olsen		54 mg/kg	1.0	96	80	120	2.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA29-3									Bat	ch: 19110
Sample ID: LCS-1911012123112	1 Lal	ooratory Cor	ntrol Sample	;		Run: MISC	SOILS_130102F		12/31/	/12 12:11
Organic Matter		1.29	%	0.17	87	70	130			
Sample ID: H12120317-010ADUI	s Sa	mple Duplica	ate			Run: MISC	SOILS_130102F		12/31/	/12 12:11
Organic Matter		ND	%	0.17						
Sample ID: H12120317-010ADUI	• Sa	mple Duplica	ate			Run: MISC	SOILS_130102F		12/31/	/12 12:11
Organic Matter		ND	%	0.020					30	



Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA33-8							Analytic	cal Run	: FIA203-HE	_130102B
Sample ID: ICV	Init	ial Calibration	on Verificati	on Standard					01/02	/13 11:53
Nitrate as N, KCL Extract		1.1	mg/kg	1.0	106	90	110			
Sample ID: CCV	Co	ntinuing Ca	libration Ver	ification Standar	rd				01/02	/13 11:55
Nitrate as N, KCL Extract		0.50	mg/kg	1.0	100	90	110			
Sample ID: ICB	Init	ial Calibrati	on Blank, In	strument Blank					01/02	/13 11:57
Nitrate as N, KCL Extract		-0.0069	mg/kg	1.0		0	0			
Sample ID: CCV	Co	ntinuing Ca	libration Ver	ification Standar	rd				01/02	/13 12:17
Nitrate as N, KCL Extract		0.50	mg/kg	1.0	100	90	110			
Method: ASA33-8									Bat	ch: 19112
Sample ID: MB-19112	Me	thod Blank				Run: FIA20	3-HE_130102B		01/02	/13 12:00
Nitrate as N, KCL Extract		ND	mg/kg	0.1						
Sample ID: LCS-19112	Lat	oratory Co	ntrol Sample	e		Run: FIA20	3-HE_130102B		01/02	/13 12:01
Nitrate as N, KCL Extract		5.0	mg/kg	2.0	96	70	130			
Sample ID: H12120317-001AMS	Sai	mple Matrix	Spike			Run: FIA20	3-HE_130102B		01/02	/13 12:04
Nitrate as N, KCL Extract		2.3	mg/kg	1.0	95	80	120			
Sample ID: H12120317-001AMS	SD Sai	mple Matrix	Spike Dupli	icate		Run: FIA20	3-HE_130102B		01/02	/13 12:05
Nitrate as N, KCL Extract		2.3	mg/kg	1.0	94	80	120	0.1	30	
Sample ID: H12120317-010Adu	p Sai	mple Duplic	ate			Run: FIA20	3-HE_130102B		01/02	/13 12:19
Nitrate as N, KCL Extract		0.15	mg/kg	1.0					30	
Sample ID: H12120317-011AMS	Sa ₁	mple Matrix	Spike			Run: FIA20	3-HE_130102B		01/02	/13 12:22
Nitrate as N, KCL Extract		1.9	mg/kg	1.0	95	80	120			
Sample ID: H12120317-011AMS	SD Sai	mple Matrix	Spike Dupli	icate		Run: FIA20	3-HE_130102B		01/02	/13 12:23
Nitrate as N, KCL Extract		1.9	mg/kg	1.0	95	80	120	0.2	30	

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Analyte	Count Result Units	RL %REC Low Limit High Limit	RPD RPDLimit Qual
Method: ASA9-4			Batch: T_R48932
Sample ID: MBLK1301110833	Method Blank	Run: SUB-T48932	01/11/13 08:33
Exchangeable Acidity-TEA	ND meq/100g	0.1	
Sample ID: H12120317-005A	Sample Duplicate	Run: SUB-T48932	01/11/13 08:33
Exchangeable Acidity-TEA	10 meq/100g	0.10	6.4 10

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASAM10-3							Ana	lytical Ru	un: SOIL EC	_121231A
Sample ID: CCV_1_121228_1	Co	ntinuing Ca	libration Verific	ation Standar	d				12/28	/12 10:44
Conductivity, sat. paste		1.44	mmhos/cm	0.10	102	90	110			
Sample ID: CCV1_1_121228_1	Co	ntinuing Ca	libration Verific	ation Standar	d				12/28	/12 10:44
Conductivity, sat. paste		5.09	mmhos/cm	0.10	102	90	110			
Sample ID: ICV_1_121228_1	Init	tial Calibrati	on Verification	Standard					12/28	/12 10:44
Conductivity, sat. paste		18.8	mmhos/cm	0.10	94	90	110			
Sample ID: CCV_3_121228_1	Co	ntinuing Ca	libration Verific	ation Standar	d				12/28	/12 10:47
Conductivity, sat. paste		1.42	mmhos/cm	0.10	100	90	110			
Method: ASAM10-3							Bato	h: 12122	28_1_COND-	S-PASTE
Sample ID: LCS-19107	La	boratory Co	ntrol Sample			Run: SOIL	EC_121231A		12/28	/12 10:44
Conductivity, sat. paste		4.71	mmhos/cm	0.10	100	80	120			
Sample ID: H12120317-010ADUI	P Sa	mple Duplic	cate			Run: SOIL	EC_121231A		12/28	/12 10:46
Conductivity, sat. paste		0.212	mmhos/cm	0.10				4.6	20	

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASAM10-3.2							Analytical	Run: SOIL	PH METER_	_121231A
Sample ID: CCV_1_121228_1	Cor	ntinuing Cali	bration Ve	rification Standar	d				12/28/	12 10:50
pH, sat. paste		7.01	s.u.	0.10	100	95	105			
Sample ID: CCV1_1_121228_1	Cor	ntinuing Cali	bration Ve	rification Standar	d				12/28/	/12 10:50
pH, sat. paste		4.01	s.u.	0.10	100	95	105			
Sample ID: ICV_1_121228_1	Initi	ial Calibratio	n Verificat	ion Standard					12/28/	/12 10:50
pH, sat. paste		10.0	s.u.	0.10	100	98	102			
Sample ID: CCV_3_121228_1	Cor	ntinuing Cali	bration Ve	rification Standar	d				12/28/	/12 10:51
pH, sat. paste		6.97	s.u.	0.10	100	95	105			
Method: ASAM10-3.2									Bat	ch: 19107
Sample ID: LCS-19107	Lab	oratory Cor	trol Sampl	le		Run: SOIL	PH METER_1	21231A	12/28/	12 10:50
pH, sat. paste		7.56	s.u.	0.10	100	90	110			
Sample ID: H12120317-010ADU	P Sar	mple Duplica	ate			Run: SOIL	PH METER_1	21231A	12/28/	/12 10:51
pH, sat. paste		7.74	s.u.	0.10				0.1	30	

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count F	Result	Units	RL	%REC	Low Limit	High Limit	RPD RPDLimit	Qual
Method: E200.7							Ana	alytical Run: ICP2-HE	_1212310
Sample ID: ICV	17 Initial	Calibratio	n Verificatio	n Standard				12/31	/12 11:27
Aluminum		4.08	mg/L	0.10	102	90	110		
Barium		0.802	mg/L	0.10	100	90	110		
Beryllium		0.411	mg/L	0.0010	103	90	110		
Cadmium		0.396	mg/L	0.0010	99	90	110		
Calcium		40.6	mg/L	1.0	101	90	110		
Chromium		0.846	mg/L	0.010	106	90	110		
Cobalt		0.807	mg/L	0.010	101	90	110		
Copper		0.817	mg/L	0.010	102	90	110		
Iron		4.03	mg/L	0.030	101	90	110		
Magnesium		40.3	mg/L	1.0	101	90	110		
Manganese		3.99	mg/L	0.010	100	90	110		
Nickel		0.833	mg/L	0.010	104	90	110		
Potassium		40.5	mg/L	1.0	101	90	110		
Silver		0.386	mg/L	0.0054	97	90	110		
Sodium		40.8	mg/L	1.0	102	90	110		
Vanadium		0.807	mg/L	0.10	101	90	110		
Zinc		0.805	mg/L	0.010	101	90	110		
Sample ID: ICSA	17 Interfe	rence Ch	neck Sample	· A				12/31	/12 11:42
Aluminum		528	mg/L	0.10	106	80	120		
Barium	0.0	00490	mg/L	0.10		0	0		
Beryllium	-2.0	0E-05	mg/L	0.0010		0	0		
Cadmium	0.	.00215	mg/L	0.0010		0	0		
Calcium		483	mg/L	1.0	97	80	120		
Chromium	0.	.00644	mg/L	0.012		0	0		
Cobalt	0.	.00239	mg/L	0.010		0	0		
Copper	0.0	00170	mg/L	0.010		0	0		
Iron		189	mg/L	0.030	94	80	120		
Magnesium		508	mg/L	1.0	102	80	120		
Manganese	0.	.00483	mg/L	0.010		0	0		
Nickel	0.	00659	mg/L	0.010		0	0		
Potassium	-0.0	00960	mg/L	1.0		0	0		
Silver	(0.0408	mg/L	0.0054		0	0		
Sodium	0.	.00909	mg/L	1.0		0	0		
Vanadium	-0.	.00144	mg/L	0.10		0	0		
Zinc	(0.0155	mg/L	0.010		0	0		
Sample ID: ICSAB	17 Interfe	rence Ch	neck Sample	AB				12/31	/12 11:45
Aluminum		522	mg/L	0.10	104	80	120		
Barium		0.495	mg/L	0.10	99	80	120		
Beryllium		0.494	mg/L	0.0010	99	80	120		
Cadmium		0.901	mg/L	0.0010	90	80	120		
Calcium		472	mg/L	1.0	94	80	120		
Chromium		0.507	mg/L	0.012	101	80	120		

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7							Ana	alytical Ru	ın: ICP2-HE	_121231C
Sample ID: ICSAB	17 Inter	ference C	heck Sample AB						12/31	/12 11:45
Cobalt		0.453	mg/L	0.010	91	80	120			
Copper		0.506	mg/L	0.010	101	80	120			
Iron		186	mg/L	0.030	93	80	120			
Magnesium		501	mg/L	1.0	100	80	120			
Manganese		0.475	mg/L	0.010	95	80	120			
Nickel		0.942	mg/L	0.010	94	80	120			
Potassium		22.2	mg/L	1.0	111	80	120			
Silver		1.01	mg/L	0.0054	101	80	120			
Sodium		22.4	mg/L	1.0	112	80	120			
Vanadium		0.475	mg/L	0.10	95	80	120			
Zinc		0.977	mg/L	0.010	98	80	120			



Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	E300.0							Aı	nalytical R	un: IC102-H	_130103A
Sample ID: I	ICV010313-12	Init	ial Calibration	on Verification S	Standard					01/03	/13 15:26
Sulfate			390	mg/L	1.0	97	90	110			
Sample ID: (CCV010313-44	Co	ntinuing Ca	ibration Verifica	ation Standar	rd				01/03	/13 22:22
Sulfate			410	mg/L	1.0	102	90	110			
Sample ID: (CCV010313-57	Co	ntinuing Ca	ibration Verifica	ation Standar	rd				01/04	/13 01:05
Sulfate			410	mg/L	1.0	103	90	110			
Method:	E300.0									Bat	tch: 19107
Sample ID: I	MB-19107	Me	thod Blank				Run: IC102	-H_130103A		01/03	/13 21:56
Sulfate, sat.	paste		ND	meq/L	0.0005						
Sample ID: I	H12120317-009AMS	Sa	mple Matrix	Spike			Run: IC102	-H_130103A		01/04	/13 00:40
Sulfate, sat.	paste		97.7	meq/L	0.47	117	90	110			S
Sample ID: 1	H12120317-009AMSI) Sa	mple Matrix	Spike Duplicat	e		Run: IC102	-H_130103A		01/04	/13 00:53
Sulfate, sat.	paste		97.4	meq/L	0.47	117	90	110			S
Sample ID: 1	H12120317-011AMS	Sa	mple Matrix	Spike			Run: IC102	-H_130103A		01/04	/13 02:08
Sulfate, sat.	paste		97.9	meq/L	0.47	117	90	110			S
Sample ID: I	H12120317-011AMSI) Sa	mple Matrix	Spike Duplicat	e		Run: IC102	-H_130103A		01/04	/13 02:21
Sulfate, sat.	paste		97.4	meq/L	0.47	117	90	110			S
Method:	E300.0									Bat	tch: 19107
Sample ID: I	LCS-19107	Lal	ooratory Co	ntrol Sample			Run: IC102	-H_130104A		01/04	/13 15:16
Sulfate, sat.	paste		61.5	meq/L	0.42	130	70	130			

Qualifiers:

RL - Analyte reporting limit.

S - Spike recovery outside of advisory limits.

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Sobek Modified									Batch	n: R85411
Sample ID: H12120317-010A	Sa	mple Duplica	ate			Run: LECO	632_121231A		12/31	/12 09:01
Sulfur, Total		ND	%	0.010					30	
Method: Sobek Modified									Bat	ch: 19108
Sample ID: LCS-19108	Lal	ooratory Con	trol Sample			Run: MAN-	TECH_121228A		12/28	/12 09:01
Neutralization Potential		70	t/kt		98	70	130			
Sample ID: H12120317-010ADUP	Sa	mple Duplica	ate			Run: MAN-	TECH_121228A		12/28	/12 10:39
Neutralization Potential		22	t/kt					0.3	20	
Method: Sobek Modified									Bat	ch: 19143
Sample ID: LCS-19143	Lal	ooratory Con	trol Sample			Run: MAN-	TECH_121231A		12/31	/12 08:15
Neutralization Potential		69	t/kt		96	70	130			
Sample ID: H12120317-007ADUP	Sa	mple Duplica	ate			Run: MAN-	TECH_121231A		12/31	/12 08:34
Neutralization Potential		23	t/kt					0.3	20	
Method: Sobek Modified									Bat	ch: 19108
Sample ID: H12120317-010ADUP	2 Sa	mple Duplica	ate			Run: MISC	SOILS_121231A		12/27	/12 07:58
Acid Potential		ND	t/kt	0.31					20	
Acid/Base Potential		22	t/kt					0.2	20	

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SSSA pt4									Batch	n: R85556
Sample ID: LCS-19107	2 Lat	ooratory Cor	ntrol Sample			Run: MISC	SOILS_121231C		12/31/	12 13:57
1/3 Bar Moisture		27	wt%	0.10	98	70	130			
15 Bar Moisture		15	wt%	0.10	86	70	130			
Sample ID: H12120317-010ADUI	P 2 Sa	mple Duplica	ate			Run: MISC	SOILS_121231C		12/31/	12 13:57
1/3 Bar Moisture		17	wt%	0.10				1.1	20	
15 Bar Moisture		7.4	wt%	0.10				1.4	20	

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bato	ch: 19111
Sample ID: MB-19111	2 Meth	od Blank				Run: ICP1-	HE_121227A		12/27/	12 18:55
Potassium, Available		8.0	mg/kg	0.02						
Potassium, Extractable		0.002	meq/100g	5E-05						
Sample ID: LCS-19111	2 Labo	ratory Co	ntrol Sample			Run: ICP1-	HE_121227A		12/27/	12 18:58
Potassium, Available		182	mg/kg	1.00	101	70	130			
Potassium, Extractable		0.466	meq/100g	0.0026	102	70	130			
Sample ID: H12120317-001AMS2	2 2 Sam	ple Matrix	Spike			Run: ICP1-	HE_121227A		12/27/	12 19:07
Potassium, Available		1050	mg/kg	2.8	97	75	125			
Potassium, Extractable		2.69	meq/100g	0.0073	97	75	125			
Sample ID: H12120317-001AMSI	D 2 Samp	ple Matrix	Spike Duplicate	e		Run: ICP1-	HE_121227A		12/27/	12 19:10
Potassium, Available		1010	mg/kg	2.8	93	75	125	4.1	20	
Potassium, Extractable		2.58	meq/100g	0.0073	93	75	125	4.1	20	
Sample ID: H12120317-010Adup	2 Samp	ple Duplic	cate			Run: ICP1-	HE_121227A		12/27/	12 19:47
Potassium, Available		83.9	mg/kg	1.00				2.0	30	
Potassium, Extractable		0.215	meq/100g	0.0026				2.0	30	

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bato	ch: 19104
Sample ID: MB-19104	17 Me	thod Blank				Run: ICP2-	HE_121231C		12/31/	12 13:11
Aluminum		ND	mg/kg	0.3						
Barium		0.02	mg/kg	0.02						
Beryllium		ND	mg/kg	0.004						
Cadmium		ND	mg/kg	0.01						
Calcium		3	mg/kg	3						
Chromium		ND	mg/kg	0.7						
Cobalt		ND	mg/kg	0.1						
Copper		ND	mg/kg	0.2						
Iron		4	mg/kg	0.7						
Magnesium		ND	mg/kg	1.0						
Manganese		0.05	mg/kg	0.04						
Nickel		ND	mg/kg	0.08						
Potassium		3	mg/kg	1						
Silver		0.2	mg/kg	0.2						
Sodium		2	mg/kg	0.7						
Vanadium		ND	mg/kg	0.10						
Zinc		0.2	mg/kg	0.1						
Sample ID: LFB-19104	17 La	boratory For	tified Blank			Run: ICP2-	HE_121231C		12/31/	12 13:15
Aluminum		250	mg/kg	5.0	100	80	120			
Barium		50.4	mg/kg	1.0	101	80	120			
Beryllium		25.2	mg/kg	1.0	101	80	120			
Cadmium		23.2	mg/kg	1.0	93	80	120			
Calcium		2390	mg/kg	5.0	96	80	120			
Chromium		50.6	mg/kg	1.0	101	80	120			
Cobalt		46.7	mg/kg	1.0	93	80	120			
Copper		49.5	mg/kg	1.0	99	80	120			
Iron		242	mg/kg	5.0	96	80	120			
Magnesium		2370	mg/kg	5.0	95	80	120			
Manganese		239	mg/kg	1.0	96	80	120			
Nickel		48.1	mg/kg	1.0	96	80	120			
Potassium		2530	mg/kg	5.0	101	80	120			
Silver		23.2	mg/kg	1.0	92	80	120			
Sodium		2580	mg/kg	5.0	103	80	120			
Vanadium		48.5	mg/kg	1.0	97	80	120			
Zinc		47.4	mg/kg	1.0	94	80	120			
Sample ID: LCS-19104	17 La		ntrol Sample				HE_121231C		12/31/	12 13:19
Aluminum		12600	mg/kg	5.0	87	50.7	131.3			
Barium		565	mg/kg	1.0	93	80.6	112.2			
Beryllium		45.6	mg/kg	1.0	90	76.3	108.6			
Cadmium		120	mg/kg	1.0	89	73	105.1			
Calcium		10500	mg/kg	5.0	85	78.2	111.9			
Chromium		73.0	mg/kg	1.0	97	72.8	109.1			

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bat	ch: 19104
Sample ID: LCS-19104	17 Lat	oratory Co	ntrol Sample			Run: ICP2-	HE_121231C		12/31	/12 13:19
Cobalt		49.1	mg/kg	1.0	86	73.3	103.7			
Copper		255	mg/kg	1.0	92	77.5	109.6			
Iron		18600	mg/kg	5.0	82	39.6	138.3			
Magnesium		3020	mg/kg	5.0	93	73.2	115.6			
Manganese		361	mg/kg	1.0	99	80.8	115.7			
Nickel		54.9	mg/kg	1.0	91	72.3	103.4			
Potassium		2090	mg/kg	18	99	75	127.8			
Silver		62.6	mg/kg	1.0	91	67.8	112.8			
Sodium		197	mg/kg	5.0	96	70.9	123.3			
Vanadium		59.5	mg/kg	1.0	82	66.6	107.3			
Zinc		192	mg/kg	1.0	91	74.2	109.9			
Sample ID: H12120317-011AMS	16 Sa	mple Matrix	Spike			Run: ICP2-	HE_121231C		12/31	/12 14:18
Aluminum		12300	mg/kg	5.0		75	125			Α
Barium		186	mg/kg	1.0	110	75	125			
Beryllium		24.5	mg/kg	1.0	97	75	125			
Cadmium		22.6	mg/kg	1.0	91	75	125			
Calcium		4180	mg/kg	5.0	94	75	125			
Chromium		66.3	mg/kg	1.0	111	75	125			
Copper		59.8	mg/kg	1.0	90	75	125			
Iron		13900	mg/kg	5.0		75	125			Α
Magnesium		6150	mg/kg	5.0	92	75	125			
Manganese		510	mg/kg	1.0	92	75	125			
Nickel		63.4	mg/kg	1.0	102	75	125			
Potassium		5040	mg/kg	18	148	75	125			S
Silver		24.5	mg/kg	1.0	81	75	125			
Sodium		2600	mg/kg	5.0	103	75	125			
Vanadium		61.2	mg/kg	1.0	94	75	125			
Zinc		94.2	mg/kg	1.0	105	75	125			
Sample ID: H12120317-011AMSI	D 16 Sa	mple Matrix	Spike Duplicate			Run: ICP2-	HE_121231C		12/31	/12 14:22
Aluminum		12100	mg/kg	5.0		75	125	1.7	20	Α
Barium		186	mg/kg	1.0	110	75	125	0.0	20	
Beryllium		24.9	mg/kg	1.0	99	75	125	1.4	20	
Cadmium		23.1	mg/kg	1.0	93	75	125	2.2	20	
Calcium		4290	mg/kg	5.0	99	75	125	2.6	20	
Chromium		67.0	mg/kg	1.0	112	75	125	1.0	20	
Copper		61.3	mg/kg	1.0	93	75	125	2.5	20	
Iron		14200	mg/kg	5.0		75	125	2.6	20	Α
Magnesium		6410	mg/kg	5.0	102	75	125	4.2	20	
Manganese		538	mg/kg	1.0	103	75	125	5.4	20	
Nickel		60.9	mg/kg	1.0	97	75	125	4.0	20	
Potassium		4830	mg/kg	18	139	75	125	4.2	20	S
Silver		26.0	mg/kg	1.0	87	75	125	5.8	20	

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

S - Spike recovery outside of advisory limits.



Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bato	ch: 1910
Sample ID: H12120317-011AMS	D 16 Sa	mple Matrix	Spike Duplicate			Run: ICP2-	HE_121231C		12/31/	12 14:22
Sodium		2640	mg/kg	5.0	105	75	125	1.5	20	
Vanadium		62.2	mg/kg	1.0	96	75	125	1.6	20	
Zinc		89.7	mg/kg	1.0	96	75	125	4.8	20	
Method: SW6010B									Bato	ch: 19107
Sample ID: MB-19107	6 Me	thod Blank				Run: ICP2-	HE_121231C		12/31/	12 14:25
Calcium		0.04	mg/L	0.02						
Magnesium		ND	mg/L	0.007						
Sodium		ND	mg/L	0.02						
Calcium, sat. paste		0.002	meq/L	0.001						
Magnesium, sat. paste		ND	meq/L	0.0006						
Sodium, sat. paste		ND	meq/L	0.0008						
Sample ID: LCS-19107	6 La	boratory Co	ntrol Sample			Run: ICP2-	HE_121231C		12/31/	12 14:37
Calcium		492	mg/L	1.0	118	70	130			
Magnesium		199	mg/L	1.0	115	70	130			
Sodium		484	mg/L	1.0	113	70	130			
Calcium, sat. paste		24.6	meq/L	0.050	118	70	130			
Magnesium, sat. paste		16.4	meq/L	0.082	115	70	130			
Sodium, sat. paste		21.0	meq/L	0.044	113	70	130			
Sample ID: H12120317-006AMS	2 6 Sa	mple Matrix	Spike			Run: ICP2-	HE_121231C		12/31/	12 15:07
Calcium		125	mg/L	1.0	91	75	125			
Magnesium		100	mg/L	1.0	94	75	125			
Sodium		104	mg/L	1.0	101	75	125			
Calcium, sat. paste		6.22	meg/L	0.050	91	75	125			
Magnesium, sat. paste		8.23	meg/L	0.082	94	75	125			
Sodium, sat. paste		4.53	meq/L	0.044	101	75	125			
Sample ID: H12120317-006AMS	D 6 Sa	mple Matrix	Spike Duplicate			Run: ICP2-	HE_121231C		12/31/	12 15:10
Calcium		126	mg/L	1.0	93	75	125	1.0	20	
Magnesium		101	mg/L	1.0	95	75	125	1.2	20	
Sodium		103	mg/L	1.0	101	75	125	0.7	20	
Calcium, sat. paste		6.28	meq/L	0.050	93	75	125	1.0	20	
Magnesium, sat. paste		8.33	meq/L	0.082	95	75	125	1.2	20	
Sodium, sat. paste		4.50	meq/L	0.044	101	75	125	0.7	20	
Sample ID: H12120317-010Adup	o 6 Sa	mple Duplic	ate			Run: ICP2-	HE_121231C		12/31/	12 16:03
Calcium		33.7	mg/L	1.0				1.5	30	
Magnesium		5.18	mg/L	1.0				2.7	30	
Sodium		3.45	mg/L	1.0				9.6	30	
Calcium, sat. paste		1.68	meq/L	0.050				1.5	30	
Magnesium, sat. paste		0.427	meq/L	0.082				2.7	30	
Sodium, sat. paste		0.150	meq/L	0.044				9.6	30	
Method: SW6010B										ch: 19113

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bat	ch: 19113
Sample ID: MB-19113	2 Me	thod Blank				Run: ICP2-I	HE_121231C		12/31	/12 16:18
Sodium		0.7	mg/kg	0.09						
Cation Exchange Capacity		0.06	meq/100g	0.008						
Sample ID: LCS-19113	2 Lat	ooratory Co	ontrol Sample			Run: ICP2-l	HE_121231C		12/31	/12 16:22
Sodium		262	mg/kg	1.0	109	70	130			
Cation Exchange Capacity		22.8	meq/100g	0.087	109	70	130			
Sample ID: H12120317-001AMS2	2 2 Sa	mple Matri	x Spike			Run: ICP2-l	HE_121231C		12/31	/12 16:41
Sodium		361	mg/kg	1.0	99	75	125			
Cation Exchange Capacity		31.4	meq/100g	0.087	99	75	125			
Sample ID: H12120317-001AMSI) 2 Sa	mple Matri	x Spike Duplicate	Э		Run: ICP2-l	HE_121231C		12/31	/12 16:45
Sodium		366	mg/kg	1.0	102	75	125	1.5	20	
Cation Exchange Capacity		31.9	meq/100g	0.087	102	75	125	1.5	20	
Sample ID: H12120317-010Adup	2 Sa	mple Dupli	cate			Run: ICP2-l	HE_121231C		12/31	/12 17:30
Sodium		109	mg/kg	1.0				0.1	30	
Cation Exchange Capacity		9.51	meq/100g	0.087				0.1	30	

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bat	ch: 19104
Sample ID: H12120317-011AMS	17 Sa	mple Matrix	Spike			Run: ICP2-	HE_130102B		01/02/	13 16:53
Aluminum		12400	mg/kg	5.0		75	125			Α
Barium		183	mg/kg	1.0	106	75	125			
Beryllium		24.4	mg/kg	1.0	97	75	125			
Cadmium		23.4	mg/kg	1.0	94	75	125			
Calcium		4460	mg/kg	5.0	100	75	125			
Chromium		66.7	mg/kg	1.0	105	75	125			
Cobalt		54.2	mg/kg	1.0	97	75	125			
Copper		59.9	mg/kg	1.0	90	75	125			
Iron		14600	mg/kg	5.0		75	125			Α
Magnesium		6440	mg/kg	5.0	93	75	125			
Manganese		535	mg/kg	1.0	96	75	125			
Nickel		64.9	mg/kg	1.0	102	75	125			
Potassium		5030	mg/kg	18	146	75	125			S
Silver		27.9	mg/kg	1.0	84	75	125			
Sodium		2530	mg/kg	5.0	100	75	125			
Vanadium		63.3	mg/kg	1.0	97	75	125			
Zinc		97.2	mg/kg	1.0	102	75	125			
Sample ID: H12120317-011AMS	D 17 Sa	mple Matrix	Spike Duplicate			Run: ICP2-	HE_130102B		01/02/	13 16:56
Aluminum		12100	mg/kg	5.0		75	125	2.0	20	Α
Barium		184	mg/kg	1.0	107	75	125	0.5	20	
Beryllium		24.8	mg/kg	1.0	98	75	125	1.4	20	
Cadmium		23.1	mg/kg	1.0	94	75	125	1.0	20	
Calcium		4550	mg/kg	5.0	104	75	125	2.0	20	
Chromium		66.0	mg/kg	1.0	104	75	125	1.1	20	
Cobalt		52.8	mg/kg	1.0	94	75	125	2.6	20	
Copper		61.5	mg/kg	1.0	93	75	125	2.7	20	
Iron		14900	mg/kg	5.0		75	125	1.9	20	Α
Magnesium		6630	mg/kg	5.0	101	75	125	3.0	20	
Manganese		562	mg/kg	1.0	107	75	125	5.0	20	
Nickel		60.5	mg/kg	1.0	93	75	125	7.0	20	
Potassium		4780	mg/kg	18	136	75	125	5.2	20	S
Silver		28.4	mg/kg	1.0	85	75	125	1.5	20	
Sodium		2540	mg/kg	5.0	101	75	125	0.6	20	
Vanadium		63.6	mg/kg	1.0	98	75	125	0.5	20	
Zinc		90.8	mg/kg	1.0	89	75	125	6.8	20	

Qualifiers:

RL - Analyte reporting limit.

 $^{{\}sf A}$ - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

S - Spike recovery outside of advisory limits.



Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: S	SW6020							Analytica	Run: I	CPMS204-B	_121228E
Sample ID: IC	CV STD	7 Initia	al Calibration	on Verificatio	n Standard					12/28	/12 14:05
Antimony			0.0512	mg/L	0.0010	102	90	110			
Arsenic			0.0510	mg/L	0.0010	102	90	110			
Cobalt			0.0514	mg/L	0.0010	103	90	110			
Lead			0.0506	mg/L	0.0010	101	90	110			
Selenium			0.0523	mg/L	0.0010	105	90	110			
Silver			0.0252	mg/L	0.0010	101	90	110			
Thallium			0.0510	mg/L	0.0010	102	90	110			
Method: S	SW6020									Bat	ch: 1910
Sample ID: M	B-19104	7 Meth	nod Blank				Run: ICPM	S204-B_121228E	3	12/28	/12 15:10
Antimony			0.03	mg/kg	0.002						
Arsenic			0.02	mg/kg	0.006						
Cobalt			ND	mg/kg	0.003						
Lead			0.008	mg/kg	0.003						
Selenium			0.04	mg/kg	0.007						
Silver			0.3	mg/kg	0.02						
Thallium			ND	mg/kg	0.002						
Sample ID: L0	CS TEST	7 Labo	oratory Co	ntrol Sample			Run: ICPM	S204-B_121228E	3	12/28	/12 15:15
Antimony			56.9	mg/kg	1.0	46	2.2	92.9			
Arsenic			316	mg/kg	1.0	93	72.3	106.4			
Cobalt			55.5	mg/kg	1.0	98	73.3	103.7			
Lead			196	mg/kg	1.0	106	75.9	108.6			
Selenium			202	mg/kg	1.0	104	72.5	112.2			
Silver			71.3	mg/kg	1.0	104	67.8	112.8			
Thallium			90.3	mg/kg	1.0	100	71.7	109.5			
Sample ID: Li	FB-19104	7 Labo	oratory For	tified Blank			Run: ICPM	S204-B_121228E	3	12/28	/12 15:24
Antimony			53.4	mg/kg	1.0	107	80	120			
Arsenic			50.8	mg/kg	1.0	102	80	120			
Cobalt			49.1	mg/kg	1.0	98	80	120			
Lead			51.6	mg/kg	1.0	103	80	120			
Selenium			52.8	mg/kg	1.0	106	80	120			
Silver			27.4	mg/kg	1.0	108	80	120			
Thallium			50.0	mg/kg	1.0	100	80	120			

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte	(Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW	6020									Bat	ch: 19104
Sample ID: H12	120317-011AMS	7 Sa	mple Matrix	Spike			Run: ICPM	S204-B_130102A		01/02/	/13 12:08
Antimony			23.7	mg/kg	1.0	48	75	125			S
Arsenic			55.9	mg/kg	1.0	101	75	125			
Cobalt			57.7	mg/kg	1.0	102	75	125			
Lead			63.0	mg/kg	1.0	107	75	125			
Selenium			50.9	mg/kg	1.0	103	75	125			
Silver			26.2	mg/kg	1.0	106	75	125			
Thallium			50.1	mg/kg	1.0	101	75	125			
Sample ID: H12	120317-011AMSD	7 Sa	mple Matrix	Spike Duplicate			Run: ICPM	S204-B_130102A		01/02/	/13 12:13
Antimony			22.0	mg/kg	1.0	44	75	125	7.8	20	S
Arsenic			57.1	mg/kg	1.0	104	75	125	2.1	20	
Cobalt			55.4	mg/kg	1.0	97	75	125	4.0	20	
Lead			62.7	mg/kg	1.0	106	75	125	0.5	20	
Selenium			53.5	mg/kg	1.0	108	75	125	4.9	20	
Silver			26.2	mg/kg	1.0	106	75	125	0.2	20	
Thallium			49.5	mg/kg	1.0	100	75	125	1.3	20	

Qualifiers:

RL - Analyte reporting limit.

S - Spike recovery outside of advisory limits.

Prepared by Helena, MT Branch

Client:MT DEQ-Site ResponseReport Date:01/15/13Project:UBMC RepositoryWork Order:H12120317

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	SW7471A							Analytica	I Run: I	HGCV201-H	_121228A
Sample ID:	ICV	Initi	al Calibration	on Verification St	andard					12/28/	/12 11:18
Mercury			0.0010	mg/kg	0.50	101	90	110			
Sample ID:	ccv	Cor	ntinuing Ca	ibration Verificati	on Standa	rd				12/28/	/12 11:20
Mercury			0.0024	mg/kg	0.50	97	90	110			
Sample ID:	CCV	Cor	ntinuing Ca	ibration Verificati	on Standa	rd				12/28/	/12 12:11
Mercury			0.0026	mg/kg	0.50	104	90	110			
Method:	SW7471A									Bat	ch: 19106
Sample ID:	MB-19106	Met	thod Blank				Run: HGC\	/201-H_121228A		12/28/	/12 11:25
Mercury			0.002	mg/kg	0.0004						
Sample ID:	LCS-19106	Lab	oratory Co	ntrol Sample			Run: HGC\	/201-H_121228A		12/28/	/12 11:27
Mercury			4.6	mg/kg	0.50	91	80	120			
Sample ID:	H12120317-004AMS	Sar	mple Matrix	Spike			Run: HGC\	/201-H_121228A		12/28/	/12 11:39
Mercury			1.1	mg/kg	0.50	108	80	120			
Sample ID:	H12120317-004AMSI	D Sar	mple Matrix	Spike Duplicate			Run: HGC\	/201-H_121228A		12/28/	/12 11:42
Mercury			1.1	mg/kg	0.50	109	80	120	1.0	20	
Sample ID:	H12120317-004ADIL	Ser	ial Dilution				Run: HGC\	/201-H_121228A		12/28/	/12 11:44
Mercury			0.043	mg/kg	0.50		0	0		20	
Sample ID:	H12120319-001AMS	Sar	mple Matrix	Spike			Run: HGC\	/201-H_121228A		12/28/	/12 12:21
Mercury			1.00	mg/kg	0.50	100	80	120			
Sample ID:	H12120319-001AMSI	D Sar	nple Matrix	Spike Duplicate			Run: HGC\	/201-H_121228A		12/28/	/12 12:23
Mercury			1.0	mg/kg	0.50	104	80	120	3.6	20	
Sample ID:	H12120319-001ADIL	Ser	ial Dilution				Run: HGC\	/201-H_121228A		12/28/	/12 12:25
Mercury			0.014	mg/kg	0.50		0	0		20	

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Analyte	Count Result	Units	RL	%REC Lo	w Limit	High Limit	RPD	RPDLimit	Qual
Method: USDA20b								Batch	: R85555
Sample ID: H12120317-010ADUI	P Sample Duplic	cate		Ru	n: MISC	SOILS_130107B		01/07/	13 13:53
Sodium Adsorption Ratio (SAR)	0.150	unitless	0.10				6.9	30	
Sample ID: LCS-19107	Laboratory Co	ontrol Sample		Ru	ın: MISC	SOILS_130107B		01/07/	13 13:53
Sodium Adsorption Ratio (SAR)	4.65	unitless	0.10	105	80	120			

Prepared by Helena, MT Branch

Analyte (Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: USDA27a									Bat	ch: 19107
Sample ID: LCS-19107	Lab	oratory Cor	ntrol Sample			Run: MISC	SOILS_121231B		12/28	/12 10:53
Saturation		47.3	%	0.10	100	80	120			
Sample ID: H12120317-010ADUP	San	nple Duplica	ate			Run: MISC	SOILS_121231B		12/28	/12 10:54
Saturation		29.2	%	0.10				0.7	20	

Standard Reporting Procedures

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Workorder Receipt Checklist

MT DEQ-Site Response

Contact and Corrective Action Comments:

H12120317

Login completed by:	Wanda Johnson		Date	Received: 12/19/2012
Reviewed by:	BL2000\jhager		Re	ceived by: wjj
Reviewed Date:	12/21/2012			Carrier Hand Del name:
Shipping container/cooler in	good condition?	Yes √	No 🗌	Not Present
Custody seals intact on shipp	ping container/cooler?	Yes	No 🗌	Not Present ✓
Custody seals intact on samp	ple bottles?	Yes	No 🗌	Not Present 🗸
Chain of custody present?		Yes √	No 🗌	
Chain of custody signed whe	en relinquished and received?	Yes √	No 🗌	
Chain of custody agrees with	sample labels?	Yes	No 🗹	
Samples in proper container/	bottle?	Yes √	No 🗌	
Sample containers intact?		Yes 🗹	No 🗌	
Sufficient sample volume for	indicated test?	Yes 🗸	No 🗌	
All samples received within h (Exclude analyses that are co such as pH, DO, Res Cl, Su	onsidered field parameters	Yes ✓	No 🗌	
Temp Blank received?		Yes	No 🗹	Not Applicable
Container/Temp Blank tempe	erature:	18.4℃ No Ice		
Water - VOA vials have zero	headspace?	Yes	No 🗌	No VOA vials submitted
Water - pH acceptable upon	receipt?	Yes	No 🗌	Not Applicable 🗹

No date or time on sample bags. Wj 12/19/12 Do not analyze for Texture, this will be done at Pioneer. Wj 12/20/12

LABORATORIES	Chain	Chain of Custod	tody and Analytical Request		\na vide a	lyti s muc	Cal		edne	Sible.	æ	Analytical Request Record		Page	16 L of B
Company Name: MT DEQ – Site response			Project Name, PWS, Permit, Etc.	ē, ₽	/S, Pe	mit.	년 2 2		1 Continu	`` ا	25	Sai	e Orig	EPA/SI	EPA/State Compliance:
Report Mail Address:			V Direction O	<u>ا</u> ک	3	4 101 10 24 24	<u>-</u>	ة د أ اد	3		3	State	te:	√es	□ 2
PO BOX 200901 HELENA, MT 59620-0901			SHELLI HAALAND	ALANI	0	T 4	Pnone/rax: 406-431-14	Pnone/Fax: 406-431-1401	-			Email:	ail:	Sampler: (Pleg LAURI DUEN 406-439-1360	Sampler: (Please Print) LAURI DUENSING 406-439-1360
Invoice Address: PO BOX 200901 HELENA, MT 59620-0901			Invoice Contact & Phone: SHELLI HAALAND	tact & ALANI	Phon	l ini						Pur	Purchase Order:	Quote/ H813	Quote/Bottle Order: H813
Special Report/Formats – ELI must be no prior to sample submittal for the following:	ELI must be notified for the following:	otified g:	ots 12 18 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19	√		の P	62					~	Contact ELI prior to RUSH sample submittal for charges and	rto	Shipped by:
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GSA POTWWWTP	AZLA EDD/EDT (Electronic Data)	lectronic Data)	O to ned > :eqyT OZ nets) sol <u>B</u> nod		CSDSC	aisbner og gnili	ilishbuər	cidity, s	Jeconiy				Comments: All samples air dried at	ried at	Receipt Temp
State	LEVEL V		MumV elqme2 <u>Y</u> 1l <u>A</u> stege⊻	nic matter, m adsorpti	<u>ntion %, v</u>	er recommi texture, wi	ity fractions/r tial	tial Ingeable a Ing capacit	n & slatem		SEE A1	TuT ismnot			Ves No
SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Coffection (c.)	Collection	MATRIX		nutae otto	shau Ebau	nitius netog	Excha	lstoT						Intact Y/N Signature Y/N
1 S35-BGT-01	12-18-12	12:00	SOIL	×	×	×	×	×	×		<u> </u>	×		-	76
² S35-BGT-02	12-18-12	12:05	SOIL	×	×	×	×	×	×			×			2
³ S35-BGT-03	12-18-12	12:10	SOIL	×	× ·	×	×	×	×		*				VIO
4 S35-CS-01	12-18-12	12:15	SOIL	×	×	×	×	×	×		<u>×</u>				
5 S35-CS-02	12-18-12	12:20	SOIL	×	×	×	×	×	×		<u>×</u>				
8 S35-CS-03	12-18-12	12:25	SOIL	×	×	×	×	×	×		<u>×</u>				
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In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Page 35 of 36

ENERG		Chain of Custo	of Cus	6	d Þí	inal	ytí.	Sal	R e	and Analytical Request Record	st	₹ec	ord		Page .	76 of of
Company N MT DEQ – §	Company Name: MT DEQ – Site response			Project Name, PWS, Permit, Etc.	lame, PWS	/S, Per	mit, Et	nit, Etc.		Service.		3	Sampl	Sample Origin	EPA/S	ate Compi
Report Mail Address PO BOX 200901 HELENA, MT 59620	Report Mail Address: PO BOX 200901 HELENA, MT 59620-0901			Contact Name: SHELLI HAALAND	me: ALANI		₹£ ફ	// // IV. 7 Phone/Fax: 406-431-1401			5		Email:		Sampler: (Plex LAURI DUEN	Sampler: (Please Print) LAURI DUENSING
Invoice Address. PO BOX 200901 HELENA, MT 591	Invoice Address: PO BOX 200901 HELENA, MT 59620-0901			Invoice Contact & Phone: SHELLI HAALAND	Hact &	Phone							Purc	Purchase Order:	Quote/ H813	Quote/Bottle Order: H813
Special Reprior to sar	Special Report/Formats – ELI must be notified prior to sample submittal for the following:	I must be not he following	otified :	o ntainers 4 W S V B O ils/Solids sssay <u>O</u> ther		[[0]	int, field	Uonez		du			K :	Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page	to bmittal	Shipped by:
GSA POTW/ State: Other.	GSA GSA GSA GSA GSA GSA GSA GSA GSA GSA	J AZLA] EDD/EDT (Electronic Data) Format: LEVEL IV NELAC	ectronic Data)	O to mader of C Sample Type: A Aur Water So Yegetathon Bios	nic matter, pH, cor im adsorption rate	stion %, exchange capac	ter recommendation sity inschons/neutralis	inacuons/neutralis (ia) ingeable acidity, s	ing capacity metals & mercury		10 ATT A 332	SEE ATTACI) N I	Comments: All samples air dried at 60 degrees C and sieved over 10	Sta paragraphic states and the states are states as a second second states are states as a second states are states as a second states are states as a second states are states as a second states are states as a second states are states as a second state are states are states as a second state are states as a second state are states as a second state are states as a second state are states as a second state are states as a second state are states are states as a second state are states as a second state are states are states as a second state are states are states as a second state are states as a second state are stat	Receipt Temp 1 8.4 ° C On Ice: Yes No Custody Seal Y
SAMPLE (Name, Loc	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX		nutes ous:	sbsU segs2	Doten Excha	эшпа		-	1				Intact Y Signature Y
13341:	13341: TP104 (7-10')	12-18-12	12:30	SOIL	× ×	×	×	×	×		_	×				12/2/2/4
	13350 TP106 (8.4-9.4')	12-18-12	12:35	SOIL	× ×	×	\dashv	×	×			×				
	13354: TP107(9-10°)	12-18-12	12:40	SOIL	× :	\neg	_+	-	×			×				
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mples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ANALYTICAL SUMMARY REPORT

January 17, 2013

Pioneer Technical Services 63 1/2 W Broadway Butte, MT 59701

Workorder No.: H13010211

Quote ID: H813 - Mike Horse Repository

Project Name: UBMC

Energy Laboratories Inc Helena MT received the following 1 sample for Pioneer Technical Services on 1/16/2013 for analysis.

Sample ID	Client Sample ID	Collect Date Receive Date	Matrix	Test
H13010211-001	S35-BGT-990	01/16/13 8:00 01/16/13	Soil	Metals by ICP/ICPMS, Total Mercury in Solid By CVAA Digestion, Total Metals Digestion, Mercury by CVAA

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Helena, MT 877-472-0711 • Billings, MT 800-735-4489 • Casper, WY 888-235-0515 Gillette, WY 866-686-7175 • Rapid City, SD 888-672-1225 • College Station, TX 888-690-2218

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Pioneer Technical Services

Report Date: 01/17/13 **Date Received:** 01/16/13

Project: UBMC
Workorder: H13010211

		Analy	sis	Ag-T	AI-T	As-T	Ba-T	Be-T	Ca-T	Cd-T	Co-T	Cr-T	Cu-T	Fe-T
		Unit	s	mg/kg										
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
H13010211-001	S35-BGT-990	0	0	2	16300	21	269	< 1	2300	< 1	7	21	106	16300

Helena, MT 877-472-0711 • Billings, MT 800-735-4489 • Casper, WY 888-235-0515 Gillette, WY 866-686-7175 • Rapid City, SD 888-672-1225 • College Station, TX 888-690-2218

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Pioneer Technical Services

Report Date: 01/17/13

Project: UBMC

Date Received: 01/16/13

Workorder: H13010211

		Analy	sis	K-T	Mg-T	Mn-T	Na-T	Ni-T	Pb-T	Sb-T	Se-T	TI-T	V-T	Zn-T
		Unit	S	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
H13010211-001	S35-BGT-990	0	0	2070	3680	718	72	14	630	< 1	< 1	< 1	19	267

Helena, MT 877-472-0711 Billings, MT 800-735-4489 Casper, WY 888-235-0515 Gillette, WY 866-686-7175 - Rapid City, SD 888-672-1225 - College Station, TX 888-690-2218

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Pioneer Technical Services **UBMC**

Report Date: 01/17/13 Date Received: 01/16/13

Project: Workorder: H13010211

		Analys	is	Hg, Total
		Units		ma/ka
		Units	5	mg/kg
Sample ID	Client Sample ID	Up	Low	Results
H13010211-001	S35-BGT-990	0	0	< 0.50

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date: 01/17/13Project:UBMCWork Order: H13010211

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7							Ana	alytical Ru	ın: ICP2-HE_	_130117B
Sample ID: ICV	18 Initia	l Calibration	on Verificatio	n Standard					01/17/	/13 09:30
Aluminum		4.12	mg/L	0.10	103	90	110			
Arsenic		0.808	mg/L	0.0092	101	90	110			
Barium		0.810	mg/L	0.10	101	90	110			
Beryllium		0.413	mg/L	0.0010	103	90	110			
Cadmium		0.400	mg/L	0.0010	100	90	110			
Calcium		40.9	mg/L	1.0	102	90	110			
Chromium		0.797	mg/L	0.010	100	90	110			
Cobalt		0.793	mg/L	0.010	99	90	110			
Copper		0.812	mg/L	0.010	101	90	110			
Iron		4.02	mg/L	0.030	100	90	110			
Lead		0.796	mg/L	0.013	99	90	110			
Magnesium		40.2	mg/L	1.0	101	90	110			
Manganese		4.04	mg/L	0.010	101	90	110			
Nickel		0.785	mg/L	0.010	98	90	110			
Potassium		38.3	mg/L	1.0	96	90	110			
Sodium		38.6	mg/L	1.0	96	90	110			
Vanadium		0.808	mg/L	0.10	101	90	110			
Zinc		0.811	mg/L	0.010	101	90	110			
Sample ID: ICSA	18 Inter	ference C	heck Sample	e A					01/17/	/13 09:45
Aluminum		519	mg/L	0.10	104	80	120			
Arsenic		0.00487	mg/L	0.0092		0	0			
Barium	0	.000620	mg/L	0.10		0	0			
Beryllium	-1	.00E-05	mg/L	0.0010		0	0			
Cadmium	-	0.00307	mg/L	0.0010		0	0			
Calcium		473	mg/L	1.0	95	80	120			
Chromium		0.00852	mg/L	0.010		0	0			
Cobalt	-	0.00573	mg/L	0.010		0	0			
Copper	-	0.00157	mg/L	0.010		0	0			
Iron		186	mg/L	0.030	93	80	120			
Lead		0.0300	mg/L	0.013		0	0			
Magnesium		496	mg/L	1.0	99	80	120			
Manganese		0.00952	mg/L	0.010		0	0			
Nickel		0.00671	mg/L	0.010		0	0			
Potassium		-0.0366	mg/L	1.0		0	0			
Sodium		0.0454	mg/L	1.0		0	0			
Vanadium		0.00414	mg/L	0.10		0	0			
Zinc		0.0122	mg/L	0.010		0	0			
Sample ID: ICSAB	18 Inter	ference C	heck Sample	AB					01/17/	/13 09:49
Aluminum		520	mg/L	0.10	104	80	120			
Arsenic		1.10	mg/L	0.0092	110	80	120			
Barium		0.498	mg/L	0.10	100	80	120			
Beryllium		0.494	mg/L	0.0010	99	80	120			
Cadmium		0.919	mg/L	0.0010	92	80	120			

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date: 01/17/13Project:UBMCWork Order: H13010211

Analyte	Count Resul	t Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7						Ana	alytical Ru	ın: ICP2-HE	_130117B
Sample ID: ICSAB	18 Interference	Check Sample	e AB					01/17	/13 09:49
Calcium	473	3 mg/L	1.0	95	80	120			
Chromium	0.48	1 mg/L	0.010	96	80	120			
Cobalt	0.460	6 mg/L	0.010	93	80	120			
Copper	0.508	3 mg/L	0.010	102	80	120			
Iron	180	6 mg/L	0.030	93	80	120			
Lead	0.920	6 mg/L	0.013	93	80	120			
Magnesium	499	5 mg/L	1.0	99	80	120			
Manganese	0.488	3 mg/L	0.010	98	80	120			
Nickel	0.902	2 mg/L	0.010	90	80	120			
Potassium	20.3	3 mg/L	1.0	102	80	120			
Sodium	20.0	6 mg/L	1.0	103	80	120			
Vanadium	0.480) mg/L	0.10	96	80	120			
Zinc	0.99	6 mg/L	0.010	100	80	120			

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date:01/17/13Project:UBMCWork Order:H13010211

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bat	ch: 19286
Sample ID: MB-19286	18 Meth	od Blank				Run: ICP2-	HE_130117B		01/17	/13 10:38
Aluminum		ND	mg/kg	0.3						
Arsenic		ND	mg/kg	0.4						
Barium		0.04	mg/kg	0.02						
Beryllium		ND	mg/kg	0.004						
Cadmium		ND	mg/kg	0.01						
Calcium		3	mg/kg	3						
Chromium		0.1	mg/kg	0.07						
Cobalt		ND	mg/kg	0.1						
Copper		ND	mg/kg	0.2						
Iron		0.9	mg/kg	0.7						
Lead		ND	mg/kg	1						
Magnesium		ND	mg/kg	1.0						
Manganese		0.07	mg/kg	0.04						
Nickel		ND	mg/kg	0.08						
Potassium		ND	mg/kg	1						
Sodium		4	mg/kg	0.7						
Vanadium		ND	mg/kg	0.10						
Zinc		ND	mg/kg	0.1						
Sample ID: LFB-19286	18 Labo	ratory For	tified Blank			Run: ICP2-	HE_130117B		01/17	/13 10:42
Aluminum		258	mg/kg	5.0	103	80	120			
Arsenic		49.1	mg/kg	1.0	98	80	120			
Barium		52.6	mg/kg	1.0	105	80	120			
Beryllium		25.9	mg/kg	1.0	104	80	120			
Cadmium		24.1	mg/kg	1.0	97	80	120			
Calcium		2540	mg/kg	5.0	101	80	120			
Chromium		50.2	mg/kg	1.0	100	80	120			
Cobalt		50.0	mg/kg	1.0	100	80	120			
Copper		51.8	mg/kg	1.0	104	80	120			
Iron		250	mg/kg	5.0	100	80	120			
Lead		47.5	mg/kg	1.0	95	80	120			
Magnesium		2410	mg/kg	5.0	97	80	120			
Manganese		255	mg/kg	1.0	102	80	120			
Nickel		47.8	mg/kg	1.0	96	80	120			
Potassium		2390	mg/kg	5.0	95	80	120			
Sodium		2430	mg/kg	5.0	97	80	120			
Vanadium		50.3	mg/kg	1.0	101	80	120			
Zinc		49.2	mg/kg	1.0	98	80	120			
Sample ID: LCS-19286	18 Labo	-	ntrol Sample				HE_130117B		01/17	/13 10:45
Aluminum		13100	mg/kg	5.0	90	50.7	131.3			
Arsenic		297	mg/kg	1.5	87	72.3	106.4			
Barium		595	mg/kg	1.0	98	80.6	112.2			
Beryllium		47.3	mg/kg	1.0	94	76.3	108.6			
Cadmium		126	mg/kg	1.0	93	73	105.1			

Qualifiers:

RL - Analyte reporting limit.

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date: 01/17/13Project:UBMCWork Order: H13010211

Analyte	Count Re	sult	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bate	ch: 19286
Sample ID: LCS-19286	18 Laborato	ory Co	ntrol Sample			Run: ICP2-	HE_130117B		01/17/	/13 10:45
Calcium	1	1200	mg/kg	5.0	90	78.2	111.9			
Chromium		76.8	mg/kg	1.0	102	72.8	109.1			
Cobalt		54.1	mg/kg	1.0	95	73.3	103.7			
Copper		270	mg/kg	1.0	98	77.5	109.6			
Iron	20	0100	mg/kg	5.0	88	39.6	138.3			
Lead		194	mg/kg	3.1	105	75.9	108.6			
Magnesium	;	3070	mg/kg	5.0	94	73.2	115.6			
Manganese		391	mg/kg	1.0	107	80.8	115.7			
Nickel		55.0	mg/kg	1.0	91	72.3	103.4			
Potassium		1990	mg/kg	18	95	75	127.8			
Sodium		185	mg/kg	5.0	89	70.9	123.3			
Vanadium		62.8	mg/kg	1.0	87	66.6	107.3			
Zinc		203	mg/kg	1.0	96	74.2	109.9			
Sample ID: H13010197-001AMS	18 Sample	Matrix	« Spike			Run: ICP2-	HE_130117B		01/17/	/13 11:00
Aluminum	1;	3100	mg/kg	5.0		75	125			Α
Arsenic		385	mg/kg	1.5		75	125			Α
Barium		204	mg/kg	1.0	137	75	125			S
Beryllium		23.8	mg/kg	1.0	95	75	125			
Cadmium		24.4	mg/kg	1.0	89	75	125			
Calcium	23	3600	mg/kg	5.0		75	125			Α
Chromium		62.9	mg/kg	1.0	94	75	125			
Cobalt		49.5	mg/kg	1.0	93	75	125			
Copper		111	mg/kg	1.0	100	75	125			
Iron	15	5600	mg/kg	5.0		75	125			Α
Lead		418	mg/kg	3.1		75	125			Α
Magnesium	9	9050	mg/kg	5.0	97	75	125			
Manganese	1	5900	mg/kg	1.0		75	125			Α
Nickel		51.3	mg/kg	1.0	89	75	125			
Potassium	(3500	mg/kg	18	135	75	125			S
Sodium	:	2620	mg/kg	5.0	99	75	125			
Vanadium		45.3	mg/kg	1.0	91	75	125			
Zinc		560	mg/kg	1.0		75	125			Α
Sample ID: H13010197-001AMS	D 18 Sample	Matrix	Spike Duplicate			Run: ICP2-	HE_130117B		01/17/	/13 11:11
Aluminum	1:	2400	mg/kg	5.0		75	125	5.5	20	Α
Arsenic		435	mg/kg	1.5		75	125	12	20	Α
Barium		198	mg/kg	1.0	126	75	125	2.7	20	S
Beryllium		24.5	mg/kg	1.0	98	75	125	2.8	20	
Cadmium		25.5	mg/kg	1.0	94	75	125	4.3	20	
Calcium		2600	mg/kg	5.0		75	125	4.6	20	Α
Chromium		63.8	mg/kg	1.0	96	75	125	1.4	20	
Cobalt		51.0	mg/kg	1.0	96	75	125	3.0	20	
Copper		111	mg/kg	1.0	101	75	125	0.3	20	
Iron	15	5000	mg/kg	5.0		75	125	4.3	20	Α

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

S - Spike recovery outside of advisory limits.

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date: 01/17/13Project:UBMCWork Order: H13010211

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Bat	ch: 19286
Sample ID: H13010197-001AMS	D 18 Sar	mple Matrix	Spike Duplicate			Run: ICP2-I	HE_130117B		01/17/	/13 11:11
Lead		451	mg/kg	3.1		75	125	7.6	20	Α
Magnesium		9280	mg/kg	5.0	107	75	125	2.5	20	
Manganese		17200	mg/kg	1.0		75	125	7.6	20	Α
Nickel		52.7	mg/kg	1.0	92	75	125	2.8	20	
Potassium		6350	mg/kg	18	129	75	125	2.2	20	S
Sodium		2620	mg/kg	5.0	99	75	125	0.2	20	
Vanadium		45.0	mg/kg	1.0	91	75	125	0.7	20	
Zinc		594	mg/kg	1.0		75	125	6.0	20	Α

Qualifiers:

RL - Analyte reporting limit.

- A The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.
- S Spike recovery outside of advisory limits.



Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date: 01/17/13Project:UBMCWork Order: H13010211

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: S	W6020							Analytical	Run: I	CPMS204-B	_130117E
Sample ID: IC	V STD	4 Ir	nitial Calibration	on Verification St	andard					01/17	/13 10:41
Antimony			0.0592	mg/L	0.0010	99	90	110			
Selenium			0.0596	mg/L	0.0010	99	90	110			
Silver			0.0287	mg/L	0.0010	96	90	110			
Thallium			0.0593	mg/L	0.0010	99	90	110			
Method: S	W6020									Bat	ch: 19286
Sample ID: ME	B-19286	4 N	lethod Blank				Run: ICPM	S204-B_130117B		01/17	/13 13:45
Antimony			0.03	mg/kg	0.002						
Selenium			0.03	mg/kg	0.007						
Silver			0.03	mg/kg	0.02						
Thallium			0.007	mg/kg	0.002						
Sample ID: LC	CS-19286	4 L	aboratory Cor	ntrol Sample			Run: ICPM	S204-B_130117B		01/17	/13 13:50
Antimony			58.2	mg/kg	1.0	47	2.2	92.9			
Selenium			196	mg/kg	1.0	101	72.5	112.2			
Silver			71.2	mg/kg	1.0	104	67.8	112.8			
Thallium			92.1	mg/kg	1.0	102	71.7	109.5			
Sample ID: LF	B-19286	4 L	aboratory For	tified Blank			Run: ICPM	S204-B_130117B		01/17	/13 13:54
Antimony			51.2	mg/kg	1.0	102	80	120			
Selenium			51.8	mg/kg	1.0	104	80	120			
Silver			25.9	mg/kg	1.0	103	80	120			
Thallium			51.3	mg/kg	1.0	103	80	120			
Sample ID: H1	13010197-001AMS	4 S	Sample Matrix	Spike			Run: ICPM	S204-B_130117B		01/17	/13 14:17
Antimony			20.0	mg/kg	1.0	35	75	125			S
Selenium			49.2	mg/kg	1.0	99	75	125			
Silver			31.9	mg/kg	1.0	111	75	125			
Thallium			49.6	mg/kg	1.0	99	75	125			
Sample ID: H1	13010197-001AMSE) 4 S	Sample Matrix	Spike Duplicate			Run: ICPM	S204-B_130117B		01/17	/13 14:21
Antimony			20.6	mg/kg	1.0	36	75	125	2.5	20	S
Selenium			49.0	mg/kg	1.0	98	75	125	0.6	20	
Silver			31.7	mg/kg	1.0	111	75	125	0.4	20	
Thallium			50.2	mg/kg	1.0	101	75	125	1.3	20	

Qualifiers:

RL - Analyte reporting limit.

S - Spike recovery outside of advisory limits.

Prepared by Helena, MT Branch

Client:Pioneer Technical ServicesReport Date:01/17/13Project:UBMCWork Order:H13010211

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7471A							Analytic	al Run: I	HGCV201-H_	_130116B
Sample ID: ICV	Init	tial Calibration	on Verification St	andard					01/16/	13 14:52
Mercury New Calibration. SBK		0.00100	mg/kg	0.50	100	90	110			
Sample ID: CCV	Co	ntinuing Ca	libration Verificati	on Standa	rd				01/16/	13 14:55
Mercury		0.0025	mg/kg	0.50	98	90	110			
Method: SW7471A									Bate	ch: 19288
Sample ID: MB-19288	Me	thod Blank				Run: HGC\	/201-H_130116E	3	01/16/	/13 14:59
Mercury		0.002	mg/kg	0.0009						
Sample ID: LCS-19288	Lal	boratory Co	ntrol Sample			Run: HGC\	/201-H_130116E	3	01/16/	/13 15:02
Mercury		4.5	mg/kg	0.50	92	80	120			
Sample ID: H13010211-001Al	MS Sa	mple Matrix	Spike			Run: HGC\	/201-H_130116E	3	01/16/	/13 15:06
Mercury		1.1	mg/kg	0.50	101	80	120			
Sample ID: H13010211-001AI	M SD Sa	mple Matrix	Spike Duplicate			Run: HGC\	/201-H_130116E	3	01/16/	/13 15:09
Mercury		0.93	mg/kg	0.50	89	80	120	13	20	

Standard Reporting Procedures

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Workorder Receipt Checklist

Pioneer Technical Services

None

H13010211

Login completed by:	Tracy L. Lorash		Date	Received: 1/16/2013	
Reviewed by:	BL2000\sdull		Re	eceived by: TLL	
Reviewed Date:	1/17/2013			Carrier Hand Del name:	
Shipping container/cooler in	good condition?	Yes	No 🗌	Not Present ✓	
Custody seals intact on ship	ping container/cooler?	Yes	No 🗌	Not Present <a>V	
Custody seals intact on sam	ple bottles?	Yes	No 🗌	Not Present ✓	
Chain of custody present?		Yes ✓	No 🗌		
Chain of custody signed wh	en relinquished and received?	Yes ✓	No 🗌		
Chain of custody agrees wit	h sample labels?	Yes ✓	No 🗌		
Samples in proper container	/bottle?	Yes ✓	No 🗌		
Sample containers intact?		Yes ✓	No 🗌		
Sufficient sample volume fo	r indicated test?	Yes ✓	No 🗌		
All samples received within (Exclude analyses that are c such as pH, DO, Res Cl, St	considered field parameters	Yes 🗸	No 🗌		
Temp Blank received?		Yes	No 🗹	Not Applicable	
Container/Temp Blank temp	erature:	14.5℃ No Ice	- From Field		
Water - VOA vials have zero	headspace?	Yes	No 🗌	No VOA vials submitted	
Water - pH acceptable upon	·	Yes	No 🗌	Not Applicable	
Contact and Corrective Action	on Comments:				

LABORATORIES	THE PRINT- Provide as much information as possible.	PLEASE PRIN	T- Provide as much in	PLEASE PRINT- Provide as much information as possible.	1150	D .	•	rage or
Company Name: Pioneer Technical Services	ne: iical Services	Project Nam UBMC	e, PWS, Permit, Etc			Sample Origin		EPA/State Compliance:
Report Mail Address: 1101 S. Montana Butte, MT 59701	ddress: ana 01	Contact Name: Nick Jaynes		Phone/Fax: (406) 782-5177		Email: njaynes@pioneer- technical.com		r. (Ple DUEN
Invoice Address: 1101 S. Montana Butte, MT 59701	SS: ana 0.1	Invoice Contac Amanda Booth	ice Contact & Phone: nda Booth			Purchase Order:		Quote/Bottle Order: H813
Special Reporter to Sam	Special Report/Formats – ELI must be notified prior to sample submittal for the following:	0	<u>analisis</u>	REQUESTED		Cont	Contact ELI prior to RUSH sample submittal	
} } }		n tainers N S V B ∈ s/Solids say <u>O</u> the	dere y s ^a rang p ^a rang ang ang ang ang ang ang ang ang ang				for charges and scheduling – See Instruction Page	Cooler ID(s):
□ DW □ GSA □ POTWWWTP	A2LA EDD/EDT(Electronic Data) Format: EVEL V	umber of Cor iple Type: A / ir Water Soils it Water Soils	& mercury		ATTACH DrinonsmuT	Comme sample a degrees	Comments: sample air dried at 60 degrees C and sieved over 10	Receipt Temp
Other:		Ni ms2 <u>A</u> gə⊻	slatem			I		Cy Sea
SAMPLE I (Name, Loca	SAMPLE IDENTIFICATION Collection Collection (Name, Location, Interval, etc.)	MATRIX	IstoT		l			Intact Y N Signature Y N Match
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Record MUST be		Signature	ure:	Received by (print):		Date/Time:	3	Signamire
Signed	Sample Disposal: Return to Client:	Lab Disposal:		Received by Labbratory:		ete/Time:	9:30	Signature:
	l				†)	}	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis reduested.

This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

APPENDIX E

SURVEY DATA

UBMC Section 35 Design Investigation

Data Summary Report Survey Data

Size and Description	Piezometer ID	DJA Point Number	NAD83 (S.I. Fe Pi	pe	NAV88 (U.S. Feet) Top of PVC Elevation	MONTANA S (NAD83) (S.I. I Shot PV	Feet) Ground /C Pipe	NAVD88 (U.S. Feet) Ground Elevation	PVC Pipe Angle from Plumb Nearest	Piezometer Height Above Ground (Feet)
			NORTHING	EASTING	from GPS	NORTHING	EASTING	From GPS	Degree	
2" PVC	MW-201B	22032	1020347.09	1233675.78	5079.51	1020346.93	1233675.89	5075.91	3	3.60
2" PVC	MW-201T	22034	1020346.98	1233668.82	5079.19	1020347.03	1233669.02	5075.78	3	3.41
2" PVC	MW-202B	22048	1020673.87	1233018.56	5099.51	1020673.72	1233018.43	5095.36	3	4.15
1' PVC	SB-202T1	22045	1020667.81	1233022.44	5097.85	1020667.66	1233022.45	5096.39	6	1.45
1' PVC	SB-202T2	22046	1020667.87	1233022.24	5097.75	1020667.69	1233022.25	5096.46	8	1.28
2" PVC	MW-203B	22089	1021128.63	1233054.20	5127.63	1021128.57	1233054.10	5125.77	4	1.86
2" PVC	MW-203T	22088	1021133.63	1233052.98	5127.68	1021133.42	1233052.94	5125.92	7	1.76
1' PVC	SB-204B	22052	1020751.97	1233159.49	5108.68	1020751.92	1233159.35	5104.95	2	3.73
1' PVC	SB-204T	22051	1020752.06	1233159.21	5106.89	1020751.88	1233159.24	5104.99	5	1.90
1" PVC	SB-206B	22116	1020856.05	1233324.21	5117.90	1020856.02	1233324.44	5116.23	8	1.67
1" PVC	SB-206D	22112	1020845.93	1233326.88	5118.93	1020845.92	1233326.98	5115.03	1	3.90
1" PVC	SB-206T1	22115	1020855.89	1233324.07	5118.32	1020855.69	1233324.12	5115.81	5	2.50
1" PVC	SB-206T2	22114	1020850.12	1233325.83	5119.51	1020850.06	1233325.88	5115.64	1	3.87
1" PVC	SB-206T3	22113	1020846.06	1233327.18	5117.45	1020846.24	1233327.18	5115.33	5	2.12
2" PVC	MW-207	22085	1021091.32	1233314.60	5146.03	1021091.10	1233314.65	5142.09	3	3.94
2" PVC	MW-208B	22058	1021028.79	1232765.25	5088.84	1021028.74	1232765.17	5087.19	3	1.65
1" PVC	SB-208T	22057	1021024.30	1232767.37	5088.73	1021024.21	1232767.34	5087.41	4	1.32
1' PVC	SB-209B	22041	1020518.87	1233261.81	5091.98	1020518.90	1233261.87	5089.89	2	2.09
1' PVC	SB-209T	22042	1020519.00	1233262.02	5092.62	1020518.96	1233261.95	5089.83	2	2.78
1" PVC	SB-210B	22067	1020675.56	1233448.29	5109.61	1020675.56	1233448.48	5107.75	6	1.86
1" PVC	SB-210T	22066	1020675.30	1233448.27	5111.62	1020675.25	1233448.26	5107.75	1	3.87
1" PVC	SB-211B1	22076	1020810.84	1233635.64	5133.44	1020811.18	1233635.42	5129.26	5	4.17
1" PVC	SB-211B2	22077	1020811.15	1233635.25	5131.05	1020811.31	1233635.24	5129.33	5	1.72
1' PVC	SB-212B	22029	1020846.10	1233943.38	5139.64	1020846.07	1233943.38	5137.78	1	1.87
1' PVC	SB-212T	22030	1020846.28	1233943.54	5139.81	1020846.17	1233943.64	5137.91	4	1.90

UBMC Section 35 Design Investigation

Data Summary Report Survey Data

Size and Description	Piezometer ID	DJA Point Number	MONTANA S NAD83 (S.I. Fe Pi	et) Top of PVC pe	NAV88 (U.S. Feet) Top of PVC Elevation	MONTANA S (NAD83) (S.I. I Shot PV	Feet) Ground /C Pipe	NAVD88 (U.S. Feet) Ground Elevation	PVC Pipe Angle from Plumb Nearest	Piezometer Height Above Ground (Feet)
			NORTHING	EASTING	from GPS	NORTHING	EASTING	From GPS	Degree	
1" PVC	SB-213B	22072	1020602.44	1233865.37	5112.14	1020602.46	1233865.26	5110.54	4	1.60
1" PVC	SB-213T	22073	1020602.32	1233865.24	5112.28	1020602.37	1233865.19	5110.53	2	1.74
1' PVC	SB-214B	22038	1020332.86	1233296.90	5086.31	1020332.83	1233297.12	5082.86	4	3.45
1' PVC	SB-214T	22037	1020332.96	1233297.30	5085.00	1020332.86	1233297.26	5083.26	4	1.73
1' PVC	SB-215T1	22019	1020393.32	1233994.32	5090.82	1020393.31	1233994.42	5088.99	3	1.83
1' PVC	SB-215T2	22020	1020393.46	1233994.48	5091.24	1020393.37	1233994.62	5089.01	4	2.23
1" PVC	SB-216B	22080	1020935.23	1233542.73	5149.30	1020935.25	1233542.80	5145.84	1	3.46
1" PVC	SB-216A	22081	1020935.19	1233542.51	5147.57	1020935.15	1233542.61	5145.88	4	1.69
2" PVC	MW-217	22095	1021341.61	1233088.22	5141.90	1021341.29	1233088.18	5137.95	5	3.95
1" PVC	SB-217A	22097	1021345.90	1233083.25	5139.43	1021345.73	1233083.26	5137.73	6	1.70
1" PVC	SB-217B	22096	1021345.75	1233083.35	5141.50	1021345.65	1233083.44	5137.70	2	3.80
1.5" PVC	TP-101A	22120	1020197.25	1232982.21	5067.78	1020197.24	1232982.39	5064.51	3	3.27
1.5" PVC	TP-101B	22121	1020197.43	1232982.18	5067.53	1020197.58	1232982.08	5064.35	3	3.18
1.5" PVC	TP-101C	22122	1020197.38	1232982.34	5067.00	1020197.42	1232982.48	5064.33	3	2.67
1.5" PVC	TP-102	22083	1021092.77	1233385.12	5150.50	1021092.52	1233384.95	5147.96	7	2.55
1.5" PVC	TP-103	22023	1020449.00	1233972.74	5099.61	1020448.79	1233973.53	5095.58	11	4.04
*	TP-104									
1.5" PVC	TP-105	22100	1020960.61	1233139.08	5119.31	1020960.51	1233140.29	5115.23	17	4.07
1.5" PVC	TP-106	22054	1020918.15	1232895.44	5102.10	1020917.82	1232895.37	5098.36	5	3.74
1.5" PVC	TP-107	22069	1020683.38	1233796.13	5119.52	1020684.26	1233795.92	5114.92	11	4.59
1.5" PVC	TP-108	22091	1021154.66	1232949.19	5118.88	1021154.01	1232949.66	5115.16	12	3.72
1.5" PVC	TP-109	22060	1021077.35	1232749.80	5091.28	1021077.17	1232750.18	5087.32	6	3.96
1.5" PVC	TP-110	22063	1020634.95	1233451.93	5110.57	1020634.70	1233452.38	5106.81	8	3.76
1.5" PVC	TP-111A	22104	1020844.10	1233244.89	5117.67	1020844.58	1233244.80	5113.82	7	3.84
1.5" PVC	TP-111B	22105	1020844.23	1233244.67	5117.31	1020844.65	1233244.51	5113.62	7	3.70

UBMC Section 35 Design Investigation

Data Summary Report Survey Data

Size and Description	Piezometer ID	DJA Point Number	MONTANA S NAD83 (S.I. Fe Pi	et) Top of PVC pe	NAV88 (U.S. Feet) Top of PVC Elevation	MONTANA STATE PLANE (NAD83) (S.I. Feet) Ground Shot PVC Pipe		NAVD88 (U.S. Feet) Ground Elevation	PVC Pipe Angle from Plumb Nearest	Piezometer Height Above Ground (Feet)
			NORTHING	EASTING	from GPS	NORTHING	EASTING	From GPS	Degree	
1.5" PVC	TP-111C	22106	1020844.09	1233244.71	5117.07	1020844.32	1233244.32	5113.43	7	3.64
1.5" PVC	TP-112	22126	1020918.91	1232542.35	5071.85	1020918.47	1232542.59	5067.59	7	4.26
1.5" PVC	TP-113	22124	1020729.63	1232675.00	5074.25	1020730.25	1232675.16	5069.27	7	4.98
1" PVC	PZ-01T	22017	1020093.22	1234545.24	5097.17	1020093.20	1234544.98	5095.31	8	1.86

^{*} A lathe was found for TP-104, but no piezometer pipe. No survey shot taken.

APPENDIX F

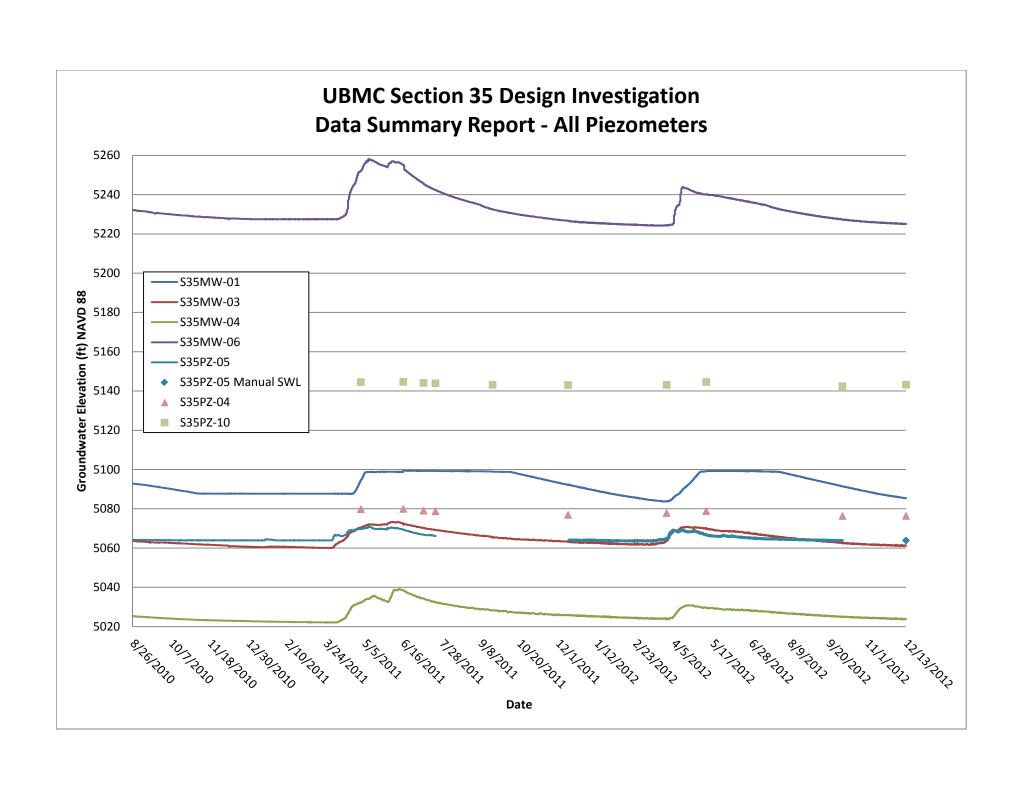
WATER LEVEL DATA

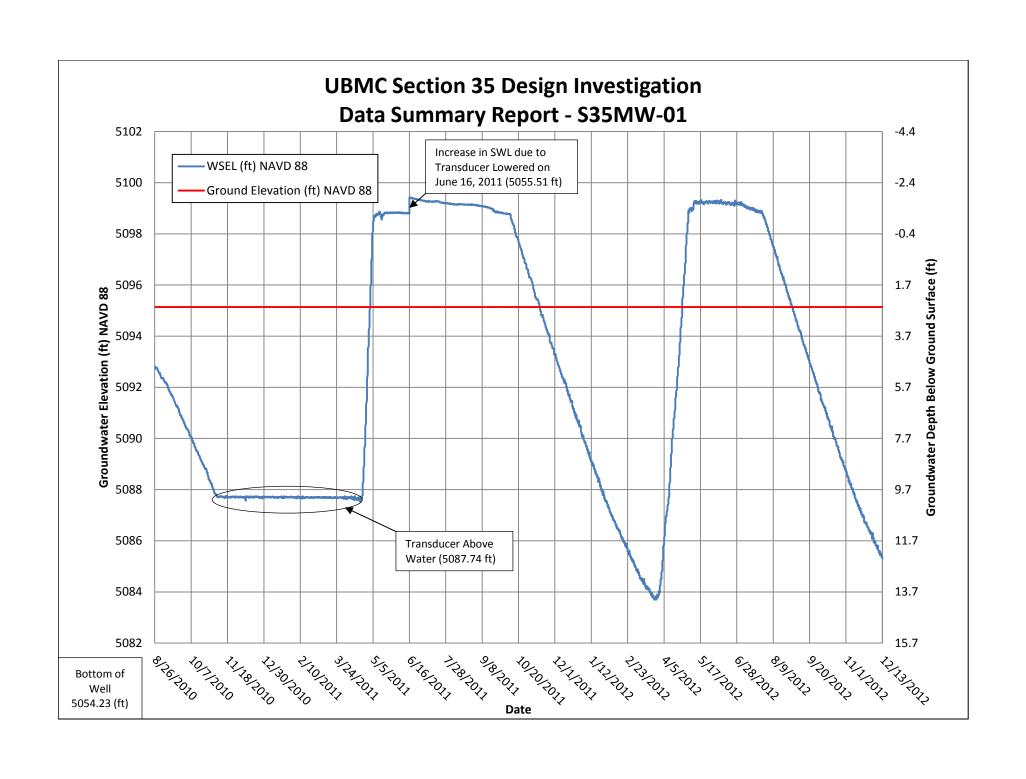
UBMC Section 35 Design Investigation Data Summary Report Existing Monitoring Wells and Piezometers

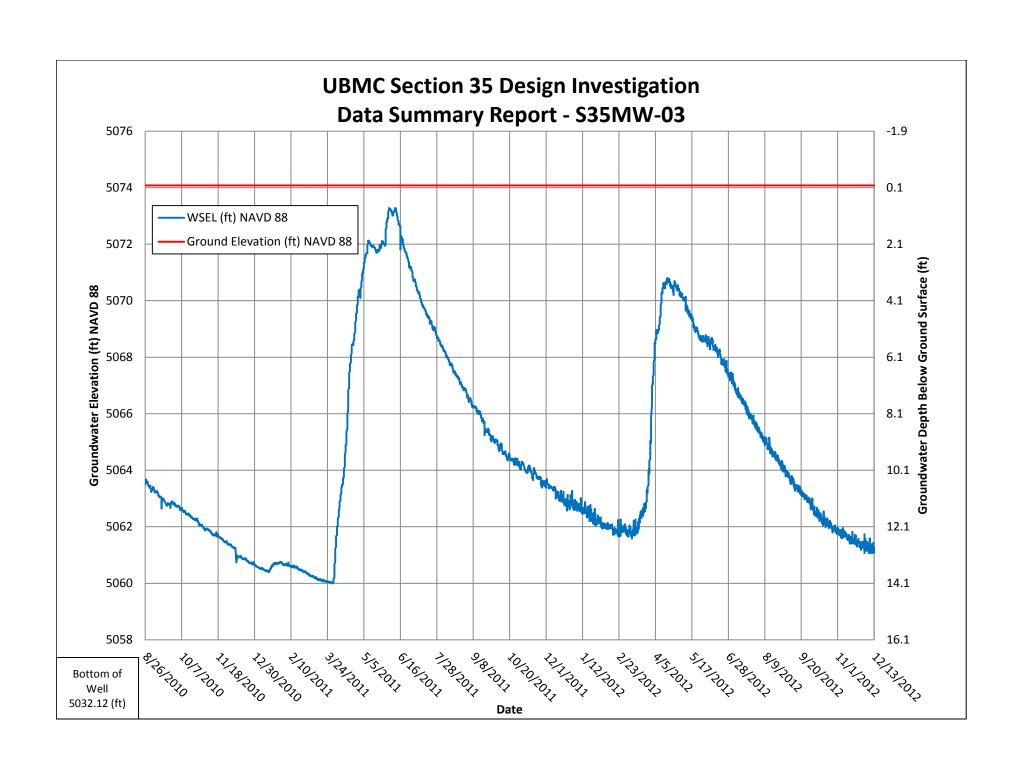
Monitoring Point ID	Montana S (NAD83) (Northing	tate Plane (S.I. Feet) Easting	NAVD88 (US Feet) Elevation	Stickup (feet)	MP_Elev (ft) NAVD88	Transducer_Depth Before June 16, 2011 (ft) ⁽¹⁾	Tranducer_Elev (ft) NAVD88 Before June 16, 2011	Transducer_Depth After June 16, 2011 (ft) ⁽¹⁾	Tranducer_Elev (ft) NAV88 After June 16, 2011	Well Depth (ft) ⁽²⁾
C25N4V4/ O4				2.02	5007.00		F007.74		FOFF F4	
S35MW-01	1020113.00	1234563.00	5095.14	2.82	5097.96	10.22	5087.74	42.45	5055.51	43.40
S35MW-03	1020131.00	1233334.00	5074.08	2.53	5076.61	18.19	5058.42	41.80	5034.81	42.00
S35MW-04	1020735.00	1232540.00	5062.77	1.90	5064.67	42.90	5021.77	42.80	5021.87	43.10
S35MW-06	1021996.00	1233463.00	5261.05	2.20	5263.25	35.72	5227.53	67.45	5195.80	68.00
S35PZ-04	1020296.00	1233331.00	5082.00	2.02	5084.02	NA	no transducer	NA	no transducer	9.90
S35PZ-05	1019657.72	1234289.90	5073.35	2.25	5075.60	11.55	5064.05	11.85	5063.75	12.00
S35PZ-10	1021829.86	1235024.25	5151.00	2.78	5153.78	NA	no transducer	NA	no transducer	14.90

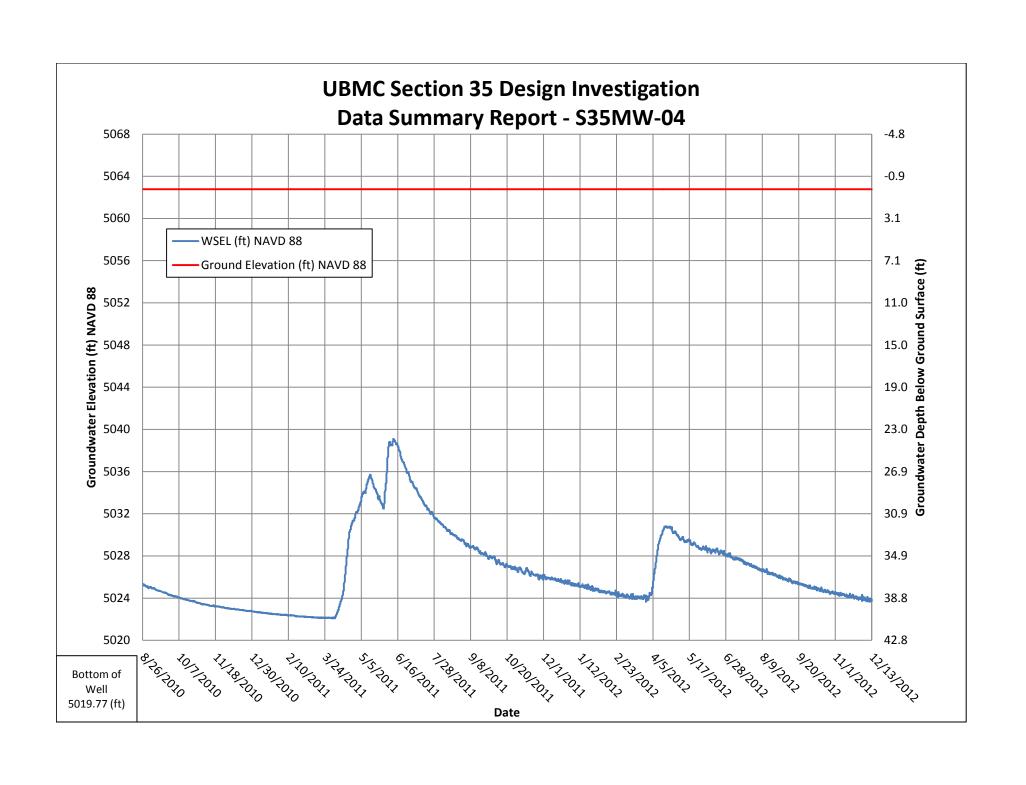
Notes: 1) Measured from top of PVC casing

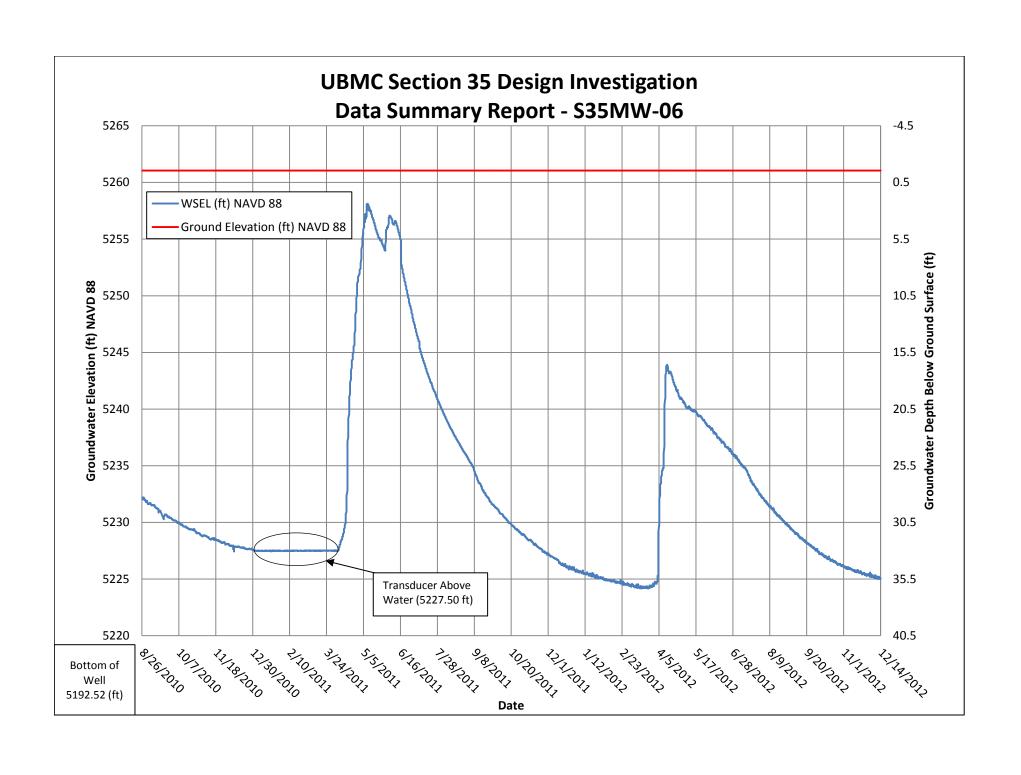
2) Measured below ground surface

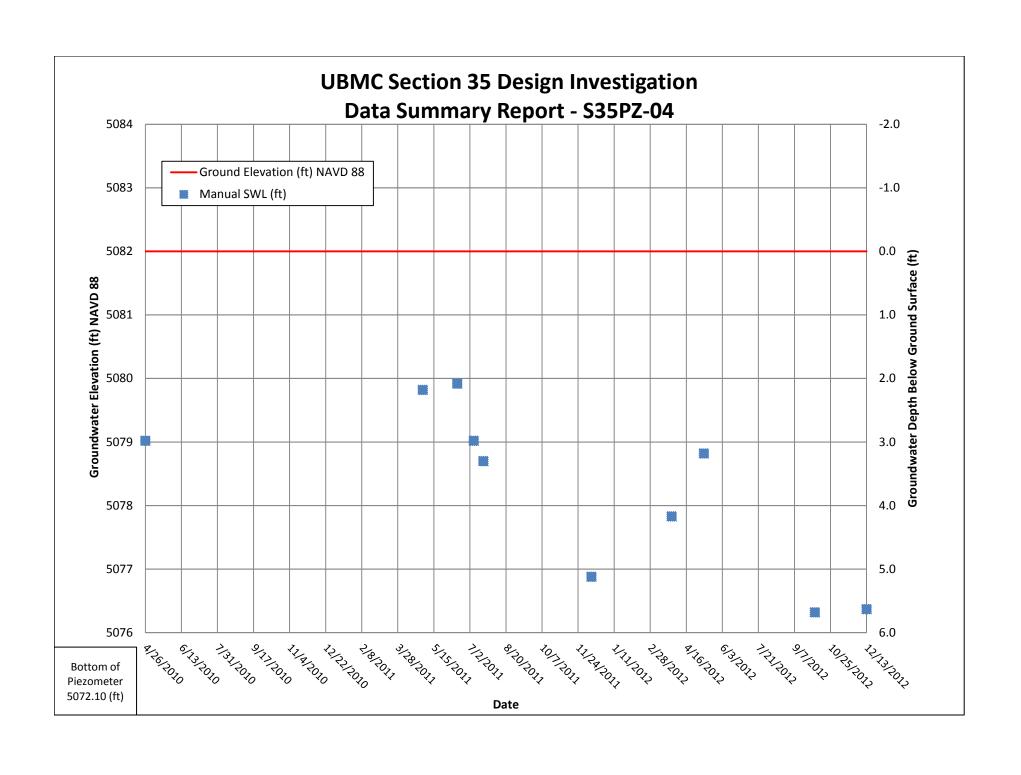


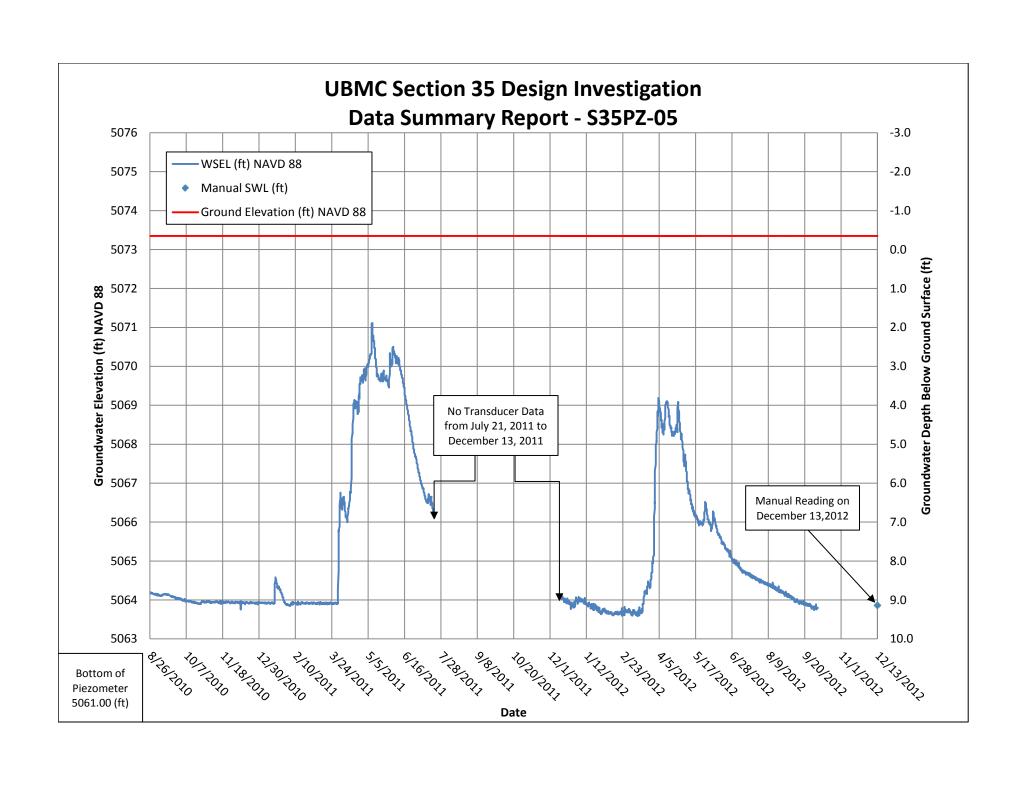


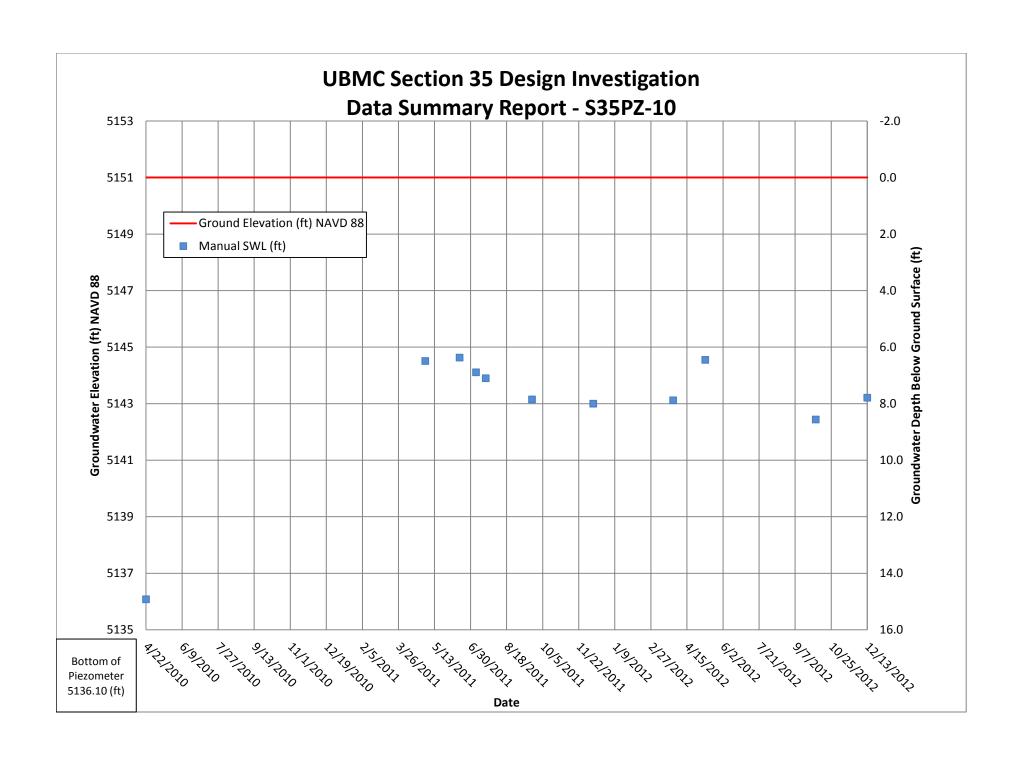












APPENDIX G

DATA VALIDATION REPORT

DATA VALIDATION REPORT UPPER BLACKFOOT MINING COMPLEX SECTION 35 DESIGN INVESTIGATION

Sample collection and analysis were consistent with the *Final UBMC Flood Plain Sampling and Analysis Plan* and the *Final Quality Assurance Project Plan* (QAPP) *for the Upper Blackfoot Mining Complex Design Investigation, approved July, 2012* (DEQ-Pioneer Technical Services, 2012). Tables G-1, G-2, and G-3 provide a listing of the samples collected during the pilot project, the laboratory information including lab name, lab ID number, date sampled, the sample matrix, the analytical method, reporting units, the data qualifiers associated with each sample, and the type and number of laboratory QA/QC samples. Table G-4 presents the field duplicate sample collected and the relative percent difference (RPD). In the following sections, the QA/QC information presented in these tables is discussed by matrix type and sampling event.

Soil samples were collected by Pioneer in early October, composited into 11 samples based on physical characteristics and hand delivered to Energy Laboratories, Inc. (Energy) in Helena, Montana on December 19, 2012. The temperature of the samples upon receipt by the laboratory was recorded at 18.4°C which is above the accepted temperature range of 4°C (±2°C) in the *EPA National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2010). The Chain of Custody records from field to laboratory was complete and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Mercury has a 28 day holding time and this sample was extracted several months after collection. The purpose of the Section 35 investigation was to provide a baseline screening and not to characterize the site for cleanup. As a result, the impact of sampling mercury outside of the temperature and holding time is considered to be negligible. It appears from the analytical report that all the other analytes were extracted and analyzed within the appropriate holding times.

In addition, an archived portion of sample S35-CS-01was split by Pioneer personnel on January 16, 2013 to create a duplicate to evaluate matrix variability. The sample was hand delivered on January 16, 2013 to Energy in Helena, Montana. The temperature of the samples upon receipt by the laboratory was recorded at 14.5°C which is above the accepted temperature range of 4°C (±2°C) in the *EPA National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2010). The Chain of Custody records from field to laboratory was complete and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Mercury has a 28 day holding time and this sample was extracted several months after collection. As discussed above, this investigation was not for cleanup screening purposes and therefore, the impacts of sampling mercury out of the temperature and holding time range is considered to be negligible. It appears from the analytical report that all the other analytes were extracted and analyzed within the appropriate holding times.

Analytical results with laboratory analytical results are presented in Table 2 of the DSR, and the analytical reports are attached in Appendix D of the DSR. Table G-1 in Appendix G of the DSR presents the field sample number, the associated lab sample number, the analysis performed, the analytical method, the reporting units, and any laboratory data qualifiers associated with the analysis and the assigned data validation qualifiers. A description of the data qualifiers used in the table is included on the table as well as on Attachment 1 in this Data Validation. Data validation was completed on January 18, 2013 by Julie Flammang of Pioneer.

Table G-2 in Appendix G of the DSR presents a summary of the Laboratory Quality Control/Quality Assurance Samples that the laboratory ran for each sample batch and analysis. Included on the table is the analysis, the type and quantity of QA/QC samples and a description of the result if it was out of the laboratory control limits. As shown on Table G-2 the number of laboratory QA/QC samples met the requirements defined in the *EPA National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2010) QAPP.

Table G-3 presents a summary of laboratory QA/QC results that were outside of the laboratory control limits, and the resulting data qualifications. Because of method blank detections in the samples submitted on December 19, 2012, all detected silver results were qualified with a J+ (the result is an estimated quantity, but the result may be biased high). The barium result from the sample submitted on January 16, 2013 was qualified with a J+ based on matrix spike (MS) results. Potassium results from both submittals were qualified with a J+ based on matrix spike (MS) and matrix spike duplicate (MSD) recoveries that were outside of the laboratory control limits. Antimony results from both sample submissions were qualified as UJ (the analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise) based on MS and MSD recoveries outside of the laboratory control limits. All mercury results were qualified as UJ; the receiving temperature of the samples was well above the temperature required in the *EPA National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2010) and all samples were extracted outside of the recommended holding times.

No field duplicates or field blanks were collected as none were required in the SAP or QAPP. One duplicate was generated by Pioneer on January 16, 2013 from an archived sample to evaluate matrix variability. Table G-4 presents the duplicate sample and the relative percent difference (RPD). Silver had and RPD outside the +/- 35% precision criteria with a value of 67%. Both results (natural and duplicate) were near the reporting limit. The variability may be indicative of the heterogeneity of natural soil conditions or may reflect the difficulties of precision near the reporting limit. No qualifications have been assigned based on duplicate precision. All remaining field duplicate results were within the +/- 35% acceptance criteria.

Analytical methods and reporting limits as defined in the SAP and QAPP were met by the laboratory.

No additional samples were flagged due to the data validation and the results are accepted with the qualifications indicated. No data was rejected.

REFERENCES

DEQ-Pioneer Technical Services, 2012. Final Quality Assurance Project Plan for the Upper Blackfoot Mining Complex Design Investigation, July 13, 2012.

EPA, 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, OSWER 9240.1-51, USEPA-540-R-10-011, January 2010.

									Laboratory	Data Validation
Laboratory	Work Order Number	Laboratory ID	Field Sample ID	Date Sampled	Matrix	Analysis	Analytical Method	Reporting Units	Qualifiers	Qualifiers/Reason
				12/18/2012 12/18/2012	Soil Soil	Exchange Acidity, TEA pH. SMP Buffer	ASA9-4 ASA12-3	meq/100g s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012 12/18/2012	Soil Soil	Saturated Paste, pH Conductivity	ASAM10-3.2 ASAM 10-3	s.u. mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/I		
						Magnesium - Saturated				
				12/18/2012	Soil	Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium	USDA20b SW6010B	unitless mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
						Organic Carbon/Matter				
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012 12/18/2012	Soil Soil	Neutralization Potential Acid Potential	Sobek Modified Sobek Modified	t/kt t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Total Sulfur	Sobek Modified	%		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Nitrate as N Silver, Total	ASA33-8 E200.7, SW6010B, SW6020	mg/kg		
_				12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B, SW6020	mg/kg mg/kg		
Energy	H 12120317	H12120317-001	S35-BGT-01	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Calcium, Total Cadmium, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B E200.7, SW6010B, SW6020	mg/kg mg/kg		
				12/18/2012	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Copper, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil Soil	Iron, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012 12/18/2012	Soil	Potassium, Total Magnesium, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		JT, IVIO
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Lead, Total Antimony, Total	SW6020 SW6020	mg/kg		UJ, MS
				12/18/2012	Soil	Selenium, Total	SW6020	mg/kg mg/kg		OJ, IVI3
				12/18/2012	Soil	Thallium, Total	SW6020	mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		III MD and town
				12/18/2012 12/18/2012	Soil Soil	Mercury, Total 1/3 Bar Moisture	SW7471A SSSA-pt4	mg/kg wt%		UJ, MB and temp
				12/18/2012	Soil	15 Bar Moisture	SSSA-pt4	wt%		
				12/18/2012	Soil	Exchange Acidity, TEA	ASA9-4	meq/100g		
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
			12/18/2012	Soil Soil	Lime Requirements Percent Saturation	ASA12-3 USDA27a	Tons/1000T %			
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	S.U.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/I		
				12/18/2012	Soil	Magnesium - Saturated Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
				12/18/2012	Soil	Organic Carbon/Matter Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012 12/18/2012	Soil Soil	Total Sulfur Olsen Phosphorus	Sobek Modified ASA24-5	% mg/kg		
				12/18/2012	Soil	Nitrate as N	ASA24-5 ASA33-8	mg/kg		
				12/18/2012	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg		
Energy	H 12120317	H12120317-002	S35-BGT-02	12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		
٥,				12/18/2012 12/18/2012	Soil Soil	Arsenic, Total Barium, Toatal	SW6020 E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020			
				12/18/2012	Soil Soil	Chromium, Total Copper, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Iron, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Manganese, Total Sodium, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
				12/18/2012	Soil	Selenium, Total	SW6020	mg/kg		
				12/18/2012	Soil	Thallium, Total	SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Vanadium, Total Zinc, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
										t
				12/18/2012	Soil	Mercury, Total	SW7471A	mg/kg		UJ, MB and temp
				12/18/2012 12/18/2012 12/18/2012	Soil Soil	Mercury, Total 1/3 Bar Moisture 15 Bar Moisture	SSSA-pt4 SSSA-pt4	mg/kg wt%		UJ, MB and temp

			et data under p	5.1. 6t.d					Laboratory	Data Validation
Laboratory	Work Order Number	Laboratory ID	Field Sample ID	12/18/2012	Matrix Soil	Analysis Exchange Acidity, TEA	Analytical Method ASA9-4	Reporting Units meq/100g	Qualifiers	Qualifiers/Reason
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	s.u.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste Magnesium - Saturated	SW6010B	meq/l		
				12/18/2012	Soil	Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium CEC NH4AC	SW6010B SW6010B	mg/kg		
				12/18/2012	3011	Organic Carbon/Matter	24/00109	meq/100g		
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Total Sulfur	Sobek Modified	%		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Nitrate as N Silver, Total	ASA33-8 E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B, SW6020	mg/kg mg/kg		
Energy	H 12120317	H12120317-003	S35-BGT-03	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
		1		12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
		1		12/18/2012 12/18/2012	Soil Soil	Copper, Total Iron, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg mg/kg		J+, MS
]		12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		,
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
				12/18/2012 12/18/2012	Soil Soil	Selenium, Total Thallium, Total	SW6020 SW6020	mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Mercury, Total	SW7471A	mg/kg		UJ, MB and temp
				12/18/2012	Soil	1/3 Bar Moisture	SSSA-pt4	wt%		
				12/18/2012	Soil	15 Bar Moisture	SSSA-pt4	wt%		
				12/18/2012	Soil	Exchange Acidity, TEA	ASA9-4	meq/100g		
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	S.U.		
				12/18/2012 12/18/2012	Soil Soil	Lime Requirements Percent Saturation	ASA12-3 USDA27a	Tons/1000T %		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	S.U.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/l		
						Magnesium - Saturated				
				12/18/2012	Soil	Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012	Soil Soil	Sodium Adsorption Ratio	USDA20b SW6010B	unitless		
				12/18/2012 12/18/2012	Soil	Available Potassium CEC NH4AC	SW6010B	mg/kg meq/100g		
				12/18/2012	3011	Organic Carbon/Matter	34400108	med/100g		
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
]		12/18/2012	Soil	Total Sulfur	Sobek Modified	%		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
]		12/18/2012 12/18/2012	Soil Soil	Nitrate as N Silver, Total	ASA33-8 E200.7, SW6010B, SW6020	mg/kg mg/kg		U, Method Blank
		1		12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B, SW6020	mg/kg		z, meenou blank
Energy	H 12120317	H12120317-004	S35-CS-01	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
		1		12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Chromium, Total Copper, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
		1		12/18/2012	Soil	Iron, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
		1		12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
		1		12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg	-	
		1		12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Antimony, Total Selenium, Total	SW6020 SW6020	mg/kg		UJ, MS
				12/18/2012	Soil	Thallium, Total	SW6020 SW6020	mg/kg mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg		
	1	1		12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
							SW7471A			Transport to
				12/18/2012	Soil	Mercury, Total	3VV/4/1A	mg/kg		UJ, MB and temp
				12/18/2012 12/18/2012 12/18/2012	Soil Soil	1/3 Bar Moisture 15 Bar Moisture	SSSA-pt4 SSSA-pt4	wt%		UJ, MB and temp

Laboratory	Work Order Number	Laboratory ID	Field Sample ID	Date Sampled	Matrix	Analysis	Analytical Method	Reporting Units	Laboratory Qualifiers	Data Validation Qualifiers/Reason
Laboratory	work Order Number	Laboratory ID	Field Sample ID	12/18/2012	Soil	Exchange Acidity, TEA	Analytical Method ASA9-4	meq/100g	Qualifiers	Qualifiers/ Reason
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	S.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	S.U.		
				12/18/2012 12/18/2012	Soil Soil	Conductivity Calcium - Saturated paste	ASAM 10-3 SW6010B	mmhos/cm meq/l		
				12/18/2012	3011	Magnesium - Saturated	34400108	meq/i		
				12/18/2012	Soil	Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC Organic Carbon/Matter	SW6010B	meq/100g		
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Total Sulfur	Sobek Modified	%		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Nitrate as N Silver, Total	ASA33-8 E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B, SW6020	mg/kg mg/kg		
Energy	H 12120317	H12120317-005	S35-CS-02	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Chromium, Total Copper, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Iron, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Lead, Total Antimony, Total	SW6020 SW6020	mg/kg mg/kg		UJ, MS
				12/18/2012	Soil	Selenium, Total	SW6020	mg/kg		OJ, IVI3
				12/18/2012	Soil	Thallium, Total	SW6020	mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Mercury, Total	SW7471A	mg/kg		UJ, MB and temp
				12/18/2012	Soil	1/3 Bar Moisture	SSSA-pt4	wt%		
				12/18/2012 12/18/2012	Soil Soil	15 Bar Moisture	SSSA-pt4 ASA9-4	wt% meq/100g		
				12/18/2012	Soil	Exchange Acidity, TEA pH, SMP Buffer	ASA9-4 ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	s.u.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/l		
				12/10/2012	C-il	Magnesium - Saturated	CMCOLOD	/1		
				12/18/2012 12/18/2012	Soil Soil	Paste Sodium - Saturated Paste	SW6010B SW6010B	meq/L meq/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
						Organic Carbon/Matter			-	
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
1				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012 12/18/2012	Soil Soil	Acid Potential Acid/Base Potential	Sobek Modified Sobek Modified	t/kt t/kt		
				12/18/2012	Soil	Total Sulfur	Sobek Modified	1/KL %		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012	Soil	Nitrate as N	ASA33-8	mg/kg		
1				12/18/2012	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg		
Energy	H 12120317	H12120317-006	S35-CS-03	12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Barium, Toatal	E200.7, SW6010B E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total Calcium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
1				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Copper, Total	E200.7, SW6010B	mg/kg		
					Soil	Iron, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg		1. 146
				12/18/2012						J+, MS
				12/18/2012	Soil	Potassium, Total		mg/kg		,
				12/18/2012 12/18/2012	Soil Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil	Magnesium, Total Manganese, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil	Magnesium, Total Manganese, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020	mg/kg mg/kg mg/kg		UJ, MS
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total Thallium, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020 SW6020	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total Thallium, Total Vanadium, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total Thallium, Total Vanadium, Total Zinc, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		UJ, MS
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total Thallium, Total Vanadium, Total	E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		

Laboratory									Laboratory	Data Validation
	Work Order Number	Laboratory ID	Field Sample ID	Date Sampled 12/18/2012	Matrix	Analysis	Analytical Method	Reporting Units	Qualifiers	Qualifiers/Reason
				12/18/2012	Soil Soil	Exchange Acidity, TEA pH, SMP Buffer	ASA9-4 ASA12-3	meq/100g		
				12/18/2012	Soil	Lime Requirements	ASA12-3 ASA12-3	s.u. Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	s.u.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/I		
				42/40/2042	6.1	Magnesium - Saturated	CIA/COAOD			
				12/18/2012 12/18/2012	Soil Soil	Paste	SW6010B SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste Sodium Adsorption Ratio	USDA20b	meq/L unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
						Organic Carbon/Matter				
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012	Soil Soil	Total Sulfur Olsen Phosphorus	Sobek Modified ASA24-5	%		
				12/18/2012 12/18/2012	Soil	Nitrate as N	ASA24-5 ASA33-8	mg/kg		
				12/18/2012	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg mg/kg		
				12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		
Energy	H 12120317	H12120317-007	13341:TP104 (7-10')	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Copper, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Iron, Total Potassium, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg mg/kg		J - , 191J
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
				12/18/2012	Soil	Selenium, Total	SW6020	mg/kg		
				12/18/2012	Soil	Thallium, Total	SW6020	mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Mercury, Total	SW7471A	mg/kg		UJ, MB and temp
				12/18/2012	Soil	1/3 Bar Moisture 15 Bar Moisture	SSSA-pt4 SSSA-pt4	wt% wt%		
				12/18/2012	Soil	Exchange Acidity, TEA	ASA9-4	meq/100g		
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	s.u.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
						Calcium - Saturated paste				
				12/18/2012	Soil		SW6010B	meq/l		
						Magnesium - Saturated				
				12/18/2012	Soil	Magnesium - Saturated Paste	SW6010B	meq/L		
				12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste	SW6010B SW6010B	meq/L meq/L		
				12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio	SW6010B SW6010B USDA20b	meq/L meq/L unitless		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium	SW6010B SW6010B USDA20b SW6010B	meq/L meq/L unitless mg/kg		
				12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC	SW6010B SW6010B USDA20b	meq/L meq/L unitless		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter	SW6010B SW6010B USDA20b SW6010B SW6010B	meq/L meq/L unitless mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC	SW6010B SW6010B USDA20b SW6010B	meq/L meq/L unitless mg/kg meq/100g		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black	SW6010B SW6010B USDA20b SW6010B SW6010B	meq/L meq/L unitless mg/kg meq/100g		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified	meq/L meq/L unitless mg/kg meq/100g % t/kt		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Suffur	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt %		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Posential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total	SW6010B SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SObek Modified SODE ASA24-5 ASA33-8 E200.7, SW6010B, SW6020	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid/ Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified E200.7, SW6010B SW6020 E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Sotential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Barium, Total Barium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBER MODIFIED SW6010B SW6020 E200.7, SW6010B SW6020 E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt g/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Sotential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total	SW6010B SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Colsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Calcium, Total Cadmium, Total Cadmium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBE Modified SOBE MODIFIED SOBE SOBE SOBE SOBE SOBE SOBE SOBE SOBE	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Calcium, Total Calcium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cobalt, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBE Modified SOBE MODIFIED SOBE SOBE SOBE SOBE SOBE SOBE SOBE SOBE	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Calcium, Total Calcium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Chomium, Total Chromium, Total Chromium, Total Chomium, Chomium, Chomiu	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBER MODIFIED SOBER	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt f/kt mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Barium, Total Calcium, Total Cadmium, Total Cadmium, Total Cobalt, Total Chromium, Total Cohmit, Total Chromium, Total Copper, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Passe Potential Total Suffur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Aluminum, Total Barrylum, Total Barrylum, Total Barrylum, Total Cadium, Total Cadium, Total Cadmim, Total Cadmim, Total Cadmim, Total Cadmim, Total Copper, Total Chromium, Total Croper, Total Incon, Total Copper, Total Incon, tional Incondition Inconditional Inconditiona	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4 ¹)	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Potential Arsenic, Total Barryllium, Total Calcium, Total Cadmium, Total Cobalt, Total Chromium, Total Copper, Total Iron, Total Potassium, Total Potassium, Total Potassium, Total Potassium, Total Potassium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBEK MODIFIED SOBEK SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Barium, Total Calcium, Total Cadmium, Total Cadmium, Total Cadmium, Total Copper, Total Cropper, Total Iron, Total Potassium, Total Iron, Total Potassium, Total Iron, Total Potassium, Total Potassium, Total Potassium, Total Magnesium, Total Magnesium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potantial Acid Potential Acid Potential Acid Potential Acid Potential Total Sulfur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barrium, Total Barrium, Total Calcium, Total Calcium, Total Calcium, Total Candium, Total Coper, Total Iron, Total Coper, Total Iron, Iro	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBER MODIFIED SOBER SOB	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt t/kt mg/kg		J+, MS
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Calcium, Total Cadeium, Total Cadeium, Total Cadeium, Total Cobalt, Total Chromium, Total Copper, Total Iron, Total Copper, Total Iron, Total Potassium, Total Magnesium, Total Magnesium, Total Magnesey, Total Magnesey, Total Magnesey, Total Magnesey, Total Magnesey, Total Magnesey, Total Sodium, Total Magnesey, Total Sodium, Total Magnesey, Total Sodium, Total Magnesey, Total Sodium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Total Suffur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Aluminum, Total Barrylium, Total Barrylium, Total Cadium, Total Cadium, Total Cadium, Total Cadmium, Total Copper, Total Iron, Total Iron, Total Potassium, Total Potassium, Total Magnesium, Total Magnesium, Total Sodium, Total Sodium, Total Nagnesium, Total Magnesium, Total Magnesey, Total Iron, Total Magnesey, Total Nickel, Total Nickel, Total Nickel, Total Nickel, Total Nickel, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	н 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Total Satifur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barrium, Total Barrium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Capper, Total Iron, Total Potassium, Total Magnesium, Total Magnesium, Total Magnesium, Total Magnesium, Total Sodium, Total Sodium, Total Sodium, Total Magnesium, Total Magnesium, Total Magnesium, Total Nickel, Total Inckel, Total Inckel, Total Inckel, Total Lead, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt t/kt mg/kg		J+, MS
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Total Suffur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Aluminum, Total Barrylium, Total Barrylium, Total Cadium, Total Cadium, Total Cadium, Total Cadmium, Total Copper, Total Iron, Total Iron, Total Potassium, Total Potassium, Total Magnesium, Total Magnesium, Total Sodium, Total Sodium, Total Nagnesium, Total Magnesium, Total Magnesey, Total Iron, Total Magnesey, Total Nickel, Total Nickel, Total Nickel, Total Nickel, Total Nickel, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Asrenic, Total Barrium, Total Calcium, Total Calcium, Total Cadnium, Total Cadnium, Total Copper, Total Iron, Total Potassium, Total Iron, Total Potassium, Total Manganese, Total Manganese, Total Manganese, Total Sodium, Total Manganese, Total Sodium, Total Lead, Total Lea	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified E200.7, SW6010B SW6020 SW6020	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt t/kt t/kt mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Posential Acid Posential Total Suffur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Aluminum, Total Alaminum, Total Barium, Total Barium, Total Cadium, Total Cadium, Total Cadium, Total Cadium, Total Capper, Total Iron, Total Potassium, Total Potassium, Total Magnesium, Total Magnesium, Total Magnesium, Total Sodium, Total Nickel, Total Lead, Total Aluminum, Total Sodium, Total Sodium, Total Sodium, Total Nickel, Total Aluminum, Total Capper, Total Iron, Total Potassium, Total Magnesium, Total Sodium, Total Nagnesium, Total Selenium, Total Selenium, Total Selenium, Total Vanadium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B EXW6020 SW6020 SW6020 SW6020	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt t/kt t/kt t/kt mg/kg		
Energy	H 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Total Satid Potential Total Satid Potential Total Satid Potential Total Silver, Total Aluminum, Total Arsenic, Total Barrium, Total Barrium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Copper, Total Iron, Total Potassium, Total Magnesium, Total Magnesium, Total Magnesium, Total Magnesium, Total Nickel, Total Lead, Total Lead, Total Sodium, Total Sodium, Total Sodium, Total Sodium, Total Nickel, Total Lead, Total Lead, Total Lead, Total Selenium, Total Selenium, Total Selenium, Total Selenium, Total Thallium, Total Lyanadium, Total Lyanad	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B E200.7, SW6010B	meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		UI, MS
Energy	н 12120317	H12120317-008	13350:TP106 (8.4-9.4')	12/18/2012 12/18/2012	Soil	Magnesium - Saturated Paste Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Posential Acid Posential Total Suffur Oisen Phosphorus Nitrate as N Silver, Total Aluminum, Total Aluminum, Total Alaminum, Total Barium, Total Barium, Total Cadium, Total Cadium, Total Cadium, Total Cadium, Total Capper, Total Iron, Total Potassium, Total Potassium, Total Magnesium, Total Magnesium, Total Magnesium, Total Sodium, Total Nickel, Total Lead, Total Aluminum, Total Sodium, Total Sodium, Total Sodium, Total Nickel, Total Aluminum, Total Capper, Total Iron, Total Potassium, Total Magnesium, Total Sodium, Total Nagnesium, Total Selenium, Total Selenium, Total Selenium, Total Vanadium, Total	SW6010B SW6010B USDA20b USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B EXW6020 SW6020 SW6020 SW6020	meq/L meq/L meq/L unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		

Laboratory			et date ou de les						Laboratory	Data Validation Qualifiers/Reason
	Work Order Number	Laboratory ID	Field Sample ID	12/18/2012	Matrix Soil	Analysis Exchange Acidity, TEA	Analytical Method ASA9-4	Reporting Units meq/100g	Qualifiers	Qualifiers/Reason
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012	Soil	Saturated Paste, pH	ASAM10-3.2	s.u.		
				12/18/2012	Soil	Conductivity	ASAM 10-3	mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/l		
				12/19/2012	Soil	Magnesium - Saturated Paste	SW6010B	mon/I		
				12/18/2012 12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L meq/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
						Organic Carbon/Matter				
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012 12/18/2012	Soil Soil	Acid/Base Potential Total Sulfur	Sobek Modified Sobek Modified	t/kt %		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012	Soil	Nitrate as N	ASA33-8	mg/kg		
				12/18/2012	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg		J+, Method Blank
F	11 12120217	1112120217 000	12254-T0107 (0.101)	12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		
Energy	H 12120317	H12120317-009	13354:TP107 (9-10')	12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Cobalt, Total Chromium, Total	E200.7, SW6010B, SW6020 E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Copper, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Iron, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
				12/18/2012 12/18/2012	Soil Soil	Selenium, Total Thallium, Total	SW6020 SW6020	mg/kg		
				12/18/2012	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Mercury, Total	SW7471A	mg/kg		UJ, MB and temp
				12/18/2012	Soil	1/3 Bar Moisture	SSSA-pt4	wt%		,
				12/18/2012	Soil	15 Bar Moisture	SSSA-pt4	wt%		
				12/18/2012	Soil	Exchange Acidity, TEA	ASA9-4	meq/100g		
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil	Percent Saturation	USDA27a	%		
				12/18/2012 12/18/2012	Soil Soil	Saturated Paste, pH Conductivity	ASAM10-3.2 ASAM 10-3	s.u. mmhos/cm		
				12/18/2012	Soil	Calcium - Saturated paste	SW6010B	meq/I		
				12/10/2012	3011	Magnesium - Saturated	34400100	meq/i		
				12/18/2012	Soil	Paste	SW6010B	meq/L		
					3011					
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meq/L		
				12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio	SW6010B USDA20b	meq/L unitless		
				12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil	Sodium Adsorption Ratio Available Potassium	SW6010B USDA20b SW6010B	unitless mg/kg		
				12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC	SW6010B USDA20b	unitless		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter	SW6010B USDA20b SW6010B SW6010B	unitless mg/kg meq/100g		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black	SW6010B USDA20b SW6010B SW6010B ASA29-3	unitless mg/kg meq/100g %		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter	SW6010B USDA20b SW6010B SW6010B	unitless mg/kg meq/100g		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified	unitless mg/kg meq/100g % t/kt		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified	unitless mg/kg meq/100g % t/kt t/kt		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid/Potential Acid/Base Potential Total Sulfur Olsen Phosphorus	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified	unitless mg/kg meq/100g % t/kt t/kt t/kt		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8	unitless mg/kg meq/100g % t/kt t/kt t/kt */ mg/kg mg/kg		
				12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified E20026 SW6010B SW6010B SW6010B SW6010B SW6010B SW6010B SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt # mg/kg mg/kg mg/kg mg/kg		
Energy	н 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid/Base Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Barium, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBE Modified SOBE MODIFIED SO	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil Soil Soil Soil Soil Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBE MODIFIED SOBE MODIFIED SW6010B SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg mea/100g % f/kt t/kt t/kt * mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Barium, Total Berrylium, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBE Modified SOBE MODIFIED SO	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	н 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Barium, Total Berrylium, Total Calcium, Total Calcium, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cobalt, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berryllum, Total Berryllum, Total Calcium, Total Cadmium, Total Cadmium, Total Cobalt, Total Chromium, Total Copper, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified SOBEC	unitless mg/kg meg/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Barium, Total Calcium, Total Cadmium, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified ASA24-5 ASA3-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Colsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Calcium, Total Cadmium, Total Copent, Total Chromium, Total Copper, Total Copper, Total Lopper, Total Loppe	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg mg/l00g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nilitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Calcium, Total Cadmium, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Potassium, Total Magnesium, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Possphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cobelt, Total Chromium, Total Capper, Total Iron, Total Potassium, Total Potassium, Total Repressium, T	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg meg/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barrium, Total Calcium, Total Calcium, Total Cadmium, Total Cobalt, Total Chopper, Total Iron, Total Iron, Total Potassium, Total Iron, Total Potassium, Total Manganese, Total Manganese, Total Manganese, Total Manganese, Total Manganese, Total Manganese, Total Sodium, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg meg/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Barium, Total Barium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Chromium, Total Chromium, Total Iron, Total Iron, Total Iron, Total Iron, Total Iron, Total Manganesum, Total Manganesum, Total Manganese, Total Manganese, Total Nickel, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg mea/100g % t/kt t/kt t/kt % mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Acid Posse Potential Aluminum, Total Aluminum, Total Barryilium, Total Cadmium, Total Cadmium, Total Copper, Total Iron, Total Potassium, Total Magnessium, Total Magnessium, Total Magnessium, Total Sodium, Total Sodium, Total Sodium, Total Nickel, Total Lead, Total Lead, Total Lead, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B SW6020 E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B E200.7, SW6010B	unitless mg/kg mg/l00g % t/kt t/kt t/kt */kt */kt mg/kg		J+, MS
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Barium, Total Barium, Total Cadmium, Total Cadmium, Total Cadmium, Total Cadmium, Total Chromium, Total Chromium, Total Iron, Total Iron, Total Iron, Total Iron, Total Iron, Total Manganesum, Total Manganesum, Total Manganese, Total Manganese, Total Nickel, Total	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg mea/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NH4AC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Berrylium, Total Calcium, Total Calcium, Total Cadmium, Total Cobalt, Total Chromium, Total Iron, Total Opper, Total Iron, Total Manganese, Total Manganese, Total Sodium, Total Manganese, Total Sodium, Total Nickel, Total Lead, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA34-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B SW6020 SW6020 SW6020	unitless mg/kg mg/l00g % t/kt t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Calcium, Total Calcium, Total Cadmium, Total Cobalt, Total Iron, Total Iron, Total John Magnesium, Total Manganese, Total Sodium, Total Manganese, Total Sodium, Total Nagnesium, Total Lead, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B	unitless mg/kg meq/100g % t/kt t/kt t/kt % mg/kg		
Energy	H 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Acid Pose Potential Aluminum, Total Aluminum, Total Barrium, Total Barrium, Total Calcium, Total Cadmium, Total Coper, Total Iron, Total Potassium, Total Magnesium, Total Magnesium, Total Sodium, Total Sodium, Total Antimony, Total Antimony, Total Antimony, Total Selenium, Total Thallium, Total Lead, Total Lead, Total Lead, Total Thallium, Total Lead,	SW6010B USDA20b SW6010B SW6010B SW6010B ASA29-3 Sobek Modified Sobek Modified Sobek Modified Sobek Modified Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B	unitless mg/kg mg/kg mg/kl f/kt f/kt f/kt f/kt % mg/kg		UJ, MS
Energy	н 12120317	H12120317-010	13371: TP111 (10.5-11.5')	12/18/2012 12/18/2012	Soil Soil	Sodium Adsorption Ratio Available Potassium CEC NHAAC Organic Carbon/Matter Walkely Black Neutralization Potential Acid Potential Acid Potential Acid Potential Acid Pose Potential Total Sulfur Olsen Phosphorus Nitrate as N Silver, Total Aluminum, Total Arsenic, Total Barium, Total Calcium, Total Calcium, Total Cadmium, Total Cobalt, Total Iron, Total Iron, Total John Magnesium, Total Manganese, Total Sodium, Total Manganese, Total Sodium, Total Nagnesium, Total Lead, Total Nickel, Total Lead, Total Antimony, Total Selenium, Total	SW6010B USDA20b SW6010B SW6010B ASA29-3 Sobek Modified ASA24-5 ASA33-8 E200.7, SW6010B, SW6020 E200.7, SW6010B, SW6020 E200.7, SW6010B SW6020 SW6020 SW6020 SW6020 SW6020 SW6020 SW6020 E200.7, SW6010B	unitless mg/kg meg/100g % t/kt t/kt t/kt % mg/kg		

Laboratory	Work Order Number	Laboratory ID	Field Sample ID	Date Sampled	Matrix	Analysis	Analytical Method	Reporting Units	Laboratory Qualifiers	Data Validation Qualifiers/Reason
				12/18/2012	Soil	Exchange Acidity, TEA	ASA9-4	meq/100g		
				12/18/2012	Soil	pH, SMP Buffer	ASA12-3	s.u.		
				12/18/2012	Soil	Lime Requirements	ASA12-3	Tons/1000T		
				12/18/2012	Soil Soil	Percent Saturation	USDA27a ASAM10-3.2	% s.u.		
				12/18/2012 12/18/2012	Soil	Saturated Paste, pH	ASAM 10-3			
				12/18/2012	Soil	Conductivity Calcium - Saturated paste	SW6010B	mmhos/cm meq/l		
				12/10/2012	3011	Magnesium - Saturated	34400108	meq/i		
				12/18/2012	Soil	Paste	SW6010B	meq/L		
				12/18/2012	Soil	Sodium - Saturated Paste	SW6010B	meg/L		
				12/18/2012	Soil	Sodium Adsorption Ratio	USDA20b	unitless		
				12/18/2012	Soil	Available Potassium	SW6010B	mg/kg		
				12/18/2012	Soil	CEC NH4AC	SW6010B	meq/100g		
						Organic Carbon/Matter				
				12/18/2012	Soil	Walkely Black	ASA29-3	%		
				12/18/2012	Soil	Neutralization Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Acid/Base Potential	Sobek Modified	t/kt		
				12/18/2012	Soil	Total Sulfur	Sobek Modified	%		
				12/18/2012	Soil	Olsen Phosphorus	ASA24-5	mg/kg		
				12/18/2012	Soil	Nitrate as N	ASA33-8	mg/kg		
				12/18/2012	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg		
Energy	H 12120317	H12120317-011	13381: TP113 (1.5-3.5')	12/18/2012	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		-
				12/18/2012	Soil	Arsenic, Total	SW6020	mg/kg		
				12/18/2012 12/18/2012	Soil	Barium, Toatal Berrylium, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Calcium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
				12/18/2012	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Copper, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Iron, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Potassium, Total	E200.7, SW6010B	mg/kg		J+, MS
				12/18/2012	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Lead, Total	SW6020	mg/kg		
				12/18/2012	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
				12/18/2012 12/18/2012	Soil	Selenium, Total	SW6020 SW6020	mg/kg		
				12/18/2012	Soil	Thallium, Total Vanadium, Total	E200.7, SW6010B	mg/kg mg/kg		
				12/18/2012	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				12/18/2012	Soil	Mercury, Total	SW7471A	mg/kg		UJ, Temp, Holding Time
				12/18/2012	Soil	1/3 Bar Moisture	SSSA-pt4	wt%		er, remp, resumg sime
				12/18/2012	Soil	15 Bar Moisture	SSSA-pt4	wt%		
				1/16/2013	Soil	Silver, Total	E200.7, SW6010B, SW6020	mg/kg		
				1/16/2013	Soil	Aluminum, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Arsenic, Total	SW6020	mg/kg		
	1			1/16/2013	Soil	Barium, Toatal	E200.7, SW6010B	mg/kg		J+, MS
	1			1/16/2013	Soil	Berrylium, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Calcium, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Cadmium, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Cobalt, Total	E200.7, SW6010B, SW6020	mg/kg		
	1			1/16/2013	Soil	Chromium, Total	E200.7, SW6010B	mg/kg		
				1/16/2013 1/16/2013	Soil Soil	Copper, Total	E200.7, SW6010B E200.7, SW6010B	mg/kg		
Energy	H13010211	H13010211-001	S35-BGT-990	1/16/2013	Soil	Iron, Total Potassium, Total	E200.7, SW6010B	mg/kg mg/kg		J+, MS
rueigy	1113010211	13010211-001	333-001-330	1/16/2013	Soil	Magnesium, Total	E200.7, SW6010B	mg/kg		3.,.413
	1			1/16/2013	Soil	Manganese, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Sodium, Total	E200.7, SW6010B	mg/kg		
				1/16/2013	Soil	Nickel, Total	E200.7, SW6010B	mg/kg		
	1			1/16/2013	Soil	Lead, Total	SW6020	mg/kg		
				1/16/2013	Soil	Antimony, Total	SW6020	mg/kg		UJ, MS
	1			1/16/2013	Soil	Selenium, Total	SW6020	mg/kg		
	1			1/16/2013	Soil	Thallium, Total	SW6020	mg/kg		
	1			1/16/2013	Soil	Vanadium, Total	E200.7, SW6010B	mg/kg		
				1/16/2013	Soil	Zinc, Total	E200.7, SW6010B	mg/kg		
				1/16/2013	Soil	Mercury, Total	SW7471A	mg/kg		UJ, Temp, Holding Time

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise J- The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample. J+ - The result is an estimated quantity, but the result may be biased high MS-Sample Matrix Spike Duplicate RL - Reporting Limit

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H12120317	•	Exchange Acidity, TEA	ASA9-4	Method Blank	1	THE STATE OF THE S
1112120317	12/10/2012	Exertified Activity, TEA	7575 4	Sample Duplicate	1	
H12120317	12/18/2012	pH, SMP Buffer	ASA12-3	LCS	1	
1112120317	12/ 10/ 2012	priyotti barici	71571225	Sample Duplicate	1	
H12120317	12/18/2012	Lime Requirements	ASA12-3	Sample Duplicate	1	
H12120317		Percent Saturation	USDA27a	LCS	1	
1112120317	12/ 10/ 2012	r creene sacaración	000/12/0	Sample Duplicate	1	
H12120317	12/18/2012	Saturated Paste, pH	ASAM10-3.2	CCV	3	
1112120317	12/ 10/ 2012	Saturated Faste, pri	71571111110 512	ICV	1	
				LCS	1	
				Sample Duplicate	1	
H12120317	12/18/2012	Conductivity	ASAM 10-3	CCV	1	
	,_,,_,	,		ICV	1	
				LCS	1	
				Sample Duplicate	1	
				·		
H12120317	12/18/2012	Calcium - Saturated paste	SW6010B	Method Blank	1	Detected at 0.002, RL is 0.001, No qualification required, all results greater than 10X the blank result
	, , ,			LCS	1	
				MS	1	
				MSD	1	
				Sample Duplicate	1	
H12120317	12/18/2012	Magnesium - Saturated Paste	SW6010B	MB	1	
				LCS	1	
				MS	1	
				MSD	1	
				Sample Duplicate	1	
H12120317	12/18/2012	Sodium - Saturated Paste	SW6010B	MB	1	
				LCS	1	
				MS	1	
				MSD	1	
				Sample Duplicate	1	
H12120317	12/18/2012	Sodium Adsorption Ratio	USDA20b	Sample Duplicate	1	
				LCS	1	
H12120317	12/18/2012	Available Potassium	SW6010B	MB	1	Detected at 0.8, RL is 0.02, No qualification required, all results geater than 10X the blank result
				LCS	1	
				MS	1	
				MSD	1	
				Sample Duplicate	1	
i						
H12120317	12/18/2012	CEC	SW6010B	MB	1	Detected at 0.06, RL is 0.008, No qualification required, all results greater than 10X the blank result
				LCS	1	
ļ				MS	1	
<u> </u>				MSD	1	
				Sample Duplicate	1	
H12120317	12/18/2012	Sodium	SW6010B	MB	1	Detected at 0.7, RI is 0.09, No qualification required, all results greater than 10X the blank result
<u> </u>				LCS	1	
				MS	1	
				MSD	1	
				Sample Duplicate	1	
	40/40/	Organic Carbon/Matter				
H12120317	12/18/2012	Walkely Black	ASA29-3	LCS	1	
	441.44.	N . P	6 1 1 1 2 2 2 2	Sample Duplicate	2	
H12120317		Neutralization Potential	Sobek Modified	LCS	2	2
H12120317		Acid Potential	Sobek Modified	Sample Duplicate	1	
H12120317		Acid/Base Potential	Sobek Modified	Sample Duplicate	1	
H12120317	12/18/2012	Total Sulfur	Sobek Modified	Sample Duplicate	1	·
H12120317		Olsen Phosphorus	ASA24-5	ICV		

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
				ICB		1
				MS		2
				MSD		2
				Sample Duplicate		1
H12120317	12/18/2012	Nitrate as N	ASA33-8	ICV		1
				CCV		2
				ICB		1
				MD		1
				LCS		1
				MS		2
				MSD		2
				Sample Duplicate		1
H12120317	12/18/2012	Silver, Total	E200.7	ICV		1
		,				Detected at RL - 0.2, H12120317-009=J+ qualification, result was greater than the CRQL but less than 10X the blank
			SW6010B	Method Blank		1 result, H12120317-004- Report with a U
				Laboratory Fortified Blank		1
				LCS		1
				MS		2
				MSD		2
			SW6020	ICV		1
						Detected at 0.3, RL is 0.02, both samples, J+ qualification, result was greater than the CRQL but less than 10X the
				Method Blank		1 blank result
				LCS		1
				Laboratory Fortified Blank		1
H12120317	12/18/2012	Aluminum, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
						In both samples the analyte level was greater than 4X the spike level. In accordance with the method % recovery
				MS		2 is not calculated, data shall be reported unflagged
						In both samples the analyte level was greater than 4X the spike level. In accordance with the method % recovery
				MSD		g is not calculated, RPD - 1.7, 2.0, data shall be reported unflagged
H12120317	12/18/2012	Arsenic, Total	SW6020	ICV		1
				Method Blank		1 Detected at 0.02, RL006, No qulaification required, all results greater than 10X the blank resul
				LCS		1
				Laboratory Fortified Blank		1
				MS		1
				MSD		1
H12120317	12/18/2012	Barium, Total	E200.7	ICV		1
			SW6010B	Method Blank		1 Detected at RL - 0.02, No qualification required, all results greater than 10X the blank resul
				Laboratory Fortified Blank		1
				LCS		1
				MS		2
				MSD		2

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H12120317		Berrylium, Total	E200.7	ICV	,	
	,,		SW6010B	Method Blank		
				Laboratory Fortified Blank	,	1
				LCS		1
				MS		
				MSD		2
H12120317	12/18/2012	Calcium, Total	E200.7	ICV		
	,,					Detected at RL - 3, Detected at 0.04, reporting limit - 0.02, No qualification required, all results greater than 10X
			SW6010B	Method Blank		the blank result
				Laboratory Fortified Blank		1
				LCS		2
				MS	3	3
				MSD		3
				Sample Duplicate		1
H12120317	12/18/2012	Cadmium, Total	E200.7	ICV		1
1112120317	12/10/2012	caaman, rota	SW6010B	Method Blank		<u> </u>
			2.700200	Laboratory Fortified Blank		1
				LCS		1
				MS		
				MSD		2
H12120317	12/18/2012	Cobalt, Total	E200.7	ICV		
1112120317	12/10/2012	Cobait, Total	SW6010B	Method Blank		1
			51100105	Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		
			SW6020	ICV		1
			5110020	Method Blank		1
				LCS		1
				Laboratory Fortified Blank	-	
				MS		1
				MSD		1
H12120317	12/18/2012	Chromium, Total	E200.7	ICV		1
	,,		SW6010B	Method Blank	,	1
				Laboratory Fortified Blank		1
				LCS		1
				MS		
				MSD		
H12120317	12/18/2012	Copper, Total	E200.7	ICV		
	, -, -		SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
				MS		
				MSD	2	2
H12120317	12/18/2012	Iron, Total	E200.7	ICV		
	, .,		SW6010B	Method Blank		Detected at 4, RL is 0.7, No qualification required, all results greater than 10X the result
				Laboratory Fortified Blank		1
				LCS		1
						In both samples the analyte level was greater than 4X the spike level. In accordance with the method % recovery
				MS	2	I is not calculated, data shall be reported unflagged
						In both samples the analyte level was greater than 4X the spike level. In accordance with the method % recovery
				MSD		is not calculated, RPD - 2.6, 1.9, data shall be reported unflagged

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H12120317		Potassium, Total	E200.7	ICV		
	,,		SW6010B	Method Blank		1 Detected at 3, RL is 1, no qualification required, all results greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		- 1
						% Rec - 148, 146, Spike recoveries outside of advisory limits, gaulify detected results as J+, non-detects require no
				MS	:	qualification
						% Rec - 148, 136, Spike recoveries outside of advisory limits; RPD - 4.2, 5.2, qualify detected results as J+, non-
				MSD		2 detects require no qualification.
H12120317	12/10/2012	Magnesium, Total	E200.7	ICV		1
H12120317	12/10/2012	iviagnesium, rotai	SW6010B	Method Blank		1
			54400100	Laboratory Fortified Blank		1
				LCS		2
				MS		3
				MSD		2
				Sample Duplicate		1
H12120317	12/18/2012	Manganese, Total	E200.7	ICV		<u> </u>
1112120317	12/10/2012	ivianganese, rotal	SW6010B	Method Blank		1 Detected at 0.05, RL is 0.04, no qualification required, all results greater than 10X the blank result
			34400100	Laboratory Fortified Blank		1
+				LCS		<u>. </u>
				MS		2)
+				MSD		2
H12120317	12/18/2012	Sodium, Total	E200.7	ICV		1
1112120317	12/10/2012	Journal, Fotor	SW6010B	Method Blank		2 Detected at 2, RL is 0.7, No qualification required, all results greater than 10x the blank
			34400100	Laboratory Fortified Blank		1
+				LCS		2)
				MS		
				MSD		3
				Sample Duplicate		1
H12120317	12/18/2012	Nickel, Total	E200.7	ICV		1
	,,		SW6010B	Method Blank		1 Detected at 0.05, RL is 0.04, no qualification required, all results greater than 10X the blank resul
				Laboratory Fortified Blank		1
				LCS		1
				MS		2
				MSD		2
H12120317	12/18/2012	Lead, Total	SW6020	ICV		1
		,				
				Method Blank		Detected at 0.008, RL is 0.003, no qualification required, all results greater than 10X the blank result
				LCS		1
				Laboratory Fortified Blank		1
				MS		1
				MSD		1
H12120317	12/18/2012	Antimony, Total	SW6020	ICV		
	, -,	,,		Method Blank		1 Detected at 0.03, RL is 0.002, no qualification required, all results were non-detect
				LCS		1
				Laboratory Fortified Blank		1
				MS		1 % Rec - 48, Spike recovery outside of advisory limits, all results were non-detect, qualify as U.
						1 % Rec - 44, RPD - 7.8, Spike recovery outside of advisory limits, all reuslts were non-detect, qualify as UJ
114.24.2024.7	40/40/0	Calanium Tak !	CMCO2O	MSD		1 /o nec - 44, nr v - 7.0, Spike recovery outside of advisory littles, all redsits were non-detect, quality as OJ
H12120317	12/18/2012	Selenium, Total	SW6020	ICV		
				Method Blank		1 Detected at 0.04, RL is 0.007, no qualification required, all results were not-detect
				LCS		1
				Laboratory Fortified Blank		1
1				MS		1
<u> </u>				MSD		1

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H12120317		Thallium, Total	SW6020	ICV		1
	,,	,		Method Blank		= <u> </u>
				LCS		<u>-</u>
				Laboratory Fortified Blank		<u>. </u>
				MS		<u>. </u>
				MSD		1
H12120317	12/19/2012	Vanadium, Total	E200.7	ICV		<u> </u>
1112120317	12/10/2012	variaulum, rotai	SW6010B	Method Blank		<u> </u>
			3000108	Laboratory Fortified Blank		
				LCS		
				MS		2
				MSD		
						2
H12120317	12/18/2012	Zinc, Total	E200.7	ICV		
			SW6010B	Method Blank		1 Detected at 0.2, RL is 0.1, no qualification required, all results greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		2
				MSD	:	2
H12120317	12/18/2012	Mercury, Total	SW7471A	ICV	:	1
				CCV	:	2
				Method Blank		Detected at 0.002, RL is 0.0004, no qualification required, all results not-detect
				LCS	:	1
				MS	:	1
				MSD		1
H12120317	12/18/2012	1/3 Bar Moisture	SSSA-pt4	LCS		1
				Sample Duplicate		1
H12120317	12/18/2012	15 Bar Moisture	SSSA-pt4	LCS		1
				Sample Duplicate		1
·						
H13010211	1/16/2013	Silver, Total	SW6020	ICV		1
	, ,			Method Blank		Detected at 0.03, RL is 0.02, no qualification required, result is greater than 10X the blank result
				LCS		1
				Laboratory Fortified Blank		1
				MS		<u>-</u>
				MSD		±1 1
H13010211	1/16/2012	Aluminum, Total	E200.7	ICV		1
1113010211	1/10/2013	Aldillilalli, Total	SW6010B	Method Blank		<u> </u>
			34400108	Laboratory Fortified Blank		1
				LCS		1
				LCS		
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MS		1 data shall be reported unflagged The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
1142040244	. / /		5200 7	MSD		1 data shall be reported unflagged
H13010211	1/16/2013	Arsenic, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MS		1 data shall be reported unflagged
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MSD		1 data shall be reported unflagged

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H13010211		Barium, Total	E200.7	ICV		1
		,	SW6010B	Method Blank		1 Detected at 0.04, RL is 0.02, no qualification required, result is greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		1 % Rec - 137, Spike recovery outside of advisory limits, qualify detected results as J+
				MSD		1 % Rec - 126, RPD - 2.7, Spike recovery outside of advisory limits, qualify detected results as J+
H13010211	1/16/2013	Berrylium, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Calcium, Total	E200.7	ICV		1
			SW6010B	Method Blank		1 Detected at RL of 3, no qualification required, result is greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated, 1 data shall be reported unflagged
				INIS		The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated,
				MSD		1 data shall be reported unflagged
H13010211	1/16/2013	Cadmium, Total	E200.7	ICV		1
1110010211	1/10/2013	caaman, rota	SW6010B	Method Blank		1
			51100105	Laboratory Fortified Blank		1
				LCS		1
				MS		
				MSD		
H13010211	1/16/2013	Cobalt, Total	E200.7	ICV		1
	_, _, _,		SW6010B	Method Blank		- 1
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Chromium, Total	E200.7	ICV		1
	, , ,	, , , , , , , , , , , , , , , , , , , ,	SW6010B	Method Blank		1 Detected at 0.1, RL is 0.07, no qualification required, result is greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Copper, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Iron, Total	E200.7	ICV		1
			SW6010B	Method Blank		1 Detected at 0.9, RL is 0.7. no qualification required, result is greater than 10X the blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated, 1 data shall be reported unflagged
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated,
1				MSD		1 data shall be reported unflagged

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
H13010211		Potassium, Total	E200.7	ICV	1	1
1113010211	1/10/2013	r occosionny rocci	SW6010B	Method Blank		1
			51100105	Laboratory Fortified Blank		1
				LCS		1
				MS		1 % Rec - 135, Spike recoveries outside of advisory limits, qualify detected results as J+
				MSD		1 % Rec - 129, Spike recoveries outside of advisory limits, qualify detected results as J+
H13010211	1/16/2012	Magnesium, Total	E200.7	ICV		1
H13010211	1/10/2013	iviagnesium, rotai	SW6010B	Method Blank		1
			34400109	Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
				INISD		1
	. / /		15000 7			
H13010211	1/16/2013	Manganese, Total	E200.7	ICV		1
			SW6010B	Method Blank		1 Detected at 0.07, RL is 0.04, no qualification required, result is greater than 10X the blank
				Laboratory Fortified Blank		1
				LCS		1
					1	The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MS		1 data shall be reported unflagged
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MSD		1 data shall be reported unflagged
H13010211	1/16/2013	Sodium, Total	E200.7	ICV		1
			SW6010B	Method Blank		1 Detected at 4, RL is 0.7, no qualification required, result is greater than 10X blank result
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Nickel, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
				MS		1
				MSD		1
H13010211	1/16/2013	Lead, Total	E200.7	ICV		1
			SW6010B	Method Blank		1
				Laboratory Fortified Blank		1
				LCS		1
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MS		1 data shall be reported unflagged
						The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated
				MSD		1 data shall be reported unflagged
H13010211	1/16/2013	Antimony, Total	SW6020	ICV		1
	_,,	,,		Method Blank	1	1 Detected at 0.03, RL is 0.002, no qualification required, result was non-detect
				LCS	1	1
				Laboratory Fortified Blank	1	1
				MS	1	1 % Rec - 35, Spike recoveries outside of advisory limits, non-detect result qualified as U.
				MACD	1	1 % Rec - 36, Spike recoveries outside of advisory limits, RPD - 2.5, non-detect result qualified as UJ
	4/40/	61 . 7.1	SHICODO	MSD		1 No nec - 30, Spike recoveries outside of advisory littles, NPD - 2.3, Hott-detect result qualified as UJ
H13010211	1/16/2013	Selenium, Total	SW6020	ICV		
				Method Blank		1 Detected at 0.03, RL is 0.007, no qualification required, result was non-detect
				LCS		1
				Laboratory Fortified Blank	ļ	1
				MS	ļ	1
				MSD		1
H13010211	1/16/2013	Thallium, Total	SW6020	ICV		1
				Method Blank		1
	·			LCS		1

Work Order Number	Date Sampled	Analysis	Analytical Method	Type of QA/QC	# of Samples	Result*
				Laboratory Fortified Blank	1	1
				MS	1	
				MSD	1	1
H13010211	1/16/2013	Vanadium, Total	E200.7	ICV	1	I
			SW6010B	Method Blank	1	l
				Laboratory Fortified Blank	1	
				LCS	1	
				MS	1	
				MSD	1	<u>I</u>
H13010211	1/16/2013	Zinc, Total	E200.7	ICV	1	
			SW6010B	Method Blank	1	<u>I</u>
				Laboratory Fortified Blank	1	
				LCS	1	l
				MS	1	The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated, data shall be reported unflagged
				MSD		The analyte level was greater than 4X the spike level. In accordance with the method % recovery is not calculated, data shall be reported unflagged
H13010211	1/16/2013	Mercury, Total	SW7471A	ICV	1	[
	, , , , , , , , , , , , , , , , , , , ,			CCV	1	
				Method Blank	1	Detected at 0.002, RL is 0.0009, no qualification required, result was non-detect
				LCS	1	
				MS	1	1
				MSD	1	1

 $[\]ensuremath{^*}$ - If the cell is blank, results were within the laboratory control limits

ICV- Initial Calibration verification Standard

CCV- Continuing Calibration verification Standard

LBF-Laboratory Fortified Blank

LCS - Laboratory Control Sample

MS-Sample Matrix Spike

MSD-Sample Matrix Spike Duplicate

RL - Reporting Limit

RPD - Relative Percent Difference

ND - Not Detected

TABLE G-3
Summary of Laboratory QA/QC Results and Resulting Qualifications
UBMC Section 35 Design Investigation

Work Order		Analysis	Analytical Method	Type of QA/QC	# of Samples	Analytical Result	RL or Acceptable	Qualification Results	
Number	Date Sampled						Range		
H12120317	12/18/2012	Calcium - Saturated paste	SW6010B	Method Blank	1	0.002	0.001	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Calcium	SW6010B	Method Blank	1	0.04	0.02	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Available Potassium	SW6010B	Method Blank	1	0.8	0.02	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Sodium	SW6010B	Method Blank	1	0.7	0.09	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Cation Exchange Capacity	SW6010B	Method Blank	1	0.06	0.008	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Silver	SW6010B, SW6020	Method Blank	2	0.02 and 0.03	0.02	S35-CS-01 and 13354:TP107 (9-10') qualified with J+	
H12120317	12/18/2012	Total Arsenic	SW6020	Method Blank	1	0.02	0.006	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Barium	SW6010B	Method Blank	1	0.02	0.02	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Iron	SW6010B	Method Blank	1	4	0.07	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Potassium	SW6010B	Method Blank	1	3	1	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Potassium	SW6010B	MS	2	148%	75-125%	All results qualified with J+	
H12120317	12/18/2012	Total Manganese	SW6010B	Method Blank	1	0.05	0.04	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Sodium	SW6010B	Method Blank	2	ND and detected at 2	0.7	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Nickel	SW6010B	Method Blank	1	0.05	0.04	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Lead	SW6020	Method Blank	1	0.008	0.003	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Antimony	SW6020	Method Blank	1	0.03	0.002	All results are non detect, no qualification necessary	
H12120317	12/18/2012	Total Antimony	SW6020	MS	1	48%	75-125%	All results qualified with UJ	
H12120317	12/18/2012	Total Selenium	SW6010B	Method Blank	1	0.04	0.007	All results are non detect, no qualification necessary	
H12120317	12/18/2012	Total Zinc	SW6010B	Method Blank	1	0.2	0.1	All results greater than 10X detection, no qualification necessary	
H12120317	12/18/2012	Total Mercury	SW7471A	Method Blank	1	0.002	0.0004	All results are non detect, no qualification necessary	
H12120317	12/18/2012	Total Mercury	Holding Time			approx 69 days	28 days	Receiving temperature was above accepted range, all results qualified with UJ	
H12120317	12/18/2012	Total Mercury	Temperature			18.4°C	4°C ± 2°C	Receiving temperature was above accepted range, all results qualified with UJ	
H13010211	12/18/2012	Total Barium	SW6010B	Method Blank	1	0.04	0.02	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Barium	SW6010B	MS	1	137%	75-125%	Result qualified with J+	
H13010211	12/18/2012	Calcium	SW6010B	Method Blank	1	3	3	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Chromium	SW6010B	Method Blank	1	0.1	0.07	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Iron	SW6010B	Method Blank	1	0.9	0.7	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Potassium	SW6010B	MS	1	135	75-125%	Result qualified with J+	
H13010211	12/18/2012	Total Manganese	SW6010B	Method Blank	1	0.07	0.04	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Sodium	SW6010B	Method Blank	1	4	0.7	Result is greater than 10X detection, no qualification necessary	
H13010211	12/18/2012	Total Antimony	SW6020	Method Blank	1	0.03	0.002	Result are non detect, no qualification necessary	
H13010211	12/18/2012	Total Antimony	SW6020	MS	1	35%	75-125%	Result qualified with UJ	
H13010211	12/18/2012	Total Selenium	SW6020	Method Blank	1	0.03	0.007	Result are non detect, no qualification necessary	
H13010211	12/18/2012	Total Mercury	SW7471A	Method Blank	1	0.002	0.0009	Result are non detect, no qualification necessary	
H13010211	12/18/2012	Total Mercury	Holding Time			approx 97 days	28 days	Receiving temperature was above accepted range, result qualified with UJ	
H13010211	12/18/2012	Total Mercury	Temperature			14.5°C	4°C ± 2°C	Receiving temperature was above accepted range, result qualified with UJ	

MS-Sample Matrix Spike

MSD-Sample Matrix Spike Duplicate

RL - Reporting Limit

- UJ The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise
- J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ The result is an estimated quantity, but the result may be biased high

ND - Not detected

TABLE G-4 DUPLICATE SAMPLE COMPARISON UBMC Section 35 Design Investigation

	S35-CS-01	S35-BG-990	RPD
Sample Type	Natural	Duplicate	
Sample Generation			
Date	12/18/2012	1/16/2013	
Silver, Total	1	2	67
Aluminum, Total	16300	16300	0
Arsenic, Total	21	21	0
Barium, Toatal	254	269	6
Berrylium, Total	<1	<1	NCU
Calcium, Total	2300	2300	0
Cadmium, Total	1	<1	NC1
Cobalt, Total	6	7	15
Chromium, Total	19	21	10
Copper, Total	113	103	9
Iron, Total	16000	16300	2
Potassium, Total	2280	2070	10
Magnesium, Total	3570	3680	3
Manganese, Total	603	718	17
Sodium, Total	68	72	6
Nickel, Total	14	14	0
Lead, Total	548	630	14
Antimony, Total	<1	<1	NCU
Selenium, Total	<1	<1	NCU
Thallium, Total	<1	<1	NCU
Vanadium, Total	21	19	10
Zinc, Total	274	267	3
	<0.50	<0.50	NCU

RPD - Relitive Percent Difference

NCU - Not Calculated because both of the samples were reported at below detection

NC1 - Not Calculated because one of the samples was below detection

< - result is less than reporting limit

ATTACHMENT 1

Data Qualifier Flags - Energy Labs

RL – analyte reporting limit

QCL – quality control limit

S – spike recovery outside of advisory limits

ND – Not detected at the reporting limit

R – RPD exceeds advisory limit

A – The analyte level was greater than 4 times the spike livel. In accordance with the method % recovery is not calculated.

Data Validation Flags

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- **J** The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- **J**+ The result is an estimated quantity, but the result may be biased high.
- **J-** The result is an estimated quantity, but the result may be biased low.
- **UJ** The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- **R** The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.